

## DSTG Summer Vacation Placement Program

2025 - 2026

## **Proposed Projects**

## List of Abbreviations

Division	Abbreviation
Human and Decision Sciences	HADS
Platforms Division	PLAT
Research Technology Operations	RTO

Research Stream	Abbreviation
Aerospace / Aeronautical Engineering, Naval Architecture Stream	AAENA
Chemical, Radiological, Biological, Food Sciences Stream	CRBFS
Computer Sciences, IT, Software Engineering, Telecommunications Stream	CSITSET
Electronic / Electrical Engineering Stream	EEE
Materials Science Stream	MS
Mathematics and Physics Stream	MP
Mechanical and Mechatronic Engineering (including Robotics) Stream	MMER
Psychology and Social Sciences Stream	PSS

Project ID	Location	Project Title	Project description	Desirable Skills	AAENA	CRBFS	CSITSET	EEE	MS	MP	MMER	PSS
SVP HADS 01	Edinburgh, South Australia	Threat Prediction Using Sets of Parameterized Functions.	For a Combat Management System to counteract an incoming air threat it requires some ability to estimate where the threat will be located at some future time. However, a perfect prediction of an air threat's location is intrinsically impossible because no amount of sensing can predict what manoeuvres a threat might do between the present and the future time. Nonetheless, we need to make some kind of 'best' future state prediction in order to enact countermeasures. In other words, if we're going to protect ourselves from incoming missiles we need some best estimate of how it's approaching us; even if it's not perfect. For this, we can formulate of a set of motions the threat might make and use a time history of sensor data to determine a best estimate of the threat will do in the future. Mathematically, this involves matching a set of parametrised functions to the observed flight profile of a threat, which can then be used to make forward estimates. Deriving and testing an algorithm of this kind will be the focus of this project. This project will therefore require work in two areas: (i) developing a mathematical algorithm to match functions to observed flight paths, and (ii) performing analysis to see how well this algorithm predicts future motion. It is recommended that any applicants for this project have a foundational skillset in some combination of (but not all of) applied mathematics, mechanical/aerospace engineering, physics, and programming.	<ul> <li>Numerical (mathematical) modelling and data analysis using Matlab or Python</li> <li>Ability to derive novel mathematical algorithms</li> <li>Ability to work independently and in small teams.</li> </ul>	X					x	X	
SVP HADS 02	Edinburgh, South Australia	Machine Learning Parameter Values for a Surface Vessel Motion Model.	<ul> <li>We have a generic model of vessel motion that can be parameterised to yield different kinematic performance. What we don't have are values for the parameters so that the resultant motion from the model is representative of real vessels.</li> <li>Your task for this project will be to learn and use data farming techniques to explore how different parameter configurations result in different outputs from the motion model. You will then use this aggregated data to machine learn a new model that maps the surface vessel model outputs to the associated parameter values. Finally, performance data of real world surface vessels will be fed to the model to yield the parameters that will make the model generate as close to the same result as possible. A comparison from the ML model output and the motion model output will establish the accuracy of the results.</li> <li>Your work will contribute to the ongoing development of the Research Combat Management System (RCMS) by creating configuration parameters to allow our simulated surface vessels to represent the performance of real world surface vessels. You will work as part of a team and will have the opportunity to learn new skills and develop existing skills in software development, AI/ML, and simulation frameworks.</li> </ul>	<ul> <li>Software development (Java, Python, or similar)</li> <li>Machine learning</li> <li>Communication skills</li> </ul>	X		x	X		X	X	
SVP HADS 03	Edinburgh, South Australia	Coach, We Just Got Hustled.	Slamming your hat on the ground, you curse and rant under your breath. Losing the grand final, despite comfortably winning at half time. So frustrating. As you calm down, questions begin appearing in your mind. How did this happen? Is one of our players to blame, or were we just not on the same page? Did we have the wrong strategies and tactics? Did their star players step up? ooorrra tingle of insight rushes though your body maybe we got hustled! They tricked us! During the round games, their tactics seemed to be inferior to ours. But what just happened was a masterclass. They changed their goals to perfectly counteract ours. So sneaky! Lucky students who pick this project will research and develop hustling (or perhaps anti-hustling) concept demonstrators. You might consider how multi-agent team coordination depends on commander goals, focusing on power imbalance dynamics when the other team might deceptively counteract your goals. Ultimately, we want students to learn and make an impact (and have fun!), so we are happy to take students from many different disciplines such as Artificial Intelligence, Machine Learning, Psychology, Biology, Mathematics and Physics. Experience with software development is preferred, but if not, all good, we can help you.	<ul> <li>Experience with software development is desirable, but not essential.</li> <li>Interest in Applied AI and Machine Learning.</li> <li>Ability to work independently and in small teams.</li> </ul>			X	X		X	X	X

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SVP HADS 04	Edinburgh, South Australia	Torn, I feel Pulled in Multiple Directions.	On the one hand, he had to rescue search for survivors – some of them teammates – and on the other, he needed to cover and protect innocent bystanders from imminent harm. Not to mention avoiding being captured. Recalling his ethical class from university, his Professors voice echoed in his mind – "preserving life is of upmost importance". But which life? The knowingly frail life or the potential for loss in the future? The harsh reality is that humans simply do our best in such complex situations. When operating in teams that are competing for the same resources and goals, we usually defer to a central decision maker. But what of autonomous agents who try and predict the outcomes of decisions? Such is life in the games we play. Team sports, organisational coordination, emergency services and military teams know this all too well. They must reconcile multiple conflicting goals and priorities, some from official command, others from rules of "the game". All this, whilst maintaining composure and smooth team coordination.	<ul> <li>Experience with software development is desirable, but not essential.</li> <li>Interest in Applied AI and Machine Learning.</li> <li>Ability to work independently and in small teams.</li> </ul>			X	X		x	X	X
SVP HADS 05	Edinburgh, South Australia	Joint Operations Command Workplace Survey Development.	<ul> <li>DSTG conducts an annual workplace survey of Joint Operations Command (JOC), collecting psychometric data on a breadth of sociotechnical factors such as teamwork, leadership and agility. This survey project helps inform targeted workplace initiatives within JOC.</li> <li>There is flexibility in how students may support this project, which may be in one or more of the following ways: <ul> <li>statistical modelling</li> <li>scale development and validation</li> <li>literature review</li> <li>research paper writing</li> </ul> </li> </ul>	<ul> <li>Statistics</li> <li>Psychology theory, preferably organisational psychology</li> <li>Strong communications skills</li> </ul>								X
SVP HADS 06	Edinburgh, South Australia	Weapon System Modelling Visualisation and Analysis Tool Development.	DSTG's Integrated Weapons Modelling and Analysis Discipline in the Weapon System Performance group provides informed modelling of Defence's weapon system capabilities at a systems level with a focus on integrated air and missile defence. In collaboration with the Royal Australian Navy, the team is developing the Area Defence Visualisation Tool (ADVIS) as a python-based data visualisation and analysis tool for post-processing complex weapon engagement simulation output. This project will comprise of extending the development of ADVIS to include new data visualisation methods and analytical pipelines supporting Navy and broader Defence requirements. There is also the potential to carry out a small study using our simulation tools to generate test data investigating the impact of remote sensing on ADF capability.	<ul> <li>Numerical modelling and data analysis in a programming environment. Python or Matlab preferred.</li> <li>Applied Mathematics or related background</li> <li>Familiarity or experience with software development tools, e.g. Git, Jira etc.</li> <li>Ability to work independently and within a broader team.</li> <li>Willingness to learn.</li> </ul>	X		X			X		
SVP HADS 07	Edinburgh, South Australia	Analysis of Weapon Concepts.	Novel and Emerging Weapon Systems (NEWS) is a team focused on exploring how new technologies could be applied for the Australian Defence Force (ADF). This assessment is generally called "Military Utility", a measure of how well the weapon system fits for what the ADF want to do. Our science requires engaging with subject matter experts to collect qualitative data, as well as numerical simulation to assess weapon performance. Generally, it is easier to rule concepts out than rule concepts in, and the team is interested in finding assumptions and limitations for proposed concepts and assessing whether that's a 'deal breaker' for overall utility. This project would explore analysis techniques for qualitative and quantitative data sets. The successful applicant would investigate trends to identify cases where numerical simulation might	<ul> <li>Good communication skills</li> <li>Ability to contribute as part of a team</li> <li>Interest in Defence technologies</li> <li>Basic competency in one or more programming languages</li> <li>Familiarity with data analysis tools (Jupyter Notebook, Microsoft Excel, etc.)</li> </ul>	X		X		X	X	X	

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			<ul> <li>disagree with expert judgement, or where a concept's performance might be limited by key factors.</li> <li>We expect that the applicant would have the opportunity to be involved in investigations to explore these discrepancies with simulation or subject matter interviews. We expect there would be opportunity to focus the work based on the applicant's interest and aptitude across simulation, data collection, mathematical modelling and analysis.</li> <li>Working over a three month period you would expect to contribute to one analytical activity.</li> </ul>									
SVP HADS 08	Fishermans Bend, Victoria	Mission Nutrition: Enhancing Military Dining Experiences.	A nutritious diet is critical for health and performance, and many military personnel consume meals from the mess. Consumption of a diet that supports health and performance requires nutritious food provision (supply) as well as strategies to encourage healthy food choice (demand). This project aims to evaluate the implementation of a healthy food supply policy, and behavioural strategies to promote healthy eating. Using food photography the aim of the project is to evaluate the food in an ADF mess against policy and make recommendations for improvements.	<ul> <li>Ability to work independently and in small teams and good communication skills</li> <li>Competent at using nutritional analysis software e.g. FoodWorks</li> </ul>	Curr An ir	ently onteres	enroll t in sp	led in ports	Bache nutrit	elor o	desira	l ∍tics. ∍ble
SVP HADS 09	Fishermans Bend, Victoria	Graphical User Interface for Advanced Framework for Simulation, Integration and Modelling (AFSIM).	<ul> <li>The Advanced Framework for Simulation, Integration and Modelling (AFSIM) is used to conduct modelling and simulation of systems, platforms, and behaviours throughout defence.</li> <li>There is a need to develop graphical user interfaces to improve the usability and human on the loop operations of AFSIM.</li> <li>The successful candidate will need to become familiar with AFSIM, conduct surveys of how AFSIM is used, and develop a strategy for integrating suitable GUIs so that users can better interact with AFSIM.</li> <li>The student will also have the opportunity to work with autonomous system and developing autonomous behaviours.</li> </ul>	<ul> <li>Strong software development skills (Python and/or C++)</li> <li>Strong knowledge of GUI design principles and human-computer interaction</li> <li>GUI Design and development (Web design, Qt Framework)</li> <li>Excellent communication and teamwork skills</li> <li>Knowledge of classical Artificial Intelligence paradigms as well as Machine Learning approaches, highly desirable</li> </ul>	X		X	x			X	
SVP PLAT 01	Adelaide (EDN) or Melbourne (FMB)	Autonomous Teaming and Swarming Behaviour Implementation for UAVs.	The Aerial Systems Autonomy team is the lead for UAV research at DSTG. This includes an extensive capability for delivering AI and autonomous behaviours onto UAVs for demonstration in live field trials. This project would explore using reinforcement learning to grow our toolkit of autonomous behaviours for different aspects of autonomous UAV missions. In collaboration with our team of autonomy researchers, relevant autonomous behaviours and control techniques will be identified, developed, and trained to control teams of UAVs through our autonomy stack and autopilot. This may include the extraction of information from on-board sensors to enable sensor driven behaviours. The behaviours will then be tested and refined on our digital test-range (simulation environment) before being demonstrated in live flight trials or on military exercises with our RAAF and Army partners.	<ul> <li>Software Development Skills (Python)</li> <li>General knowledge in Machine learning, Al and IT systems</li> <li>Robotics</li> <li>Ability to work in teams</li> <li>Willingness to participate in field or lab based flight trials</li> <li>Good verbal and writing skills</li> </ul>	X		x	x		x	X	
SVP PLAT 02	Eveleigh, New South Wales	Real-Time Sonar Mosaic Generation on Board an Autonomous Underwater Vehicle to Allow Single- Mission Anomaly Detection and Inspection.	Autonomous underwater vehicles fitted with high-resolution side-looking sonar are used to map the seabed for purposes such as maintenance and inspection of marine infrastructure. The raw imagery from these sonars must be geo-corrected and "mosaiced" together to form a map that is suitable for detection of anomalies that may indicate issues or interference. At present, the mosaicing process happens only after data collection. This project seeks to add an embedded mosaicing system to the online perception module, which will allow an AI-driven image inspection system to detect anomalies and cue the vehicle to revisit them with additional sensors. The work involves redeveloping existing off-line mosaicing software to work with data streaming from data streaming from an underwater vehicle's sonar and navigation system. There will also be an opportunity to develop behaviours to cause the underwater vehicle to re-inspect features of interest.	<ul> <li>Strong programming skills in a language such as C++ or Python</li> <li>An interest in image processing</li> <li>An interest in learning techniques in robotics and path planning</li> <li>Ability to work independently and in small teams</li> <li>Good communications skills</li> </ul>	X		X	X		X	X	

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SVP PLAT 03	Edinburgh, South Australia	Drone Tech Upgrade for Maritime Platform.	An autonomous maritime surface vehicle in DSTG requires a software refresh to allow it to benefit from modern drone technologies. The vehicle is a hardy and well-built platform that has the potential to be a robust test platform for maritime sensors and effectors, but it's UI and compute stack are limiting its usage. It requires a software upgrade, requiring the complete overhaul of its on-board computer, replacing it with open source drone technology such as Ardupilot. This project involves work on both hardware and software. Hardware includes both the existing proprietary computer hardware, Ardupilot cube orange boards and the vehicle's on-board propulsion and navigation systems. Software includes the existing proprietary UI software, C++ and Python coding, and new UI design and coding to replace the proprietary UI. Time permitting, the work will also involve the integration of the upgraded platform with a DSTG trial network, allowing the vehicle to be tested at field trials within wider Adelaide (day trips only, no overnight stay required).	<ul> <li>General electronics hardware handling and testing skills: soldering, testing using oscilloscope, using power supply, handling PCB boards</li> <li>Hardware: Ardupilot</li> <li>Software/coding: SDK, Ardupilot's Mission Planner, C++, Python, QGroundControl, MAVLINK</li> <li>Ability to work independently</li> <li>Good communication and writing skills</li> <li>Experience with drone control systems will be a bonus</li> </ul>	X		X	X			X	
SVP PLAT 04	Fairbairn, Canberra	Non-Lethal UAV Interdiction.	Air to Air UAV interception measures are increasingly used in current conflicts. The majority of the interdiction methods are kinetic and potentially lethal even when interdiction is successful. A gap exists for a close range interdiction approach that is non-lethal and can be used in a dense or urban environment whilst minimising the potential for collateral damage that is suitable against fast UAVs (>150knts). The scope of this research is comprised of a literature review of existing interdiction Air to Air approaches and the prototyping and experimentation of alternate close range non lethal mechanical and/or chemical interdiction approach. The Air 2 Air detection and tracking is outside of scope.	<ul> <li>Chemical, mechanical, electrical engineering, robotics</li> <li>Ability to work independently and in small teams</li> </ul>		x		X	x		x	
SVP PLAT 05	Fairbairn, Canberra	Prototyping and Simulating Biomimetic Drone.	<ul> <li>Filtering out flying objects such as birds as 'noise' whilst detecting and tracking UAVs is an important performance metric for Air Defence (AD) systems. This research seeks to exploit this performance requirement of AD systems to develop UAVs that biomimic the flight mechanics and signal signature of flying objects such as birds. Biomimiced UAVs are likely to penetrate AD and CUAS systems that are designed to filter them out. This will provide Defence new capability for long range strike, ISR, EW or loitering.</li> <li>The research is comprised of a number of options depending on the candidate's skill set and interests. These include a literature review on biomimetic UAVs including identification of kinematics datasets, simulation using Matlab and Gazebo of flight mechanics and kinematics, and/or early mechanical prototyping and testing of a biomimetic drone.</li> </ul>	<ul> <li>Robotics, autonomy, flight mechanics, kinematics, biomechanics, aerospace engineering and design</li> <li>Ability to work independently and in small teams</li> </ul>	X			X	X	X	X	
SVP PLAT 06	Fishermans Bend, Victoria	Object Detection and Tracking.	<ul> <li>This project will explore a range of Off the Shelf (OtS) computer vision packages for the task of detecting an object and estimating its pose (in camera frame), given a reference model.</li> <li>Further, this project will require the OtS software to be integrated into a proprietary software suit, running inside a secure development environment.</li> <li>Students applying for this project should have some experience in computer vision and/or a mature understanding of collaborative software development practices.</li> </ul>	<ul> <li>Programming in CPP and/or python</li> <li>Experience with a Unix based operating system</li> <li>Experience with (or a desire to learn about) computer vision</li> <li>Ability to work independently and in small teams</li> <li>Ability to be adaptive to work-package requirements</li> </ul>			X				x	
SVP PLAT 07	Fishermans Bend, Victoria	Operational Guidance Tool to Assure Structural Integrity of a Naval Ship.	Naval ships must be able to perform their missions in variable, and often harsh, sea environments. As such, ships are exposed to wave-induced cyclic loading and slamming impact loads, which degrades the structure over time and can lead to reduced operational readiness or technical capability. A shipboard guidance tool may assist a ship's crew in avoiding undesirable operational conditions, and also reduce unplanned maintenance of the hull. This research project involves the evaluation of ship structural responses to various wave heights, and at different speeds, using a coupled hydrodynamic-structural (finite element) modelling tool. As a	<ul> <li>Numerical modelling and data analysis using Python</li> <li>Basic understanding of structural mechanics and loading</li> <li>Ability to work independently and in small teams</li> <li>Good communications skills</li> </ul>	X		X			Х	X	

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			large database of results is required to be generated to represent the possible operational profile of the ship, data processing and analysis are expected to be undertaken using Python or similar tool. Development of the tool will also entail engagement with Defence stakeholders, to ensure the tool will meet end-user requirements.	<ul> <li>Professional report writing skills</li> </ul>								
SVP PLAT 08	Fishermans Bend, Victoria	Development of Electric Motor Test Bench.	Electric motor are widely used in modern military platforms including autonomous systems, naval ships and electric vehicles. As such it is important to be able understand the performance of these systems, and how to optimise their use in different applications. The candidate will work with a team of researchers and technicians to commission, refine and conduct experiment on DSTG motor test benches. This will involve developing simulation models for different motors using various simulators and multi-physics software, and development of control system in micro and FPGA controllers. The work would also involve significant experimental components where the candidate will perform measurement on multi-tens of kilowatt electric motor systems, to determine its efficiency and vibro-acoustic behaviour.	<ul> <li>Numerical modelling and data analysis using Matlab, circuit simulators and FEA software</li> <li>Microcontroller and FPGA development</li> <li>Experience with motor drivers and power electronics converter</li> <li>Ability to work independently and in small teams</li> <li>Good communications skills</li> </ul>			X	X		x	X	
SVP RTO 01	Fishermans Bend, Victoria	Safety in Defence Research: Co- designing a Verification Program for Next-Generation Plant and Equipment Management.	The DSTG Safety Team collaborates with researchers and partners across all areas of DSTG to enhance safety outcomes in Defence research through the provision of professional safety advice and assistance. The project is seeking a safety-interested student with an engineering or mechanical background to redefine the concept of "Plant and Equipment" in a novel research environment. The student will have the opportunity to co-design and lead a verification program, focusing on gathering legislated and organisational assurance data to improve the management of Plant and Equipment. Additionally, the student will develop a contextualised training package for the Group's Plant Management Software package, MEX.	<ul> <li>Occupational Health and Safety studies</li> <li>Interested in work, health and safety (WHS)</li> <li>Systems thinking</li> <li>Ability to engage with stakeholders across the organisation</li> <li>Demonstrable verbal and written communication skills</li> <li>Ability to work independently and in small teams</li> </ul>					X		X	
SVP RTO 02	Edinburgh, South Australia	Building, Developing and Mobilising the Defence Science and Technology Workforce to Enhance Defence Capability.	In response to challenges in the strategic environment, it is vital to build, develop and mobilise the Defence science and technology workforce to enhance defence capability. This project will involve using evidence-based decision making to inform organisational interventions in areas such as culture change, talent development, and diversity and inclusion. The project may involve collecting human data using methods such as surveys, focus groups or interviews, and may also involve analysing existing data.	<ul> <li>Experience with collecting and analysing data from humans, using qualitative and/or quantitative methods</li> <li>Demonstrated verbal and written communication skills</li> <li>Ability to work independently and in small teams</li> <li>Ability to engage with stakeholders across the organisation</li> </ul>								X
SVP RTO 03	Fishermans Bend, Victoria	Defence Communications – the STEM Pipeline.	Enhancing the STEM pipeline for Australia is critical in ensuring that Defence and DSTG has access to the best talent. We are seeking a budding communication student who is passionate about STEM to work with the outreach and engagement team in development and delivery of a major conference for entry level students. They will also take a leading role in the design of a communications plan for 2026 with a focus on outreach and engagement.	<ul> <li>Communication planning and implementation, event management, collaborative teamwork, graphic design, good oral and written skills</li> </ul>	Enrol Mana in Sci	lled in ageme ence (	a Bacl ent or Comm	helor c Comm unicat	of Busir Junicati ions is	ness ions. A desira	n intei ble.	rest