DAIRNet

2022 annual report

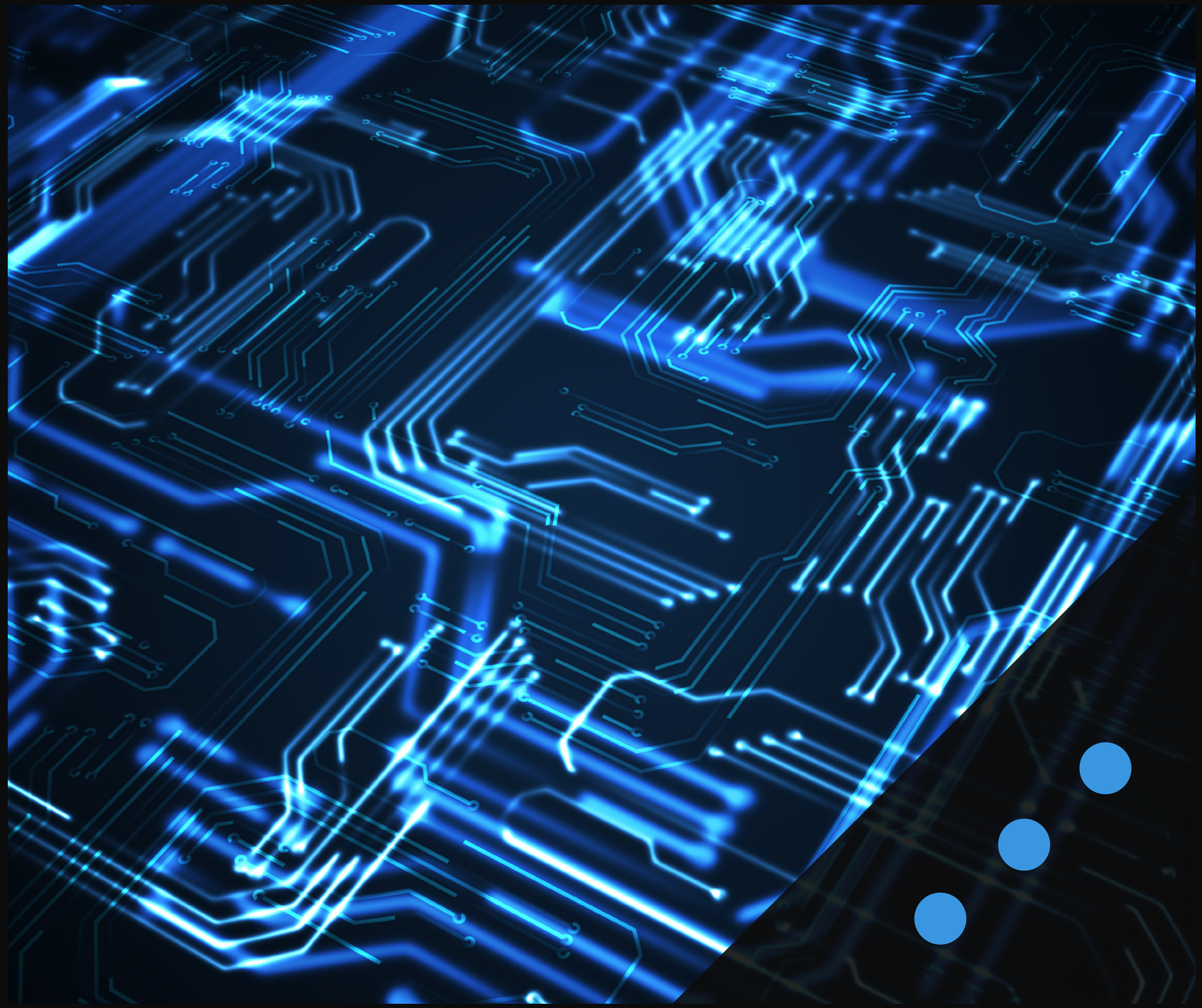
PARTNERS

Australian Government
Defence

NEXT GENERATION TECHNOLOGIES FUND

University of South Australia

The DAIRNet office is located on lands of the Kaurna people. DAIRNet acknowledges the Kaurna people and the Traditional Owners of Country throughout Australia and the continuing connection to lands, waters and communities. We pay our respect to Aboriginal and Torres Strait Islander cultures; and to Elders both past and present and emerging leaders.



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director's report

Dr Mel McDowall

Dear colleagues, supporters, and members of the Defence AI ecosystem,

It is my pleasure to present to you our annual report for 2022, DAIRNet's first full year of operations.

There is a reason we are called the "Defence AI Research Network". DAIRNet aims to develop and support a community of practice for the Defence AI ecosystem, from academics and researchers, through to end users. From concept to capability.

A major achievement in 2022 was the activation of our strategy. Our key objectives that drive DAIRNet activities include:

- People and talent: sustain a talent pipeline to grow domestic AI capabilities and Defence AI ready specialists
- Research impact: supporting R&D and providing the platform in which AI-users work alongside researchers and developers
- Integration and evaluation: bringing together and supporting the broader Defence and AI ecosystems.

DAIRNet was fortunate to assist with many activities that support our objectives, including the awarding of 39 new research projects, hosting of events, attendance of conferences such as ADSTAR, supporting 5 early and mid-career women in AI, the development of an AI Landscape report, and our first AI-literacy course.

Thank you to everyone who has reached out to learn more about DAIRNet and to help inform how we can best support Defence AI. We have enjoyed engaging with different members of the community, hearing about their research, interests, needs and solutions and look forward to supporting the network in the future.

2023 is already shaping up to be an exciting one as we activate more of our initiatives and learn more about how DAIRNet can support initiatives of the Defence Strategic Review and ASRA.

I would like to sincerely thank alumni members of the DAIRNet management team, including our founding Director, Prof Jason Whittle; DAIRNet architects, Dr Brian Hanlon and Mr Paul Heuer; and Dr Ross Kyprianou, DSTG Liaison.

Also the ongoing support from Mr Andrew Seedhouse (Chief of Cyber, Intelligence and National Security Division), NGTF, our Governance panel, Technical Advisory Panel, Management Committee, and the broader Defence AI ecosystem.

I look forward to continuing our work and making even more significant contributions to our field in the coming year.

Dr Mel McDowall
Director, DAIRNet

sponsor's report

AI plays an important role in Defence by helping to identify and respond to emerging threats, as well as enhancing decision-making and operational capabilities. As technology advances, potential adversaries are also investing in AI, so it's crucial for us to innovate and stay ahead of the curve.

Additionally, AI-powered autonomous systems can assist in a variety of Defence applications, from surveillance and reconnaissance to logistics and battlefield support. By leveraging AI and automation, Defence organisations can achieve greater efficiency, accuracy, and agility in their operations.

The robustness of AI technology relies on two aspects: continuous innovation of platforms, and the quality and quantity of data.

Innovation is essential for Defence to keep up with the rapidly evolving technology landscape and remain competitive against emerging threats.

Meanwhile, data plays a vital role in AI, and the ability to collect and analyse large amounts of data is crucial for the success of AI in Defence. Additionally, autonomous systems powered by AI can perform critical tasks without human intervention, making them extremely useful in areas such as surveillance, reconnaissance, and logistics.

The adoption of AI in Defence can offer significant advantages, but it's also important to consider that AI is a system. To adopt a new system, Defence needs to consider: how to transition the technology from concept to capability, responsible AI, infrastructure, data quality, appropriate use, and training and upskilling of future users. This ecosystem is diverse, and the best outcomes will be achieved when the potential end-users work alongside the innovators and the developers.

DAIRNet is the chosen path for new ideas and experimentation to start that innovation pathway for Defence in AI. The Network serves as a valuable platform for collaboration on new AI ideas and technologies within the Defence AI ecosystem, along with education and integration.

Overall, AI has immense potential to revolutionise Defence, and leveraging its capabilities can provide a significant advantage in terms of threat detection, decision-making, and operational efficiency.

Mr Andrew Seedhouse
Chief of Cyber Intelligence and National Security Division
Defence Science and Technology Group
Department of Defence

Mr Andrew Seedhouse

achievements

39
PROJECTS
COMMENCED

exceeded
550
mailing list
SUBSCRIBERS

26
prototypes
developed

22
organisations
funded

37
projects
completed

more than
$3.3M
research funding
awarded

what is ai?

“Artificial intelligence is the automation of cognition. I mean when we look at artificial intelligence you have two components, one is artificial so that’s man-made systems. So, we will call it artificial because it’s a man-made system or human made system and the other component is intelligence”[1]

1 Participant 13 (university) in Rupa, J, Shardeshmukh, S, and McDowall, M (2023). Unpublished report: Artificial Intelligence (AI) in Australian Labour Market: Emerging workforce skills and challenges for AI ecosystem, p 32.

about DAIRNet

bringing together thinking on defence AI

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.

The DAIRNet Strategy was developed in consultation with key stakeholders within the Defence AI ecosystem and was endorsed by the Governance Panel in June 2022.

our mission

Connecting Defence opportunities with next generation AI solutions

our vision

By empowering innovation and collaboration across diverse national AI capabilities, we will develop safe and secure AI solutions to provide advantages for Defence

our objectives

people & talent

Sustain a talent pipeline to grow domestic AI capability and AI-ready specialists.

research impact

Support R&D and provide the platform in which AI-users work alongside researchers and developers.

integration & evolution

Bring together and support the broader Defence and AI ecosystems.

snapshot of 2022

january

Probity Plan and Conflict of Interest register endorsed

february

6 phase 1 projects awarded funding in the Patterns in Noisy Data call

april

33 AI for Decision Making research agreements executed

may

Website launch

First AI table-top simulation event hosted

june

DAIRNet Strategy endorsed by Governance Panel

Completion of phase 1 Patterns in Noisy Data projects

july

First newsletter published

First Women in AI scholarships awarded

ADSTAR 2022 sponsorship and DAIC breakfast presentation

august

Completion of AI for Decision Making projects

october

Inaugural AI Academy course

november

Presentation of DAIRNet case study to Australian, United Kingdom and United States partners

december

2 agreements executed for Phase 2 of the Patterns in Noisy Data call

AI Landscape report submitted

people and talent

Sustain a talent pipeline to grow domestic AI capability and AI-ready specialists.

- An active community of AI specialists from multiple institutes and at different career stages.
- Creation of the AI Academy to train the next generation of AI specialists and up-skill existing workforces.
- Science communication and outreach to inspire the next generation of AI specialists.

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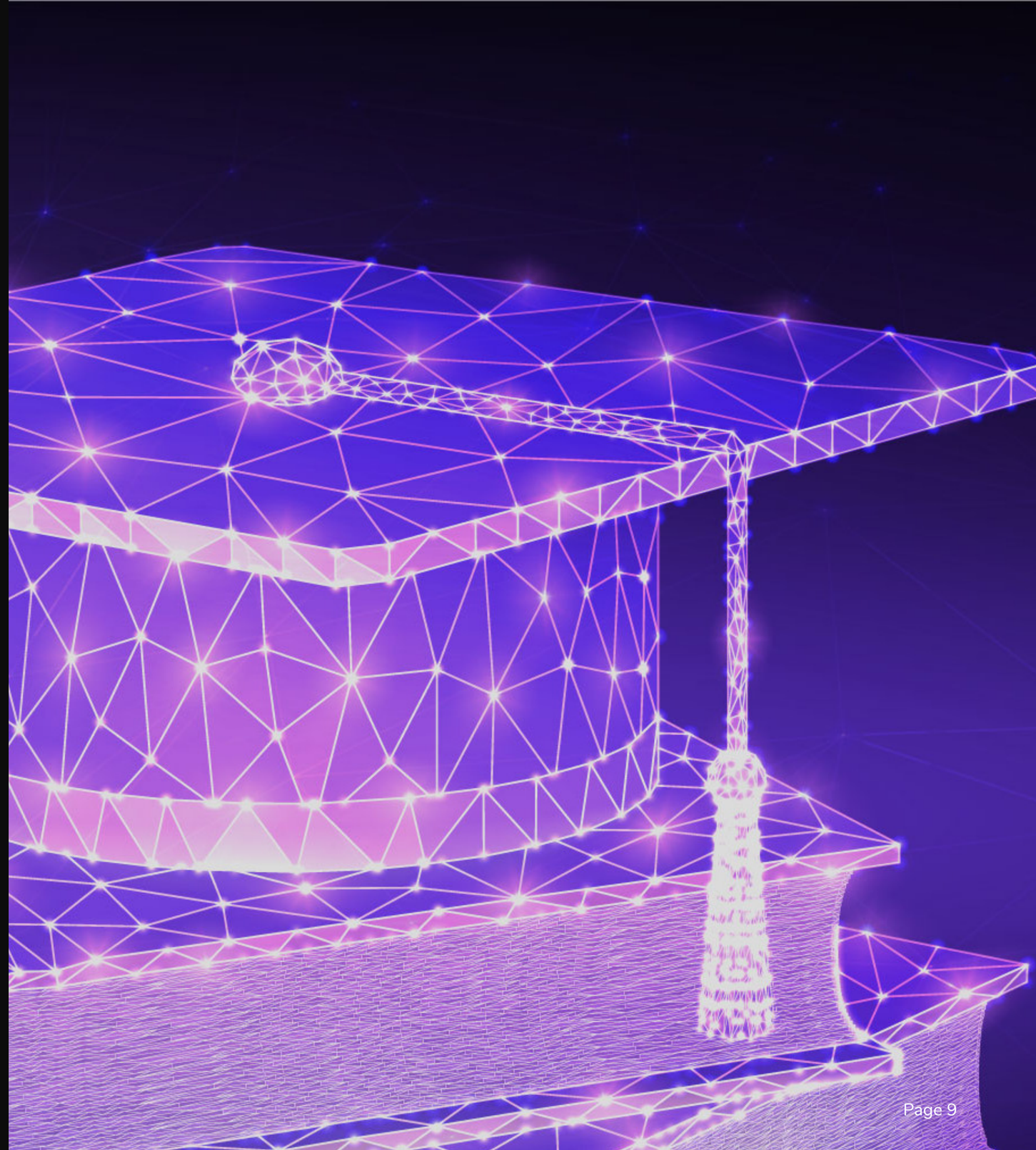
women in ai scholarships 11

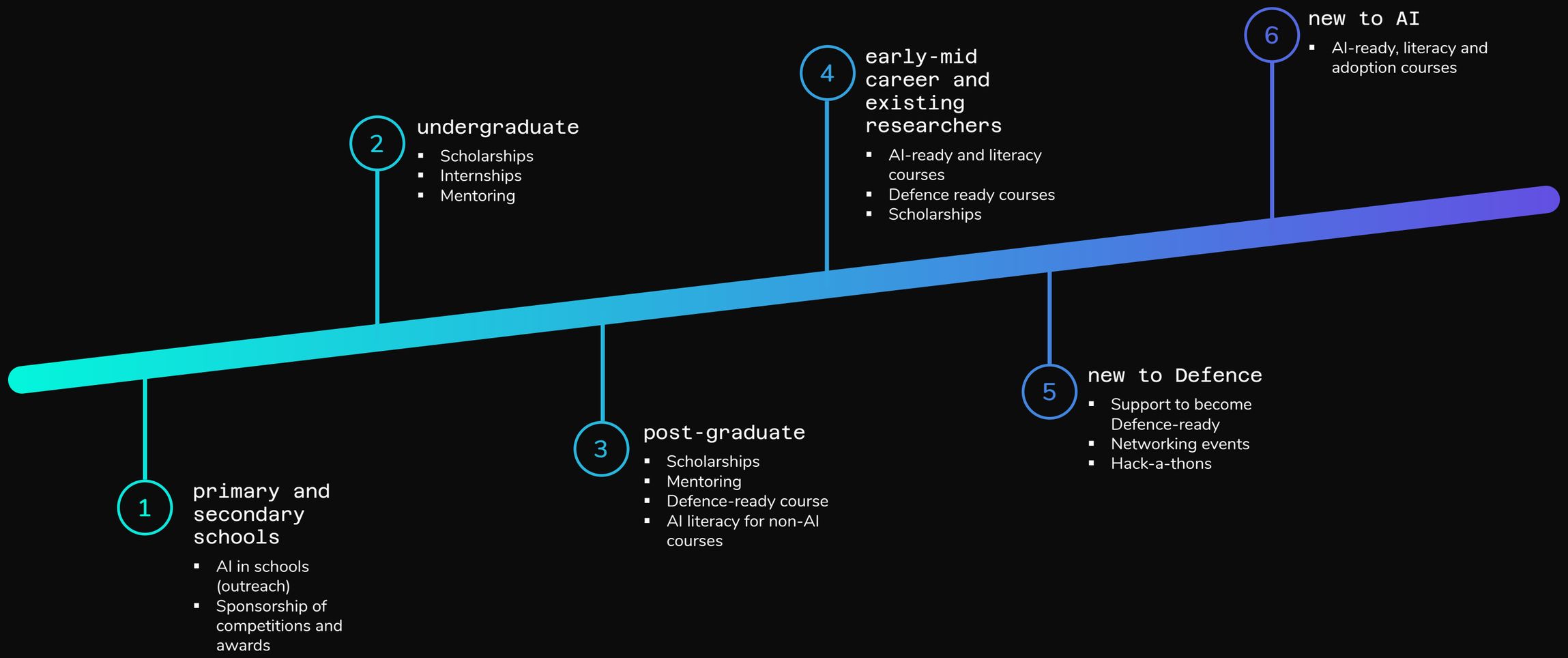
ai academy 14



ai talent pipeline

DAIRNet supports activities that lead to increased AI capability (people AND products) in Australia. DAIRNet aims to support the AI talent pipeline via:

- **immediate:** existing talent post-graduate, early-mid career and existing researchers
- **short-term:** new to AI and/or Defence
- **long-term:** school and undergraduate students.



women in ai scholarships

Through the inaugural Women in AI Scholarships, DAIRNet is proud to have supported five early- to mid-career researchers to attend the ADSTAR Summit 2022 in July. This was a great opportunity to build their networks and help promote their careers in AI and Defence research.

dr aya hussein

Research Associate, UNSW Canberra

My research focuses on combining human and machine intelligence by studying interaction schemes that allow humans to teach machines and to effectively team up with them in the field. Designing effective human-machine teams is critical to operational success as it ensures humans can best utilise machine strengths without over-reliance, such that humans can intervene when machines err.

The key theme of ADSTAR Summit 2022 was resilience. Central to resilience are the concepts of trust and open communication between team members, which I think my research can contribute to by enabling effective machine transparency.

The structure of the event made it easy to meet and talk to new people.

“i’m glad about the amazing people i added to my professional network and the potential collaboration opportunity i have identified”

Dr Aya Hussein

women in ai scholarships

dr yifan liu

Lecturer, School of Computer Science, The University of Adelaide

I focus on efficient AI in Computer Vision. It includes two parts: learning with less computations (a.k.a Edge AI) and learning with fewer labels. These two problems are the fundamental problems for all deep learning systems. How to reduce the labelling and training costs is an indispensable part of the process of AI landing in the industry.

I met other women in AI during the ADSTAR Summit, for example, Kam and Aya. We discussed our own experience of working in AI and spent meaningful time together. I also met new industrial partners during the e-poster and workshop sessions and learned about the needs and funding opportunities for some Defence projects.

“i met new industrial partners and learned about the needs and funding opportunities for some defence projects”

Dr Yifan Liu

dr ariel kam ha lui

Lecturer, College of Business and Law, RMIT

My research interests are interdisciplinary in nature; examining whether, why, and how IT innovations, including AI, impact society (e.g., government policy), environment (e.g., carbon footprint), and firm value (e.g., operational performance and stock price), so that organisations can create competitive advantages and strategic leverage from IT.

It was an honour to be selected as a Women in AI Scholarship recipient. At the ADSTAR Summit, I was exposed to the latest AI Defence-related research and innovation which helped sharpen my AI knowledge and inspire me with new AI research ideas.

women in ai scholarships

dr rebecca morgan

Research Fellow, UniSA STEM, University of South Australia

My current research is focused on self-adaptation in rapidly changing environments through the automated reconfiguration of information systems. In the long term, we aim to support decision-making and reduce the burden on human operators when it comes to understanding and managing complex systems.

Attending ADSTAR provided an excellent opportunity to meet other early-stage researchers outside of my own research facility; and I met some fantastic people.

“i greatly appreciated the opportunity to learn more about Defence research and technology from many different perspectives”

Dr Rebecca Morgan

dr sara webb

Postdoctoral Researcher, Centre for Astrophysics and Supercomputing, Swinburne University of Technology

My current position is supported within the project *Artificial Intelligence as the Most Valuable Player* funded through the Next Generation Technology Fund. My role combines my expertise in data handling and machine learning from astronomy and applies them to new datasets collected from human users. This project aims to investigate the use and role of artificial intelligence (AI) as both a monitor of human interaction and performance in a team, and as a team member itself.

One of the highlights of ADSTAR was seeing how and where my work could be directly related to the Defence science network within Australia. Another invaluable experience was meeting so many like-minded people and other women in STEM. It allowed me to hear about others’ career paths and goals. This was helpful for me as a young researcher in evaluating where I might want to take my career.

Congratulations to Dr Sara Webb, who was named a Superstar of STEM in 2022 by Science & Technology Australia.

ai academy

The DAIRNet AI Academy will train the next generation of AI-specialists and up-skill existing workforces to become AI and Defence ready. The inaugural AI Academy short course, *AI literacies for leadership*, was attended by 22 leaders and future AI users from DSTG on 11 October 2022.

Prof George Siemens and Dr Srecko Joksimovic from the Centre for Change and Complexity in Learning (C3L) facilitated the course with the aim of providing attendees with a landscape of AI concepts and technologies. This included:

- detailed analysis of what should remain the exclusive domain of human cognition and what should be handed over to the machine
- the role of leadership in supporting innovative technologies in complex organisational settings.

The content of the course was tailored from the results of a training needs analysis. An evaluation was conducted to inform future AI Academy planning.

2023 program

Subscribers to the DAIRNet mailing list were asked which topics should be prioritised for the 2023 AI Academy calendar.

The results were:

- AI literacy (33%)
- Ethical and responsible AI (29%)
- How to be ready to work with Defence (15%)
- How to pitch R&D to end users and potential investors (11%)
- Science communication (5%)
- A variety of other topics (totalling 11%).

31 of these respondents volunteered to help plan the 2023 AI Academy program. These volunteers represent universities, Defence and industry from across Australia.

research impact

Support R&D and provide the platform in which end-users work alongside researchers and AI specialists.

- Provide and manage research calls for basic and applied R&D.
- Up-scale funding opportunities through external funding sources.
- Bring the best AI talent together.
- Promote AI commercialisation mindsets.

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2022 research calls

2 research calls

- Patterns in noisy and dynamic data (Next Generation Technologies Fund)
- Artificial Intelligence for Decision Making

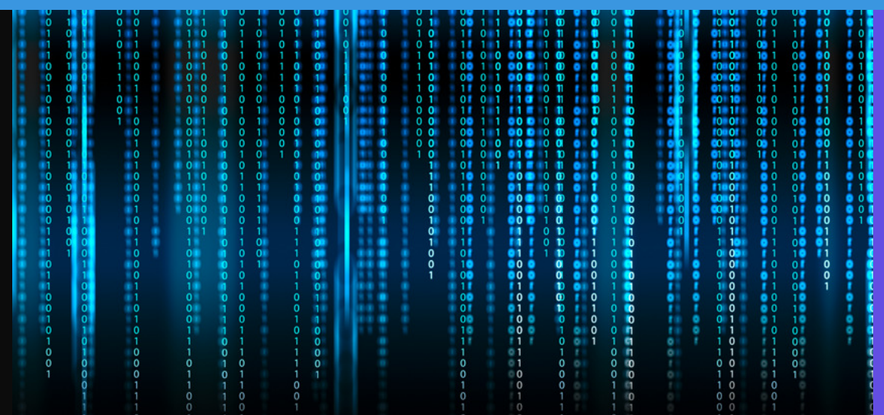
248
applications received

$3.3m
in funding awarded

22 organisations funded

- 18 universities
- 3 Defence small to medium enterprises
- 1 Defence Prime

39
projects commenced



37
projects completed

patterns in noisy and dynamic data

applications received: 33 **projects funded: 6**
projects complete: 4 **projects in progress: 2**

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.

current projects

- Prof Siobhan Banks, University of South Australia, Statistical machine learning algorithm for early detection of infection using data from consumer wearables
- A/Prof Truyen Tran, Deakin University, Coupled self-supervised learning and deep reasoning for improved processing of noisy and dynamic multimodal data from multiple sources

completed projects

- A/Prof Belinda Chiera, University of South Australia, Towards the real-time robust identification of online malicious information using open source intelligence
- Dr Leon Clark, Lockheed Martin Australia Pty Ltd, Graphical interaction representations aiding prognostic health management (GIRaPHMan)
- Prof Matt Duckham, RMIT University, INDEX: Intention and explanation for fusion of uncertain, noisy, and dynamic spatial data
- Dr Simon Williams, The University of Melbourne, Multi-agent coordination for undersea surveillance

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.

current projects

- A/Prof Frank den Hartog, University of New South Wales, Use of SDN for multi-bearer time-sensitive distributed systems in the combat cloud
- A/Prof Hung Nguyen, The University of Adelaide, Machine learning solutions for BGP-based software defined combat clouds
- Dr Matt Selway, University of South Australia, Advanced integrated modelling environments for self-adaptive software systems (AIME)

next generation technologies fund (NGTF)

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.

current projects

- Prof Christopher Fluke, Swinburne University of Technology, Artificial intelligence as the most valuable player: Enabling cyber-human teams to achieve decision superiority
- Prof Anna Ma-Wyatt, The University of Adelaide, Modelling, monitoring and moderating human-AI interaction

autonomous processing and reasoning

projects complete: 4 **projects in progress: 3**

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.

current projects

- Prof Matt Duckham, RMIT University, NEXUS: Explainable and unified spatial reasoning and sensor fusion
- A/Prof Yuan-Fang Li, Monash University, RUSH: Reasoning and learning under soft and hard data
- A/Prof Jamie Sherrah, Australian Institute of Machine Learning, The University of Adelaide, Intelligent decision superiority through vision and language technology

AI for decision making initiative 2022

applications received: 215 **projects funded: 32**
projects complete: 31 **projects in progress: 1**

The initiative was a collaborative project between the Office of National Intelligence and DSTG to fund pilot projects and develop AI and machine learning expertise and capability in areas of significant importance to the Australian defence and national security community. Projects addressed one of 30 challenges.

current project

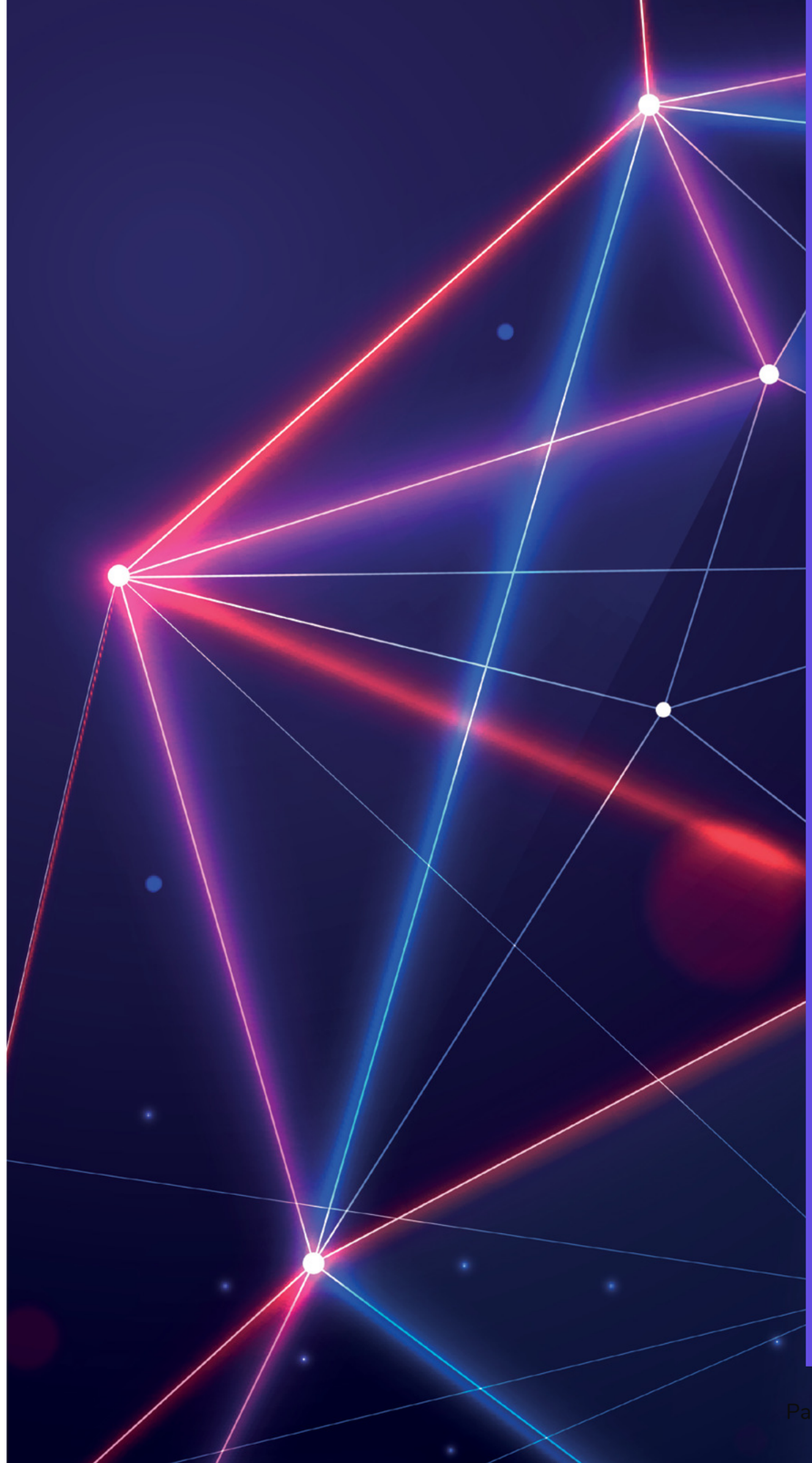
- Prof Li-minn Ang, University of the Sunshine Coast, AI and Signal Processing Models for Extraction of ENF Signals for Video Geo-Localisation and Timestamping from Smartphones

complete projects

- Dr Paul Black, Federation University, Security patch identification using compiled updates and release notes
- Mr Paul Conyngham, Core Intelligence Technologies Pty Ltd, Reward isn't enough: combining promising techniques into a significantly stronger state-of-the-art agent
- A/Prof Richard Dazeley, Deakin University, Application of Generic Actual Argument Model to represent complex decisions and generate narratives
- Prof Ravinesh Deo, University of Southern Queensland, Sequential field tokenisation and type classification
- Dr Colm Flanagan, Hiroco, Mapping agent capability to objective for multi-agent planning
- Prof Clinton Fookes, Queensland University of Technology, A multi-modal deep generative framework for video based identification
- Dr Mingyu Guo, The University of Adelaide, Abstract game prototype for cyber attack/defence
- Dr Mingyu Guo, The University of Adelaide, Tackling the TTCP CAGE challenge using Monte-Carlo planning for large-scale POMDPs
- Dr Markus Hagenbuchner, University of Wollongong, Explainable Graph Neural Network via explicit causality modelling - a proof-of-concept study

complete projects (cont)

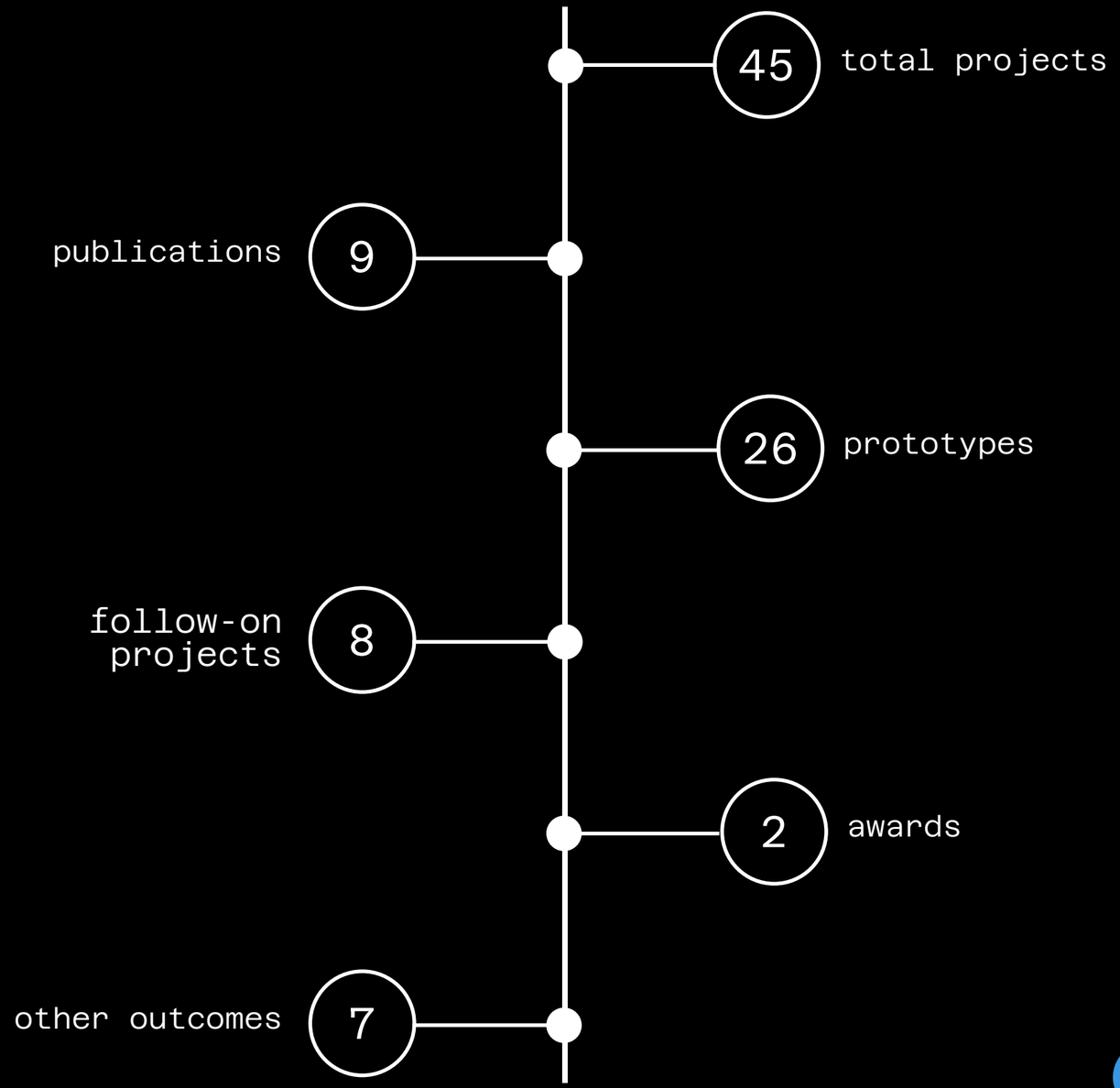
- A/Prof Yuan-Fang Li, Monash University, Cross-lingual text summarisation with a plan
- Dr Charles Martin, Australian National University, Open-form music composition for synchronised and coordinated action
- Dr Sebastien Miellet, University of Wollongong, The influence of trust in the algorithm on AI explanations use and decision-making
- Dr Sajib Mistry, Curtin University, Resource allocation using multi-agent distributed collaborative learning in a contested environment
- Dr Aneta Newmann, The University of Adelaide, Applying machine learning techniques to games on graphs for the detection and concealment of spatially defined communication networks
- Mr Nhat Nguyen, The University of Adelaide, A decentralised combined and hybrid approach for multi-agent decision making
- Dr Thanh Thi Nguyen, Deakin University, Holonic-based deep reinforcement learning for multi-agent systems
- Dr Jihong Park, Deakin University, Federated subgraph learning for fast, robust and communication-efficient low probability detection
- Dr Son Lam Phung, University of Wollongong, New deep networks for iris-based post-mortem identification
- Ms Josephine Plested, Perceptrix, Zero shot learning and domain adaptation for direct neural speech translation
- Prof Flora Salim, University of New South Wales, Online learning based forecasting with irregular time-series data
- Prof Flora Salim, University of New South Wales, A general time-series representation learning pipeline with self-supervised learning
- Dr Rolf Schwitter, Macquarie University, Bi-directional translation from written English to probabilistic logic programs
- A/Prof Nabin Sharma, University of Technology Sydney, Sequential Monte Carlo methods for TTCP CAGE
- Dr Mohd Fairuz Shiratuddin, Murdoch University, Multi-layered adaptive FCMs for high- and low-level decision making
- Dr Keshav Sood, Deakin University, Accurate decision-making for network security with compromised data



complete projects (cont)

- Dr Guoxin Su, University of Wollongong, Temporal objective modelling, reasoning and learning for multi-agent systems
- Dr Maiken Ueland, University of Technology Sydney, Using AI for real-time victim detection in mass disasters
- Dr Yu Xin, University of Technology Sydney, Dynamic vessel pulsations and eyeball movements based liveness detection
- Dr Yu Xin, University of Technology Sydney, An automatic deepfake technology integration pipeline for benchmarking deepfake detection methods
- Dr Nayyar Zaidi, Deakin University, Discretisation inspired Defence methods for adversarial attacks on cyber security domain data
- Dr Jingge Zhu, The University of Melbourne, Generalisation of learning algorithms: theory and efficient implementations from an information-theoretic point of view

2022 project outcomes



integration & evolution

Bring together and support the broader Defence and AI ecosystems.

- Support the broader Defence AI ecosystem.
- Host resources and events to increase accessibility and attract new talent.
- Facilitate the engagement between Defence AI and other stakeholders.

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ai landscape report

The AI Landscape Report was submitted to DSTG in December 2022. This report describes an informed AI labour market analysis for Australia using online job postings data, interviews with government, university, and industry stakeholders and AI experts, and an online survey of recent AI graduates and current AI students. The research project related to this report was conducted by Dr Jesmin Rupa, A/Prof Shruti Sardeshmukh and Dr Mel McDowall with the aim of finding out about the market and challenges related to AI skills across Australia and particularly for the Australian Defence industry.

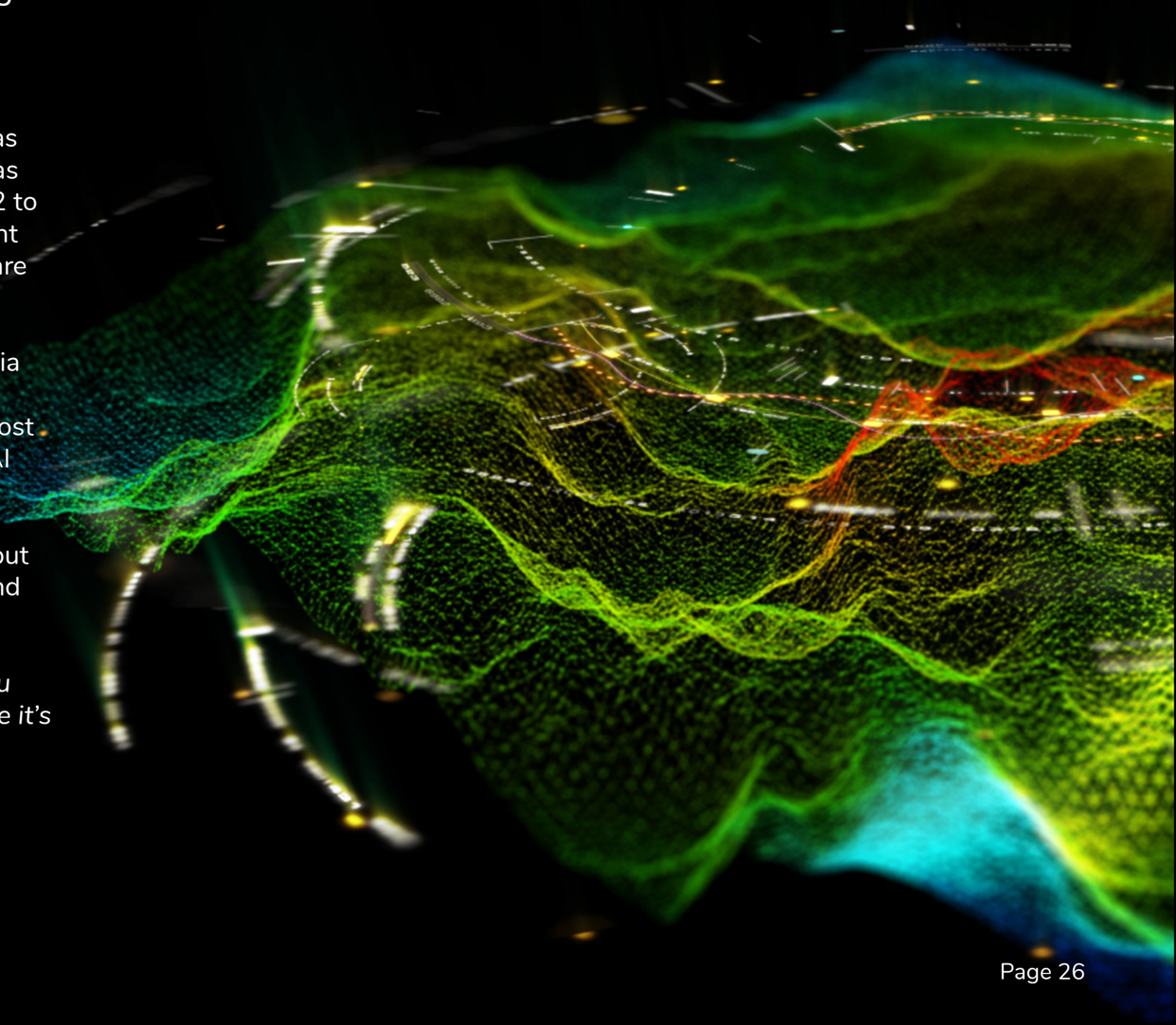
Findings from online job postings data report that in Australia, the share of AI-related job postings has grown more than eight-fold over the past decades. Machine Learning (ML) has the highest demand, as total number of job postings requesting ML as an AI skill has increased significantly from 203 in 2012 to 4,766 in 2021. Deep Learning, TensorFlow, Blue Prism and Scikit-learn are emerging AI skills in recent years. During 2021-2022 (July), the top three Australian industries that requested AI skills the most are Professional, Scientific and Technical Activities, Education and Training, and Financial and Insurance.

Most of the AI-related job postings from the Australian Defence industry are located in South Australia and the Australian Capital Territory, although New South Wales and Victoria are two big hubs for AI talents according to the Harvard Business Review 2021. ML, AI and Autonomous Systems are the most requested AI skills and communications, skills, teamwork and planning are the most requested non-AI skills requested in 2021-2022 (July) job postings by Australian Defence industry.

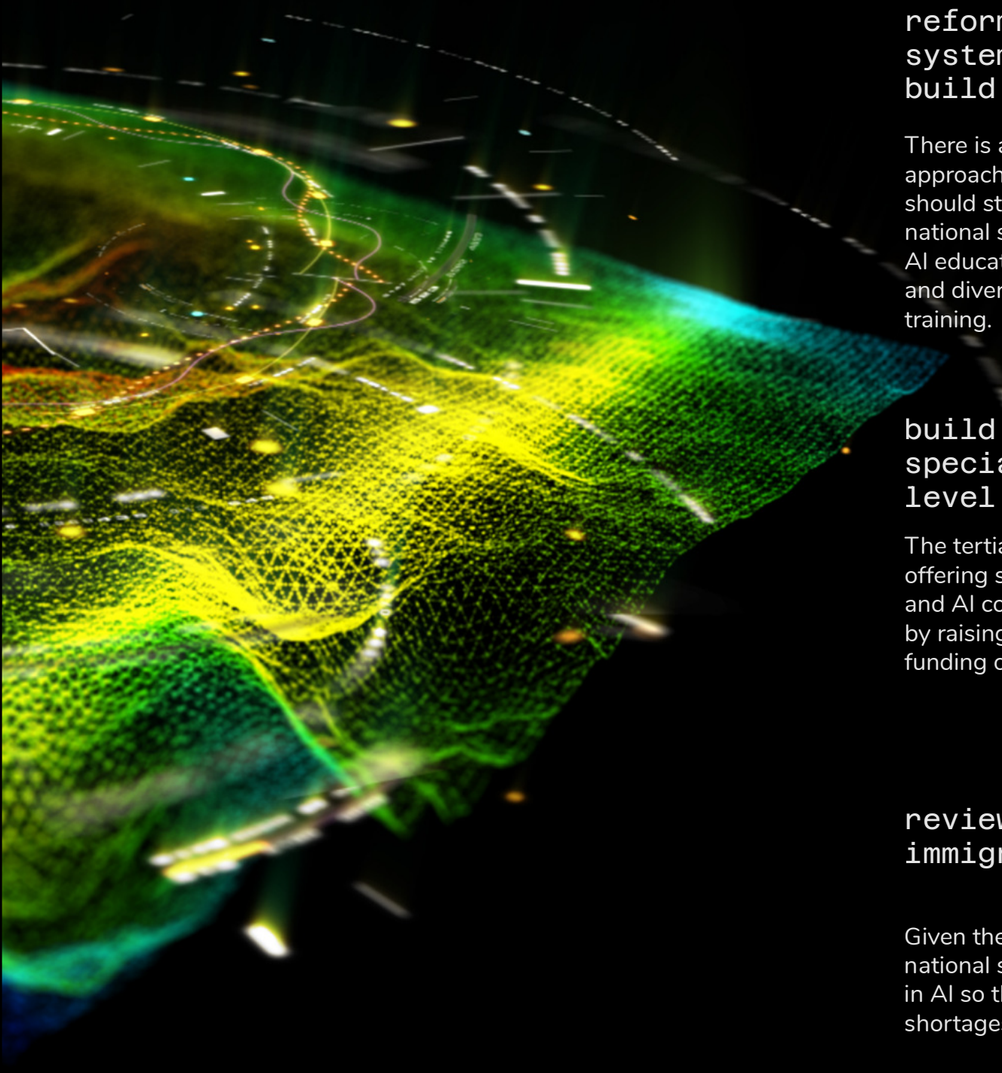
Participants from stakeholder interviews defined AI as a broad discipline which is not limited to ML, but to a wide range of technologies that can perform a specific action such as reasoning and planning, and how humans can be involved in it:

"Artificial intelligence is the automation of cognition. I mean, when we look at artificial intelligence you have two components, one is artificial so that's man-made systems. So we will call it artificial because it's a man-made system or human made system and the other component is intelligence."

Overarching challenges identified from the stakeholder interviews are skill shortages, knowledge gap of AI talents between theory and practice, and AI talent retention. The report presents six key recommendations from the participating stakeholders.



ai landscape report



recommendations

reform broader strategic educational system from primary to tertiary level to build a talent pipeline

There is a need for rethinking the way that Australian education is approached from a strategic talent building point of view, and this should start from the primary level of education. For example, a national strategy could build investment, quality and consistency in AI education through coding clubs, competitions and scholarships, and diverse options for high school students including vocational AI training.

build a spectrum of talents by AI speciality at the tertiary education level

The tertiary education sector can help build the AI talent pool by offering specialised AI qualifications (eg. machine learning, ethics, etc.) and AI courses as elective subjects across a variety of disciplines, and by raising awareness among AI researchers of the type of grant and funding opportunities available.

review and restructure Australian immigration policy

Given the existing skill shortages for the AI industry, Australia needs a national strategy to review and restructure immigration visa categories in AI so that it can support the education testament and fill the shortages.

foster the AI talents to retain in the job

AI talent will move between jobs and between employers to build their skills throughout their career. Industry can either accept that AI talents will move to develop their skills and lose them, or can foster them by keeping the ‘door’ open for them if they want to come back and recognising their levels of skills. Another way to foster these talents is to acknowledge their contribution and reward them accordingly.

develop inter-industry collaboration

Inter-industry collaboration through talent swaps (eg. between the mining and defence industries) could be beneficial to improve AI capability in Australia. Sharing knowledge and talent can help industries to further strengthen Australia’s future capabilities and building an ecosystem for AI.

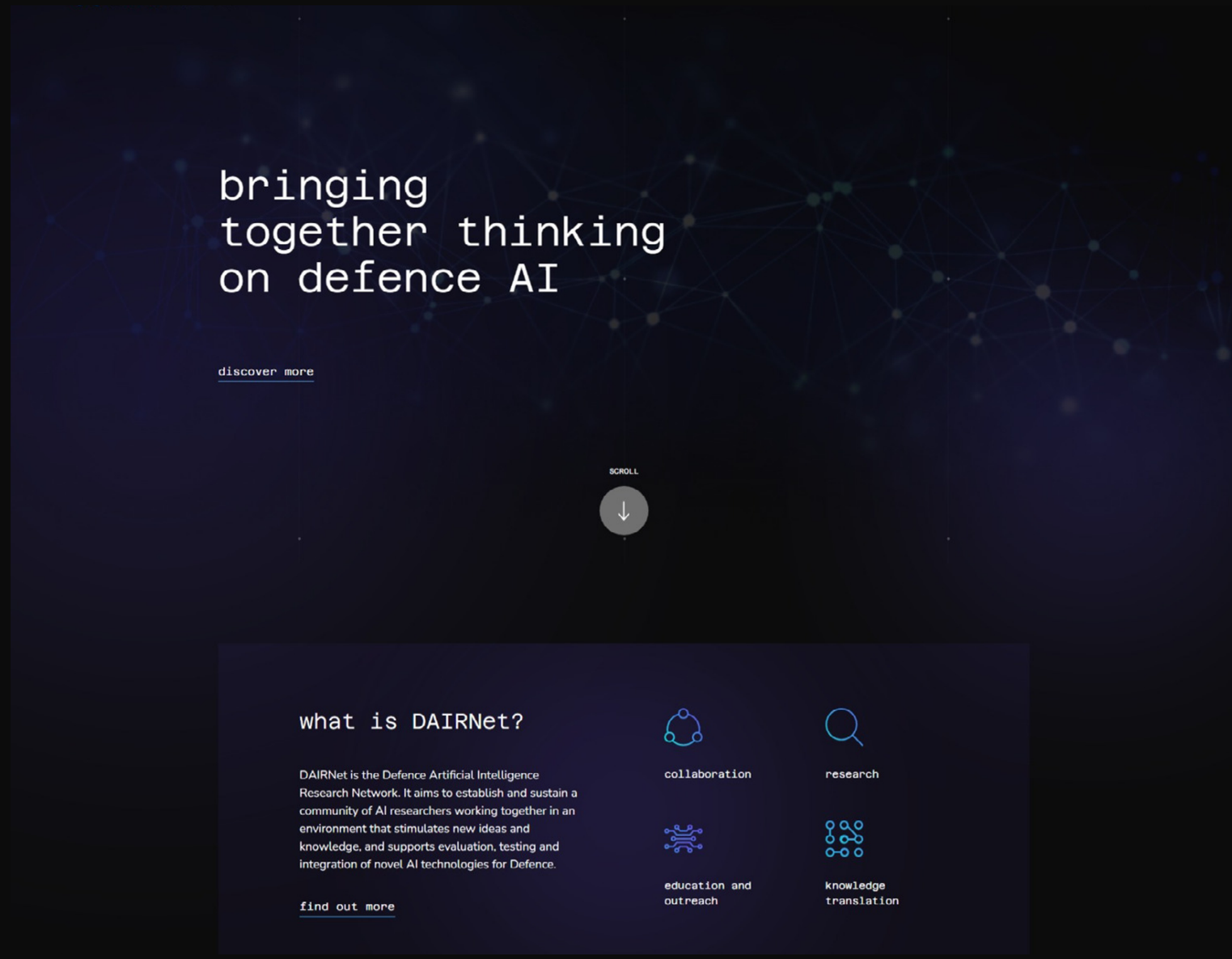
build an AI community within Australia

There is currently no professional body specifically for AI. Building such a professional organisation would help industry with talent identification and provide a vehicle for collaboration between industry, researchers and government to work together with a common cause, share information and therefore contribute to building an AI ecosystem.

website launch

The DAIRNet website launched on 27 May 2022. So far, the site has received more than 1,200 unique visitors.

News, opportunities, events and resources are publicised through the website. In addition, information about DAIRNet researchers and their projects is housed on the website. Over time, the aim is for the website to be a one stop shop for Defence AI in Australia.



sponsorship

DAIRNet was very proud to support ADSTAR Summit 2022 in July by sponsoring the coffee cart in the Exhibition Hall.

This provided DAIRNet with the opportunity to build brand awareness and engage with the 1,800+ summit delegates from the Defence, academic and industry sectors.

Defence AI was featured at the Defence AI Centre (DAIC) breakfast held during the ADSTAR Summit. DAIRNet's Director, Prof Jason Whittle, introduced the attendees to DAIRNet.

ai check 1-2 exercise

DAIRNet hosted its first table-top simulation event on Thursday 12th May. Intended as a pilot for future events at larger scale, the day consisted of a high-level AI-enabled Information Warfare/ Cyber scenario in the morning followed by a more detailed AI imagery analysis scenario in the afternoon.

Participants from the Defence Science and Technology Group walked through pathways from engaging academia on initial research to testing concepts and prototypes and then to industry involvement in delivering Defence AI capability. Round-table discussions identified areas that already exist and function well, as well as impediments and gaps in processes, resources, staffing, policy, ethics and technology.

Members of the DAIRNet Technical Advisory Panel, AI thought leaders and Defence stakeholders will be invited to future events.

engagement

DAIRNet primarily engages with our stakeholders using four media: website, direct email campaigns, LinkedIn and Twitter.

	1,200 unique visitors	251 unique visitors	57 followers	3,381 emails sent
	1,200 new users	153 new followers	38 new followers	54% open rate
	3,465 page views	558 page views	7,017 Twitter impressions	20% click rate

governance

Strong governance is essential to ensure that DAIRNet keeps moving in the right direction and is underpinned by strong principles, policies and processes.

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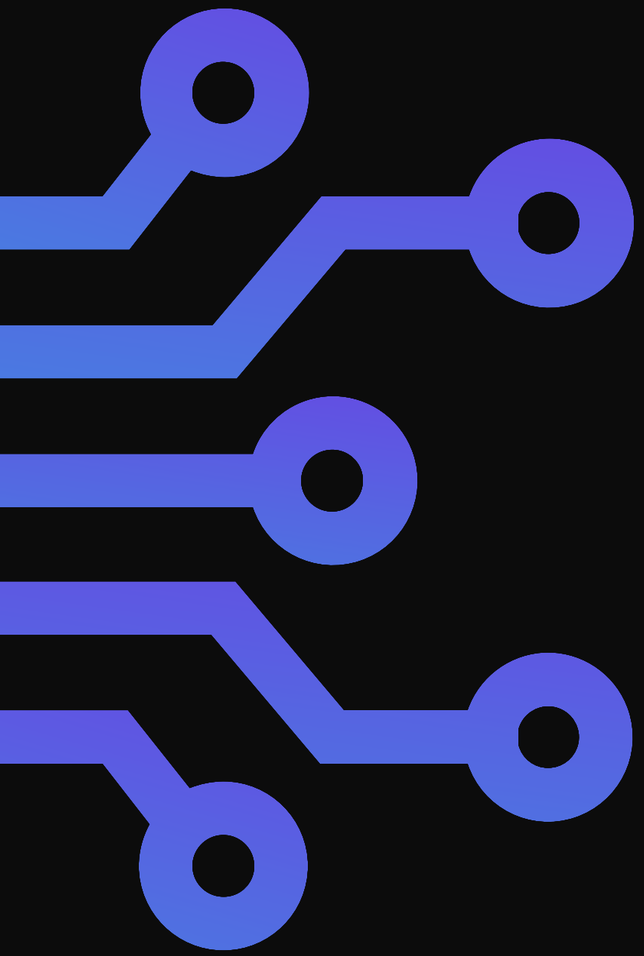
members	40

governance update



DAIRNet is fortunate to be supported by the Governance Panel, DAIRNet Management Committee, Technical Advisory Panel and the soon to be activated Defence Key Stakeholder Group. These multi-discipline and multi-institutional groups assist and guide the DAIRNet management team on how to best support the Defence AI ecosystem.

The primary focus of 2022 was the establishment and activation of DAIRNet governance and operations. Major wins and achievements included:

DAIRNet strategy

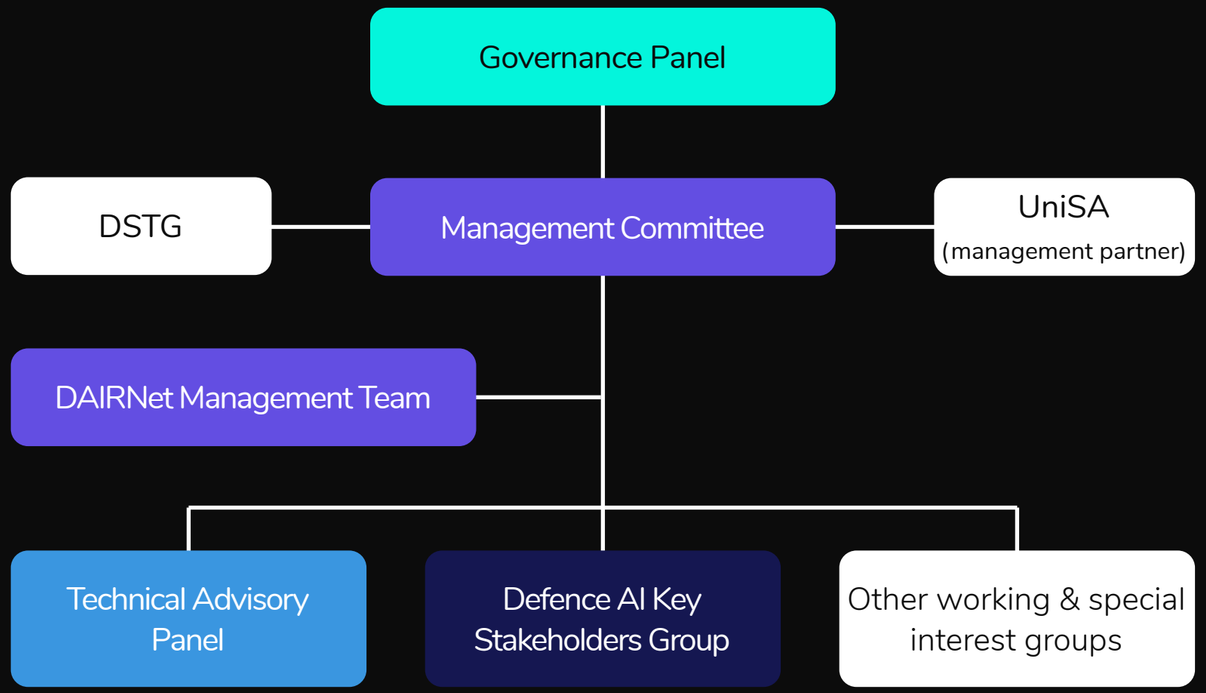
Following consultation with key stakeholders within the Defence AI ecosystem, we are proud to release our strategy, with DAIRNet activities and initiatives guided by our objectives of people and talent, research impact, and integration and evolution. The DAIRNet Strategy was endorsed by the Governance Panel in June 2022.

policies and procedures

To ensure the operations of DAIRNet are undertaken in a fair, transparent and compliant manner, a suite of policies are being created and endorsed. These include probity plan, conflict of interest register, security register, terms of reference for each of our committees and processes for supporting other businesses. The policy portfolio will continue to expand and evolve as the Network increases.

governance structure

DAIRNet 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 DAIRNet Management Team implements decisions made by the Management Committee and coordinates the network on behalf of the Department of Defence. The team is from the University of South Australia and the Defence Science and Technoglogy Group (DSTG) and is the main point of contact for universities, researchers, and other stakeholders.

members

Dr Mel McDowall, Director DAIRNet

Ms Aleesa Clough, Project Officer DAIRNet

Dr Ralph Gailis, Deputy Program Leader AI, DSTG

Dr Gary Hanly, DSTG Liaison to DAIRNet

Dr Adi Chopra, Scientific Advisor, NAVIGATE Program, DSTG

Dr Jesmin Rupa, Lead Investigator, AI Landscape Report

Prof Jason Whittle, inaugural Director DAIRNet until November 2022

Mr Paul Heuer, Specialist Science Advisor, DSTG until September 2022

Dr Ross Kyprianou, DAIRNet Engagement Lead, DSTG until May 2022

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.

Dr Robert Hunjet
Chair, DAIRNet Governance Panel

members

Current members:

Chair: Dr Robert Hunjet, Program Lead AI, Defence Science and Technology Group

- Mr Simon Joyce, Assistant Secretary Data Governance and Services, Data Division, Associate Secretary Group
- Dr Mel McDowall, Chair of the DAIRNet Management Committee
- AIRCDRE Di Turton, Director General Intelligence Capability Integration, Defence Intelligence Group
- CDRE Stu Watters, Director General Joint Command, Control, Communications and Computers (JC4), Joint Capabilities Group

Previous members:

- Dr Brian Hanlon, Senior Principal AI Scientist for AI, Defence Science and Technology Group and Chair until March 2022
- AIRCDRE Jason Begley, DGJC4, Joint Capabilities Group until October 2022
- COL Kirk Johnstone, Executive Director EIM, Chief Information Officer Group until April 2022

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 Defence.

Dr Mel McDowall
Chair, DAIRNet Management Committee

members

Current members:

Chair: Dr Mel McDowall, Director DAIRNet

- Dr Ralph Gailis, Deputy Program Leader AI, DSTG
- Dr Gary Hanly, DSTG Liaison to DAIRNet, DSTG
- Mr Jim Mitkas, Director Strategic Engagement, National Partnerships, Science Partnerships, Science Engagement & Impact Division, DSTG
- Mr Matt Opie, Director Defence and Space, University of South Australia
- Prof Markus Stumptner, Chair of DAIRNet Technical Advisory Panel

Previous members:

- Prof Jason Whittle, Director DAIRNet and Chair until November 2022
- Dr Brian Hanlon, Senior Principal AI Scientist for AI, DSTG until March 2022
- Mr Paul Heuer, Specialist Science Advisor for AI, DSTG until September 2022
- Dr Ross Kyprianou, DAIRNet Engagement Lead, DSTG until May 2022

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 also plays 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 member organisations.

Prof Markus Stumptner
Chair, DAIRNet Technical Advisory Panel

members

Chair: Prof Markus Stumptner, Director Industrial AI Research Centre, University of South Australia

- Dr Axel Bender, STaR Shot Leader Operating in CBRN Environments, Defence Science and Technology Group
- Dr Angela Consoli, Chief Defence Scientist Fellow, Defence Science and Technology Group
- Prof Christopher Fluke, Swinburne University of Technology
- Dr Ralph Gailis, Deputy Program Leader Artificial Intelligence, Defence Science and Technology Group
- Prof Matt Garratt, University of NSW Canberra
- A/Prof Yuan-Fang Li, Monash University
- Dr Glennn Moy, Research Specialist AI and Machine Learning, Defence Science and Technology Group
- Prof Flora Salim, University of New South Wales
- Dr Daniel Salmond, Group Leader Information Warfare Command & Control, Defence Science and Technology Group
- Prof John Thangarajah, RMIT University
- Prof Michael Webb, The University of Adelaide

key stakeholders group

DAIRNet has commenced establishment of the Defence AI Key Stakeholders Group. This group will bring together representatives from across the Defence and AI ecosystems, enabling a concerted effort to empower and evolve Defence AI capability. The Group will report to the DAIRNet Management Committee and function as an advisory body to inform the Defence AI Innovation, Science & Technology (IS&T) Program.

Dr Adi Chopra, project manager for Defence AI Key Stakeholders Group

update from the project manager

I joined the DAIRNet team as a NAVIGATOR in November to activate the Key Stakeholder Group which will help shape the future of Defence AI. To date, this has involved key stakeholder analysis and beginning to engage with representatives of each stakeholder group.

I have had the privilege of meeting amazing individuals across the Defence community, and thank those I've met so far for generously sharing their insights on some of the current challenges and opportunities to use and develop AI-driven technologies. Defence AI is much more than just the latest hardware and software, and some of the early objectives of the Group will be to examine how we can better develop the talent pipeline and establish more coordinated R&D activities with industry and academia to meet the future capability needs of the ADF.

A very exciting year ahead awaits as the Key Stakeholder Group embarks on its mission to engage diverse perspectives and guide future activities and investments that will strengthen Defence AI.

Dr Adi Chopra
Scientific Advisor, NAVIGATE Program

navigate program

In 2022, NAVIGATE was launched by DSTG as a pilot program. The NAVIGATE program is one of several measures being undertaken to build a capable, diverse, and integrated workforce of STEM specialists in Defence who can work across the national innovation ecosystem to deliver Defence capability.

A diverse group of 69 future leaders were selected for their skills, knowledge, and expertise critical to delivering the scientific advice and technology solutions to support Australia's Defence Force. As one of the participants of this year's NAVIGATE program, Dr Adi Chopra is being provided with a tailored training and development program, mentoring, and the opportunity to work with Australia's brightest scientists, engineers, and IT specialists.

Adi joined DAIRNet for his first 6-month rotation to help establish the Defence AI Key Stakeholder Group. Prior to joining DSTG, Adi was using AI to analyse global satellite observations during the 2022 East Coast Floods in NSW and QLD to rapidly map the scale and intensity of the devastating floods.

DAIRNet is excited about Adi joining the team and the prospect of continuing to engage with the diverse team of NAVIGATORS into the future.

members

Universities and industry that enter a collaborative arrangement with Defence regarding DAIRNet become members of DAIRNet. 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.

By collaborating, we can understand, develop novel ideas, and integrate this knowledge into the Defence ecosystems.

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prototypes and products

autonomous processing and reasoning

Lead researcher	Project title	Description	Partner/s	End user/s	TRL	Additional funding?	Student involvement
Prof Matt Duckham RMIT University	NEXUS: Explainable and unified spatial reasoning and sensor fusion	The NEXUS prototype is a system-of-systems able to take streaming spatial data as input (such as marine AIS data streams), perform real-time spatial reasoning on data (such as identify anomalies such as suspected location spoofing), as part of reconfigurable workflows and analytics chains, and output human-usable intelligence to analytics dashboards with associated query-able explanations for output.	Dept of Defence	Dept of Defence Defence industry Outside Defence	4	No	No
A/Prof Yuan-Fang Li Monash University	RUSH: Reasoning and learning under soft and hard data	A software prototype that utilises deep learning and neural network techniques for few-shot event extraction from multimodal data.	Dept of Defence	Dept of Defence Defence industry Outside Defence	1-3	No	No
		A paper titled "Paraphrasing Techniques for Maritime QA system" has been accepted at 25th International Conference on Information Fusion, 2022.	Dept of Defence	Dept of Defence Defence industry Outside Defence	1-3	No	No
A/Prof Jamie Sherrah Australian Institute of Machine Learning, The University of Adelaide	Intelligent decision superiority through vision and language technology	Allow user to search through overhead imagery using text queries about the image content.	Other: university	Dept of Defence	5	No	No

prototypes and products

human - AI interactions

Lead researcher	Project title	Description	Partner/s	End user/s	TRL	Additional funding?	Student involvement
Prof Christopher Fluke Swinburne University of Technology	Artificial Intelligence as the Most Valuable Player: Enabling cyber-human teams to achieve decision superiority	We are developing data collection and analysis tools to provide a dashboard for monitoring individual and team-based decision-making performance. The dashboard integrates data from a variety of biometric sensors (e.g. galvanic skin response, electrocardiogram) and eye-tracking (e.g. point of gaze, blink rate). The next stage will incorporate machine learning methods to indicate decision-making status based on development of individualised cognitive performance profiles.	Other: university	Dept of Defence Outside Defence	1-3	No	No
Prof Anna Ma-Wyatt The University of Adelaide	Modelling, monitoring and moderating human-AI interaction						

prototypes and products

distributed multi-domain networks

Lead researcher	Project title	Description	Partner/s	End user/s	TRL	Additional funding?	Student involvement
A/Prof Frank den Hartog UNSW Canberra	Use of SDN for multi-bearer time-sensitive distributed systems in the combat cloud						
A/Prof Hung Nguyen The University of Adelaide	Machine learning solutions for BGP-based software defined combat clouds	We have been working with a defence contractor (Swordfish) to develop a prototype of the research output via our DST leads.	Defence SME	Dept of Defence	1-3	No	No
Dr Matt Selway University of South Australia	Advanced Integrated Modelling Environment for Self-Adaptive Software Systems (AIME)	Improve the agility and resilience of infrastructure, C2, development, etc., systems by improving the speed at which changes to those system can be made in response to changes in their environments (real and/or virtual). By observing the relevant environments and situations, the prototype will be able to orient itself with respect to desired goals (such as maintaining or improving capability), decide on which actions to take (e.g., recover from failures, enhance protections, deploy new or updated services), and initiate those actions.	Other: university	Dept of Defence Defence industry Outside Defence	1-3	No	No

prototypes and products

Lead researcher	Project title	Description	Partner/s	End user/s	TRL	Additional funding?	Student involvement
Prof Ravinesh Deo University of Southern Queensland	Sequential field tokenisation and type classification	This set of experiments has focused primarily on determining whether the sequence-to-sequence model variants demonstrate capacity to infer the structure of novel-protocols which have been withheld from the training dataset. The experimentation has focused on a constrained setting where the model is trained on three “known” protocols (ARP, DNS and NTP) and generalisation is evaluated on an “unknown” protocol (ICMP). Protocol examples are generated first through simulation and second via filtering packet capture files. In both scenarios the sequence-to-sequence model variants demonstrate the capacity to accurately infer byte-boundary and type information from the “known” and “unknown” protocol sets.	Dept of Defence	Dept of Defence	1-3	No	1 PhD/Masters student
Dr Colm Flanagan Hiroco	Mapping agent capability to objective for multi-agent planning	The prototype demonstrates how different agents with different capabilities can be optimally mapped to actions in a plan they are most suited to executing.	Defence SME	Dept of Defence Defence industry Outside Defence	4	No	No
Prof Clinton Fookes Queensland University of Technology	A multi-modal deep generative framework for video based identification	We developed a software prototype to quantitatively evaluate the utility of auxiliary feature modalities in video to conduct person reidentification (ranging from logos in the possessions or clothes on the subject through to his or her behavioural trajectories). Furthermore, we developed software for a generative adversarial learning-based feature anticipation pipeline that aims to address domain discrepancies when associating diverse feature modalities.	Dept of Defence	Dept of Defence	1-3	No	No
Dr Mingyu Guo The University of Adelaide	Tackling the TTCP CAGE challenge using Monte-Carlo planning for large-scale POMDPs	We created a competition entry	Other	Outside Defence	1-3	No	No
A/Prof Yuan-Fang Li Monash University	Cross-lingual text summarisation with a plan	A software prototype based on deep reinforcement learning and textual entailment techniques to improve the faithfulness of cross-lingual text summarisation.	Dept of Defence	Dept of Defence Defence industry Outside Defence	1-3	No	1 Honours/ undergraduate student

prototypes and products

Lead researcher	Project title	Description	Partner/s	End user/s	TRL	Additional funding?	Student involvement
Dr Charles Martin Australian National University	Open-form music composition for synchronised and coordinated action	Our prototype system includes a web-based musical instrument application that can be used for collaborative musical performances.	Other: university	Outside Defence	4	No	No
Dr Sebastien Miellet University of Wollongong	The influence of trust in the algorithm on AI explanations use and decision-making	Our prototype pertains to explainable AI. Our package Face-XAI visualises which information an algorithm did and did not rely on, and how it weighted this information when making face verification decisions. Face-XAI offers the user considerable flexibility in deciding which information is displayed and how it is shown in order to aid their understanding of the algorithm scores, judge their validity and mitigate errors. Face-XAI can display multiple sources of algorithm information simultaneously and clearly. Current investigations are testing how human users interpret, use, and are influenced by various AI explanations. Our system could be extended beyond Defence (e.g. radiology).	Other: university	Dept of Defence Defence industry Outside Defence	1-3	No	1 PhD/Masters student
Dr Sajib Mistry Curtin University	Resource allocation using multi-agent distributed collaborative learning in a contested environment	We have developed a simulated dynamic environment that emulates Autonomous Vehicles (AVs) to encounter specific points of interest in a real contested environment. We have incorporated a Multi-Agent Deep Deterministic Policy Gradient Framework for autonomous exploration. A Multi-Agent Proximal Policy Optimizer Framework has been implemented for optimising communications in a contested environment	Non-Defence industry	Defence industry	1-3	No	1 PhD/Masters student

prototypes and products

Lead researcher	Project title	Description	Partner/s	End user/s	TRL	Additional funding?	Student involvement
Dr Thanh Thi Nguyen Deakin University	Holonic-based deep reinforcement learning for multi-agent systems	This prototype has been developed based on the Microsoft CyberBattleSim environment (an OpenAI Gym) to simulate the interactions between agents in an enterprise network environment. The attacking agents are controlled by deep reinforcement learning algorithms to explore the vulnerabilities of the network. The agents communicate and cooperate within a holonic (hierarchical) architecture to maximize their exploration capabilities. This prototype will enable network defence personnel to understand the characteristics of complex large-scale coordinated machine learning-based attacks. The lessons learned from the simulation results will provide useful knowledge for the blue team to develop better automated defence strategies for enterprise networks.	Defence SME Defence industry outside Australia Other	Defence industry	1-3	No	No
Dr Son Lam Phung University of Wollongong	New deep networks for iris-based post-mortem identification	Two prototypes have been developed. The first prototype segments the iris region from a large post-mortem iris image. The second prototype recognises the person's identity from the segmented post-mortem iris region.	Dept of Defence	Dept of Defence	1-3	No	1 PhD/Masters student
Prof Flora Salim University of New South Wales	Online learning based forecasting with irregular time-series data	We have designed a framework that can conduct time series representation learning in a self-supervised learning manner. The implementations provide the data processing modules, scripts for pre-training the representation encoder. The framework supports the processing of data in batches.	Dept of Defence	Defence industry Outside Defence	1-3	No	1 Honours/ undergraduate student
	A general time-series representation learning pipeline with self-supervised learning	We have designed a general framework that is suitable for the representation learning of time series data from diverse domains in a self-supervised learning manner without leveraging large-scale well-labelled data in the training process. The learned representation features can be used for different downstream tasks. The prototype pipeline was tested with air flight traffic and maritime vessel trajectory data.	Dept of Defence	Outside Defence	1-3	No	No

prototypes and products

Lead researcher	Project title	Description	Partner/s	End user/s	TRL	Additional funding?	Student involvement
Dr Rolf Schwitter Macquarie University	Bi-directional translation from written English to probabilistic logic programs	I developed a small prototype together with Dr. Jonathan Legg (sensemaking team at DST) in the context of an illegal fishing scenario to demonstrate the usefulness of (probabilistic) answer set programming for temporal reasoning using a linguistically motivated version of the event calculus.	Non-Defence industry	Dept of Defence	1-3	No	No
Dr Mohd Fairuz Shiratuddin Murdoch University	Multi-layered adaptive FCMs for high- and low-level decision making	This project investigates the novel use of FCM and explores its extension for modelling adaptive complex decision-making processes at different levels of abstractions. The use of hierarchical FCM could enhance the modelling. To better understand the modelling, we also explore the visualisation of such a system in a client-server desktop environment. A client-server desktop computer environment is developed to simulate the behaviours of the behaviour and modelling abilities of the proposed multi-layered adaptive FCMs for use with high- and low-level decision-making. A case study on the Civilian Emergency Services: Wildfire Natural Disaster is used to feature the development outcome.	Dept of Defence	Dept of Defence Defence industry Outside Defence	1-3	No	No
Dr Maiken Ueland University of Technology Sydney	Using AI for real-time victim detection in mass disasters	Software prototype developed that allows us to map and monitor sensor responses of electronic nose in real-time	Non-Defence industry	Dept of Defence Outside Defence	1-3	No	No

prototypes and products

Lead researcher	Project title	Description	Partner/s	End user/s	TRL	Additional funding?	Student involvement
Dr Yu Xin University of Technology Sydney	Dynamic vessel pulsations and eyeball movements based liveness detection	Dynamic vessels pulsations and eyeball movements are involuntary biological evidence to evaluate liveness. They are almost impossible to be fabricated, while iris recognition, regarded as one of the most secure biometric information, can be used for further improving identity verification. This project investigates the reliability of using such biometric features to determine liveness and it also opens another gate for unifying highly-secured ID authentication and liveness detection.	Dept of Defence Defence SME Non-Defence industry	Dept of Defence Defence industry Outside Defence	4	No	No
	An automatic deepfake technology integration pipeline for benchmarking deepfake detection methods	This project presents a Deepfake integration platform that can continuously integrate data generated by newly invented Deepfake techniques into a benchmark while balancing the ratio between real and Deepfake data. This platform also provides an interface, significantly easing evaluation of current deepfake generation and detection methods. Moreover, this platform not only supports image based data but also are extendible to audio, text based deepfake data, thus forming an ideal benchmark for evaluating multi-modality deepfakes.	Dept of Defence Defence Prime Defence SME Non-Defence industry	Dept of Defence Defence industry Outside Defence	6	Yes	No
Dr Nayyar Zaidi Deakin University	Discretisation inspired Defence methods for adversarial attacks on cyber security domain data	We have been able to develop an effective methods for adversarial defence on tabular datasets. We have been able to develop a framework that successfully leverages generative models as a defence.	Dept of Defence	Dept of Defence Defence industry	4	No	1 PhD/Masters student
Dr Jingge Zhu The University of Melbourne	Generalisation of learning algorithms: theory and efficient implementations from an information-theoretic point of view	A transfer-learning algorithm that outperforms the state-of-the-art methods	Dept of Defence	Outside Defence	1-3	No	1 PhD/Masters student

follow-on projects

Lead researcher	Project title	Follow-on project title	Description	End date	Additional funding?	Student involvement
Prof Matt Duckham RMIT University	NEXUS: Explainable and Unified Spatial Reasoning and Sensor Fusion	INDEX: Intention and Explanation for Fusion of Uncertain, Noisy, and Dynamic Spatial Data Phase 1	The INDEX project aims to develop new and distributed computational tools and techniques for automated intent recognition and explanation from fusion of heterogeneous physics- and human-based spatiotemporal sensor data streams.	31/08/2022	$100,000 from DAIRNet	No

follow-on projects

Lead researcher	Project title	Follow-on project title	Description	End date	Additional funding?	Student involvement
Prof Clinton Fookes Queensland University of Technology	A Multi-Modal Deep Generative Framework for Video Based Identification	Advanced Spatio-Temporal Modelling for Multimodal DeepFake Detection	At this stage this is only a proposal in development for a potential follow-on project.	31/12/2024	No	No
Dr Charles Martin Australian National University	Open-Form Music Composition for Synchronised and Coordinated Action	Studying coordinated performance with a touch screen musical interface	The aims are to investigate how musicians collaborate when performing music using new electronic musical instruments. We aim to use our prototype musical instrument system to assist musicians in self-coordination during performance to discover new ways that humans can collaborate at a computer interface.	30/06/2024	No	1 PhD/Masters student
Dr Sebastien Miellet University of Wollongong	The influence of trust in the algorithm on AI explanations use and decision-making	Human-AI teaming in facial recognition for rapid and reliable person identity decisions	Rapid and accurate person identification is critical to national security. Identification often relies on face recognition by human operators supported by AI systems. Our research shows that even the best-trained humans and the highest-performing AI systems make errors, but that accuracy can be maximised by selection, training, and by appropriately combining human and AI elements in a hybrid team. This project will deliver an hybrid system that will make a significant contribution to national security by building on research evidence to utilise the best elements of the human and AI components to make rapid and reliable identification decisions	01/02/2024	No	No

follow-on projects

Lead researcher	Project title	Follow-on project title	Description	End date	Additional funding?	Student involvement
Prof Flora Salim University of New South Wales	A general time-series representation learning pipeline with self-supervised learning	A general time-series representation learning pipeline with self-supervised learning	We plan to conduct more experiments to further investigate the proposed general framework. For example, we aim to evaluate the framework with more types of time series data and more downstream tasks such as forecasting.	30/06/2023	No	No
	Online learning based forecasting with irregular time-series data	Online learning based forecasting with irregular time-series data	We plan to do more research in investigating whether self-supervised pre-training helps with incremental learning with domain shifting or task shifting. We will also conduct a deeper analysis of how to better incorporate online learning capability within a self-supervised learning framework.	31/08/2023	No	1 Honours/ undergraduate student
Dr Maiken Ueland University of Technology Sydney	Using AI for real-time detection in mass disasters	Electronic nose for mass disasters	The aim is to develop an electronic nose that can independently search for victims in disaster areas	31/12/2025	No	1 PhD/Masters student
Dr Nayyar Zaidi Deakin University	Discretion inspired Defence methods for adversarial attacks on cyber security domain data	Leveraging Generative Models for defence against Adversarial Attacks	Our framework is based on the exploiting a special kind of models -- generative models, in state-of-the-art Artificial Neural Network model. The framework makes use of regularisation concept to regularise ANN parameters towards generative model's parameters. The main aim of the project is demonstrate that simple fusion of generative and discriminative models with either regularisation (or other related techniques), can result in producing effective defence methods for tabular datasets.	30/04/2023	No	No

awards

Recipient	Award	Date	Lead researcher	Project title	Project funding
Emma Ai Research Fellow The University of Adelaide	5th place in the International Competition on Graph Neural Networking Challenge 2022	08/12/2022	A/Prof Hung Nguyen	Machine learning solutions for BGP-based software defined combat clouds	NGTF: Distributed multi-domain networks
Dr Tharindu Fernando Research Fellow Queensland University of Technology	QUT Faculty of Engineering Early Career Researcher Grant	27/10/2022	Prof Clinton Fookes	A Multi-Modal Deep Generative Framework for Video Based Identification	Artificial intelligence for decision making

publications

peer reviewed

- **Duckham, M,** Gabela, J, Kealy, A, Khan, M, Legg, J, Moran, B, . . . Vasardani, M 2022, 'Explainable spatiotemporal reasoning for geospatial intelligence applications', Transactions in GIS, vol. 26, 2455– 2479. doi: 10.1111/tgis.12939
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- Dinani, MA, Holzer, A, **Nguyen, H,** Marsan, MA & Rizzo, G 2022, 'Vehicle Position Nowcasting with Gossip Learning', IEEE Wireless Communications and Networking Conference (WCNC), pp. 728-733. doi: 10.1109/WCNC51071.2022.9771706
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- Shiri, F, Zhuo, TY, Li, Z, Nguyen, V, Pan, S, Wang, W, . . . **Li, Y-F** 2022, 'Paraphrasing Techniques for Maritime QA system', 2022 25th International Conference on Information Fusion (FUSION), IEEE, pp. 1-8, doi: 10.48550/ARXIV.2203.10854

DAIRNet

for more information

www.DAIRNet.com.au

Email us at: enquiries@dairnet.com.au

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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.

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University of South Australia