DAIRNet

2021
annual report

PARTNERS

Australian Government
Department of Defence

DEFENCE INDUSTRY & INNOVATION
NEXT GENERATION
TECHNOLOGIES FUND

University of South Australia

welcome to DAIRNet

Professor Jason Whittle

The Defence Artificial Intelligence Research Network, DAIRNet, brings together thought leaders from Defence, academia and industry to provide strategic advice and innovative AI solutions to Defence, and to support the next generation of Defence AI researchers.

DAIRNet provides scale and focus to researchers across the academic sector to tackle AI problems relevant to Defence, and increase Australia's sovereign capabilities in AI. DAIRNet also connects fundamental researchers with the Defence AI Centre, Defence Technology Acceleration Collaboration-laboratory and industry.

DAIRNet was formed in April 2021. Along with developing the governance and operational structures for the network, we established a multi-party agreement between six Australian universities:

- Monash University
- RMIT University
- Swinburne University of Technology
- University of Adelaide
- University of New South Wales
- University of South Australia.

These universities form the foundation membership of DAIRNet and the basis of a truly multi-institutional and national approach to providing AI solutions for Defence. Following a call for projects in October 2021, we are set to announce several new projects in early 2022.

A highlight of 2021 was our inaugural DAIRNet Symposium in November. The event shone a light on current AI research and future needs of Defence. More than 120 individuals from 32 organisations attended the online event, validating the role of DAIRNet and the importance of developing a domestic network of AI practitioners.

Kicking off a national network has been challenging during 2021 with closed borders and so much uncertainty. A big focus for the DAIRNet team in 2022 will be to meet partners, members and other stakeholders face to face, and build on the momentum and interest in our symposium to grow our network.

We are grateful for the support from our partners in the Department of Defence, the Next Generation Technologies Fund (NGTF), the University of South Australia and our foundation members, along with the positive interactions we have had with academics, Defence and industry.

We're pleased to share our achievements (so far) with you and look forward to working together in 2022.

Professor Jason Whittle
Director, DAIRNet

bringing together thinking in Defence AI

DAIRNet was formed out of the Intelligent Decision Superiority program. It aims to establish and sustain a community of AI researchers working together in an environment that stimulates new ideas and knowledge, and supports evaluation, testing and integration of novel AI technologies for Defence. This is achieved through four pathways.
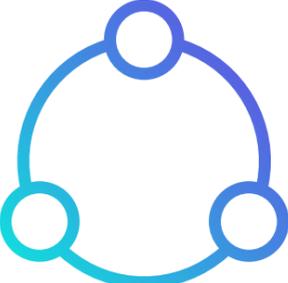
collaboration

DAIRNet brings together thought leaders to provide strategic advice to Defence on innovations in the AI sector. We provide a vehicle for teams of researchers to find novel solutions to complex and rapidly evolving AI problems relevant to Defence.
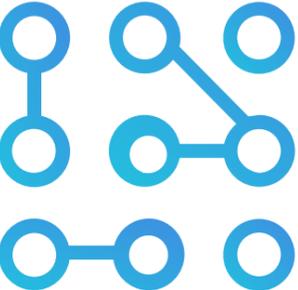
AI research and development

DAIRNet manages research programs with Department of Defence to develop AI solutions that are game-changing and provide a significant enhancement to Defence capability.
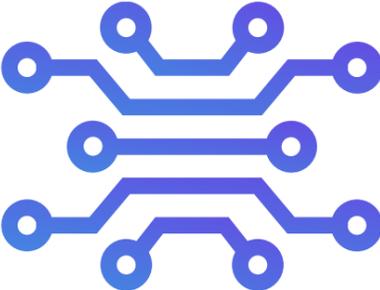
education and outreach

We are building an AI 'talent pipeline' through professional development events, short courses, and Master and PhD programs that link with DAIRNet projects and activities and address future workforce needs.

knowledge translation

DAIRNet informs Defence on key AI research and development directions to support national resilience. Through collaboration, we can understand, develop novel ideas, and integrate this knowledge into Defence and other end-users.

contents

snapshot of 2021

april

Partnership between the University of South Australia and the Department of Defence to manage DAIRNet

august

Established the DAIRNet Governance Panel, Management Committee, Management Team and Technical Advisory Panel

october

Governance terms of reference endorsed

november

A fourth research call theme was released, with projects due to commence in early 2022

december

19 AI research projects have been funded, equating to $6.5 million to date

july

Core management team recruited

september

Commenced engagement with our key stakeholders within Defence, universities, State Government, other Defence networks and industry

october

Established a multi-party agreement between DAIRNet foundation members to begin building a collaborative network of researchers across Australia

november

Inaugural DAIRNet Symposium attended by more than 125 individuals representing 32 organisations across Defence, academia and industry

Official launch of DAIRNet by the Chief Defence Scientist, Professor Tanya Monro

current research themes

Each round of projects focuses on an AI theme and issue currently faced by Defence and the wider community. We continually consult with our stakeholders to identify current gaps and issues facing Defence. Four calls for research projects have been released to date.

patterns in noisy and dynamic data

Status: projects currently being initiated

Automation and AI are tools that can improve the quality and speed of processing, disseminating, exploiting, analysing, fusing and integrating real-time tactical systems data and information to provide decision superiority to Defence. Information (Data) patterns may be unclear and may indicate anomalies that need to be investigated or events of interest such as indications of a pandemic or an attack. This research investigates how to use and combine data from multiple sources, in diverse forms, in large volumes and collected at varied rates to find these patterns.

distributed multi-domain networks

Projects complete: 4   Projects in progress: 3

The distributed multi-domain networks theme aims to effectively and efficiently process and integrate information and to support real-time or near real-time decision superiority. It is expected that the information integration architectures will need to be distributed, resilient and agile.

human – AI interaction

Projects complete: 4   Projects in progress: 2

Decision superiority enables us to make better decisions faster than an adversary. Automation is imperative to help analysts, commanders and warfighters deal with the overwhelming volume, velocity, variety and uncertain veracity of available information.

Researchers are investigating human-artificial intelligence interactions, with a focus on the design of:

- AI systems to collaborate with human decision making in high risk, time critical environments
- exploratory AI systems for interactive sense-making
- distributed human and AI teams.

autonomous processing and reasoning

Projects complete: 4   Projects in progress: 2

Today, much of the fusion and sense-making of information to make a decision happens in the analyst's head. If these processes are to be reliably automated, the meaning and uncertainty of the information must be available and amenable to automated reasoning, the automated reasoning system must be able to justify its conclusions to decision-makers, and it must be able to answer "why" questions.

Research proposals were sought in the area of autonomous processing and reasoning, with a focus on:

- Multi-intelligence content analytics
- Extracting increased information from images and videos
- Reasoning from multiple content types
- Cognitive information fusion.
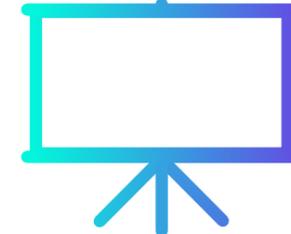
DAIRNet symposium

The inaugural DAIRNet Symposium was held on 18th November. Initially planned as a face-to-face event at the Defence Technology Acceleration Collaboration-laboratory (DTAC), with the COVID-19 restrictions in the eastern states, the symposium transitioned to a virtual event.

4 sessions

21 speakers or panelists
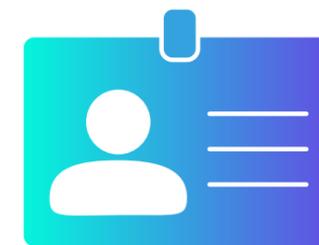
12 presentations

185 registrations

124 individuals or groups logged into the event

62-76 individuals or groups logged into each session

32 different organisations were represented in the audience

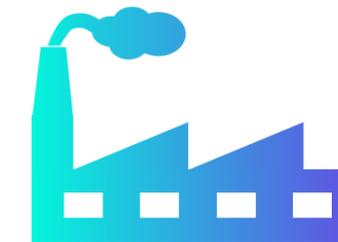The audience was from across Australia

There was representation from Defence, universities, industry and government

48% of attendees were from Defence

39% of attendees were from universities

8% of attendees were from industry

DAIRNet launch

"I think our focus needs to be on making it as easy as possible for you to get access to the kinds of problems we need to solve; for you to help us build Defence's understanding and awareness of emerging trends in AI and emerging opportunities; and for us to help the work you do be impactful through the way it's applied to Defence and Defence data.

It's my absolute pleasure to formally launch the Defence AI Research Network. I really look forward to working with you to make sure that your work has pull-through and impact for Australia, and through our allies, we can build outcomes that allow us to thrive and not just survive in this contested information environment."

Professor Tanya Monro
Chief Defence Scientist
DAIRNet Symposium, 18 Nov 2021

symposium highlights

increased accessibility

Moving the event online increased the reach and accessibility of the symposium, hence a larger and more diverse audience was able to attend. The event was supported through multiple channels, including Defence networks, Defence representatives within foundation member universities, and the Australian Defence Science Universities Network (ADSUN).

significant interest in Defence AI and DAIRNet

There were 185 registrations and 67% attendance from these registrations (not considering groups viewing from a single login), demonstrating there is significant interest in the Defence AI space and the importance of DAIRNet's role in developing a domestic network of AI-practitioners. Along with attendance of the symposium, marketing the symposium increased the awareness of DAIRNet.
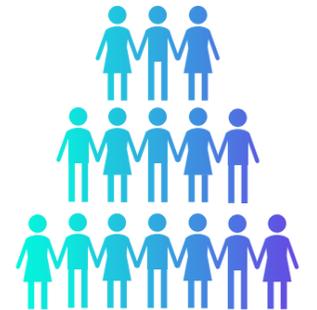
diversity of speakers

The program was designed to cover the bench to product pipeline, with representation from researchers from universities and Defence, pilot and product development within industry, and end-users in Defence. All of the DAIRNet university members and Defence (DSTG, DAIC, CIOG) were represented among the speakers.

governance

The governance and management structure of DAIRNet ensures representation from all relevant stakeholders, including Defence, DAIRNet management team and foundation university members. As the DAIRNet network grows, committees and membership will evolve to ensure representation of our stakeholders.

management team

The Management Team implements decisions made by the Management Committee and coordinates the network on behalf of the Department of Defence. The team is the main point of contact for universities, researchers, and other relevant stakeholders.

DAIRNet is managed by a multi-disciplinary team from the University of South Australia and the Defence Science and Technology Group (DSTG), part of the Department of Defence.

- Prof Jason Whittle, Director of DAIRNet
- Dr Mel McDowall, Senior Manager
- Ms Aleesa Clough, Project Officer
- Dr Ross Kyprianou, DAIRNet Engagement Lead, DSTG
- Mr Paul Heuer, Specialist Science Advisor, DSTG

Members of the DAIRNet Management Team attending the University of South Australia's Defence and Industry Research Symposium in November (from left to right): Dr Mel McDowall (Senior Manager DAIRNet), Mr Paul Heuer (Specialist Science Advisor - AI, DSTG), Prof Jason Whittle (Director DAIRNet) and Ms Aleesa Clough (Project Officer DAIRNet).
Photo: David Kilmartin, Department of Defence.

governance

governance panel

The Governance Panel provides strategic direction to the DAIRNet Management Committee and ensures that DAIRNet's activities align with the broader Defence AI strategic direction. Members of the Governance Panel represent DAIRNet, DSTG and key stakeholders within the Department of Defence.

Members

- Chair: Dr Brian Hanlon, Senior Principal Scientist for AI, DSTG
- AIRCDRE Jason Begley, DGJC4, Joint Capabilities Group
- COL Kirk Johnstone, ED-EIM, Chief Information Officer Group
- AIRCDRE Di Turton, DGICI, Defence Intelligence Group
- Prof Jason Whittle, Director of DAIRNet, University of South Australia

management committee

The Management Committee coordinates implementation of the direction provided by the Governance Panel. The Management Team and the DAIRNet panels, committees and working groups report to the Management Committee. It also provides the primary link between DAIRNet and the Department of Defence.

Members

- Chair: Prof Jason Whittle, Director of DAIRNet, University of South Australia
- Dr Ralph Gailis, Specialist Science Advisor for AI, DSTG
- Dr Brian Hanlon, Senior Principal Scientist for AI, DSTG
- Mr Paul Heuer, Specialist Science Advisor for AI, DSTG
- Dr Ross Kyprianou, DAIRNet Engagement Lead, DSTG
- Dr Mel McDowall, Senior Manager, DAIRNet, University of South Australia
- Mr Jim Mitkas, Director Strategic Engagement, National Partnerships, Science Partnerships, Science Engagement & Impact Division, DSTG
- Prof Markus Stumptner, Chair of DAIRNet Technical Advisory Panel and Director, Industrial AI, University of South Australia

technical advisory panel

The Technical Advisory Panel provides guidance on the research themes and activities undertaken within the network, identifies synergies and complementary research, and ensures the quality of research. The Technical Advisory Panel will also play a critical role in the development and assessment of research calls and activities conducted within the network, such as education and outreach and the identification of trends and gaps in sovereign AI. The current members of the panel represent DSTG and the DAIRNet foundation members.

Members

- Chair: Prof Markus Stumptner, Director, Industrial AI, University of South Australia
- Dr Axel Bender, STaR Shot Leader, Operating in CBRN Environments, DSTG
- Prof Christopher Fluke, Swinburne University of Technology
- A/Prof Yuan-Fang Li, Monash University
- Dr Ralph Gailis, Specialist Science Advisor for AI, DSTG
- Prof Matt Garratt, University of NSW Canberra
- Dr Glennn Moy, Research Specialist, AI and Machine Learning, DSTG
- Dr Daniel Salmond, Group Leader, Information Warfare Command & Control, DSTG
- Prof John Thangarajah, RMIT University
- Prof Michael Webb, University of Adelaide

members

Universities and industry that enter a collaborative arrangement with Defence regarding DAIRNet become members. Six universities are the foundation members of DAIRNet: Monash University, RMIT University, Swinburne University of Technology, The University of Adelaide, UNSW and University of South Australia.

MONASH University

THE UNIVERSITY of ADELAIDE
SUB CRUCE LUMEN

RMIT UNIVERSITY

UNSW
SCIENTIA
CORDE MANU ET MENTE

SWINBURNE UNIVERSITY OF TECHNOLOGY

University of South Australia
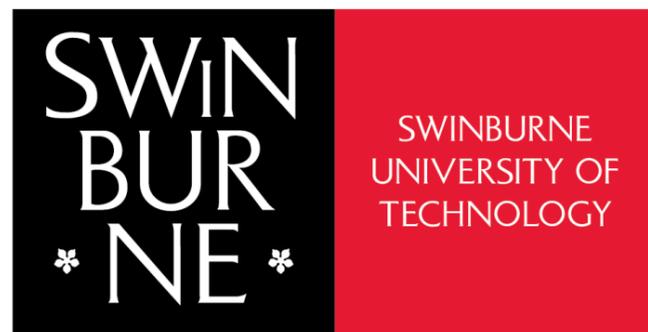
By **collaborating,** we can **understand,** develop **novel ideas,** and **integrate** this knowledge into the Defence ecosystems.

DAIRNet

for more information

Email us at: DAIRNet@unisa.edu.au

Follow us:

PARTNERS

DAIRNet is an initiative of the Department of Defence through the Next Generation Technologies Fund (NGTF), and is managed in partnership with the University of South Australia.

Australian Government

Department of Defence

DEFENCE INDUSTRY & INNOVATION

NEXT GENERATION TECHNOLOGIES FUND

University of South Australia