Project Code	Project Location	Project Title	Project Description	Tasks/Duties Required	Relevant Research Area (academic disciplines)	Other Desirable Skills (programming/desktop)	General Information (personal requirements/academic qualifications)
SVS AD 01	**FISHERMANS BEND**	**Implementation and verification of a high-quality aircraft flight dynamic model**	DSTO undertakes flight simulation and performance analysis to support Defence acquisition, operation and sustainment. The aim of this project will be to implement a high-quality aircraft model that is compatible with DSTO software, and undergo verification and validation (V&V) on the model to show that it can be reliably used and distributed. This project will support collaborative work between DSTO and NASA, with potential for the aircraft model to be used as a baseline for the V&V of flight simulation software.	Flight simulation and computational analysis; programming; data analysis; report writing.	Aerospace Engineering. Mechanical Engineering.	Familiarity with aircraft flight dynamics, performance or simulation.	A minimum of three years study in a relevant discipline; aptitude for teamwork as well as ability to work independently.
SVS AD 02	**FISHERMANS BEND**	**Helicopter Advanced Fatigue Test Technology Demonstrator (HAFT-TD)**	DSTO has an ongoing program, the goal of which is to demonstrate the capability to perform a full-scale fatigue test on a Helicopter platform. The successful candidate will provide support to this program as needed. Depending on the progress of the program, this may include support to airframe loads and spectrum development, test-rig conceptual design, and laboratory trials specific to high speed fatigue testing.	• Review of relevant literature • Assisting with laboratory trials / coupon tests • Document work as an internal DSTO publication, present to relevant people within the division.	Aerospace Engineering. Mechanical Engineering and related disciplines.	• Material testing experience (fatigue) • Effective written / oral communication skills • Ability to operate effectively in a team environment.	Experience in a technical or engineering problem solving team is desirable (in an academic context or otherwise). High academic achievement is regarded favourably.
SVS AD 03	**FISHERMANS BEND**	**Development of a background oriented schlieren (BOS) system for the DSTO Transonic Wind Tunnel**	DSTO aims to implement a Background Oriented Schlieren (BOS) system for its transonic wind tunnel (TWT) facility in order to achieve Schlieren imaging (density field) for problems were optical access and therefore traditional Schlieren is not feasible. The project will involve both practical and computational aspects, aimed at enhancing the DSTO BOS capability in conducting scientific testing and research.	Post process BOS data from the TWT facility and develop an algorithm to correct for tunnel vibrations. Produce a set of requirements for a new camera and lighting mount. Perform preliminary design of camera and lighting mount.	Aerospace/ Mechanical Engineering	Experimental aerodynamics, fluid mechanics, programming, optics, Matlab, design	
SVS AD 04	**FISHERMANS BEND**	**High Resolution Particle Image Velocimetry (PIV) and Image Blending**	Particle Image Velocimetry (PIV) is a laser diagnostic flow measurement technique that is being increasingly used in the DSTO low speed wind tunnel. The technique has a wide range of applications, including investigating the flow around aircraft and underwater vehicles. The project will involve both practical and computational aspects, aimed at enhancing the DSTO PIV capability in conducting scientific research.	The computational work will involve improving an algorithm designed to blend multiple PIV velocity fields and comparing PIV data with computational fluid dynamics (CFD) results. The practical work will consist of design and development of a PIV camera to lens adapter for conducting high resolution PIV measurements. The student will then perform an assessment of the high resolution lens by conducting an experimental study in a DSTO wind tunnel.	Aerospace/ Mechanical Engineering	Experimental aerodynamics, fluid mechanics, programming, optics, Matlab, design	
SVS AD 05	**BRISBANE**	**Lithium Ion Battery Management Hardware for Hypersonic Flight Vehicle**	Design and verification of battery monitoring hardware for lithium ion battery packs. The monitoring hardware must protect cells from Overcharge, over-discharge, and must maintain cell balance throughout the pack lifetime. Importantly the hardware must be flight ready.	Background or literature review of plausible solutions, initial electronics design of solution, prototyping of proposed design.	Electrical Engineering, Electronics Engineering, Mechatronics Engineering, or other relevant disciplines.	Electronics Design, familiarity with Altium Designer software packages.	
SVS AD 06	**BRISBANE**	**Real Time Encryption and Encoding of a Digital Telemetry Stream**	Design and verification of a real-time encryption and encoding scheme of a digital telemetry stream.	Background or literature review of industry solutions, initial software design that simulate both the encryption and decryption of the digital stream. Initial design simulations can be undertaken in MATLAB, C++, JAVA, Python, or other computer languages.	Software Engineering, Computer Systems Engineering, Computer Science, or other relevant disciplines.	Software development skills	
SVS CEWD 01	**EDINBURGH**	**NeedleShark - Searching for specific network protocols across large numbers of packet capture files.**	Network research often requires the analysis of rare or unusual traffic hidden deep within enormous datasets. The Needleshark software suite has been developed to provide researchers with easy access to the information they require, but is currently incomplete. NeedleShark makes use of the popular Wireshark open source network protocol analyser tool. Needleshark uses a client-server architecture. The server, known as Haystack, contains a repository of packet capture files. The client allows researchers to search Haystack for specific network protocols using a browser-based web interface. The search results are combined into a new packet capture file which can then be viewed with Wireshark. Haystack's design includes the ability to distribute searches across multiple servers and aggregate the results. This has not yet been implemented. The aim of this project is to complete Needleshark and deploy it for use within DSTO.	• Implement additional functionality in the web interface; such as autocomplete, job tracking, resource prediction and file management. • Implement distributed search functionality. • Prepare and develop testing procedures. • Create installation packages for easy deployment. • Update documentation.	• Computer Science • Software Engineering	• A strong background in Java, C++ and/or C is essential. • Some experience using Linux. • Some experience in AJAX and HTML5. • A familiarity with internet protocols is desirable.	• Able to work independently. • Willing to learn new skills. • Comfortable solving unfamiliar problems.
SVS LD 01	**FISHERMANS BEND**	**Evaluating the ballistic performance of a range of steel grades**	High strength and high hardness steels are the most commonly used materials in ballistic armour. They offer protection at a low cost, with high structural performance and relatively low environmental sensitivity (e.g. to abrasion, corrosion, thermal cycling, etc). Typically, for military land vehicles, ballistic performance is characterised through impact testing against armour piercing and fragmentation threats. These two threats provide a very different loading condition on the armour, and complicate the selection of an ideal steel grade.	In this project the student will be required to characterise the protective capability of a range of steel grades against an armour piercing and fragmentation threat through ballistic testing with a DSTO senior technical officer. The failure surfaces of the steels will be examined (e.g. microscopy, etching, etc) and the failure mechanisms will be characterised, e.g. adiabatic shearing, ductile plugging etc. The performance of the steels will then be evaluated against comparable test data to understand differences between materials from different steel manufacturers.	Mechanical Engineering, Aerospace Engineering, Metallurgical Engineering, Materials Science, Applied Physics		
SVS LD 02	**FISHERMANS BEND**	**Evaluation of armour steel for blast protection**	In this project the student will evaluate a range of armour steels to help determine the blast protection they will provide to an armoured vehicle. The project will look at both the suitability of different test techniques to evaluate blast protection as well as the links between material properties obtained from mechanical tests and the materials performance under blast loading.	* Literature Review of Blast Testing Techniques * Numerical modelling of armour steel performance and comparison with experiments. * Mechanical testing of armour steel specimens.	Mechanical/Aerospace Engineering Materials Engineering Materials Science - Metals	Exposure to FEA and/or CFD Exposure to mechanical testing of material properties	

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SVS LD 03	**SCOTTSDALE**	**Investigation into the development of rancidity in cereal-based products.**	The aim of this project is to determine the level of rancidity in cereal-based products that have been held under a range of storage conditions and to examine influential factors such as ingredients, temperature and water activity. Cereal-based products, such as noodles, biscuits and breakfast cereal, are important components of combat ration packs (CRP). The development of rancidity during the period between manufacture and consumption can affect acceptability and therefore consumption rates. The purpose of this project is to assist in the establishment of performance criteria for cereal-based components of CRP.	The requirements for this project will be: * Undertake a brief literature review into the types, causes and measurement of rancidity in cereal-based products. * Conduct rancidity determinations on samples of cereal-based products; interpret and report results * Present findings to a DSTO audience.	Food Science and Nutrition	Experience with and/or an interest in: * Food product development/analysis. * Ability to communicate ideas and findings to a range of audiences (scientific/academic, military) using both written and oral means.	This project is targeted at students in their penultimate year of study.
SVS MD 01	**FISHERMANS BEND**	**Sensitivity analysis for the consideration of redundant systems in the probabilistic vulnerability assessment of naval platforms.**	The Naval Platform Survivability Group, Maritime Division, DSTO, requires an undergraduate student to investigate the sensitivity of redundant systems in the assessment of naval platform vulnerability. The study will involve employing specialist vulnerability software tools to model the ship systems and their functional relationships. Next, consequence analysis to determine the system state (fail or successes) under consideration of various damage scenarios is performed.	• Literature review on ship vulnerability and reliability assessment methodologies • Familiarity with specialist software tools • Carry out analysis • Report writing and presentation	• Familiarity with naval ship structures and systems • Familiarity with reliability analysis	Computing skills	
SVS MD 02	**FISHERMANS BEND**	**Graphical User Interface for Planning Damage Control Response Actions.**	The Naval Platform Survivability Group, Maritime Division, DSTO, requires an undergraduate, 3rd year student, with software engineering skills, to develop a Graphical User Interface (GUI). The GUI will facilitate the generation and analysis of response networks for planning damage control on Royal Australian Navy ships. The response network is synonymous with decision trees and event trees. The GUI will have two primary functions: (1) the user may input a response network, with associated statistics on various paths and nodes within the network; and (2) a user may interact with an existing response network to choose their damage control response option upon being presented with a set of observations to assess the effect of their actions. In the case of the second function, the software will be required to record the user selected options and the time taken to make the decision. Damage Control response networks can be quite extensive, so novel solutions will be required to store the network and to also visualise the network on a limited resolution GUI.	1. Development of a GUI to visually generate a damage control response network. 2. Development of GUI to interact with an existing damage control response network. 3. Write a user manual documenting how to generate and interact with the damage control response network interface.	Software engineering, software programming.	1. An understanding of graph theory; and 2. An understanding of artificial intelligence techniques (in particular Hierarchical Task Networks, and Partially Observable Markov Decision Process).	
SVS MD 03	**FISHERMANS BEND**	**Development of relationships between performance and design aspects for naval patrol boats.**	The decisions made during the conceptual phase of naval ship design, often related to design and performance attributes, can have a significant effect on the military effectiveness of a ship. The Defence Science and Technology Organisation is currently undertaking a project to develop an approach that helps to inform decision makers during the conceptual design stage. The tool supports the design process by providing a rudimentary design space that is linked to mission effectiveness. This linkage is achieved using parametric and surrogate relationship models. These models can subsequently be used in simple numerical simulations of naval missions to evaluate the performance of the design relative to the design space. The aim of the summer vacation student (SVS) project is to develop a set of parametric and surrogate models for a naval patrol boat conceptual design. The student will be responsible for collecting and generating relevant data then, with input from the supervisor, identify trends and relationships between performance and design aspects within the data. The student will also be responsible for developing a simple numerical model to simulate a typical patrol boat mission using the relationship set that has been identified.	Literature review and collection of relevant data Establishing the scope and aim of the project ANALYSIS Identification of trenAds and relationships within the data Development of an a simple numerical model of a typical patrol boat mission Conducting experiments using the simple numerical model Post-processing of experiment results Preparation of a draft report/presentation Comment and feedback provided Finalization of report and presentation	Naval Architecture, Mathematics, Mechanical Engineering	Familiarity with statistical analysis techniques, such as regression analysis. Familiarity with software tools, such as Matlab, MS Excel and MS Word.	A student currently enrolled to obtain a bachelor degree in relevant disciplines. Preferably the student should have an understanding of ship geometry and design.
SVS MD 04	**FISHERMANS BEND**	**The effect of loading frequency on the amount of intergranular fracture and crack growth rate at specified levels of stress intensity factor in structural steel**	A sound underpinning knowledge of material mechanical properties is crucial to making informed decision regarding the design and acquisitions of major Naval assets such as ships and submarines. This project is part of ongoing work to inform the fundamentals of fatigue crack growth behaviour of materials for Naval platforms. The student will perform fatigue testing on steels to obtain crack-growth rate data at a variety of frequencies. This data with validate an experimental test set-up for future experimentation. The fracture surfaces will be analysed using optical and scanning electron microscopy to characterise the crack morphology. The students will work directly with DSTO staff to carry out testing and microscopy and asses the percentage of intergranular fracture. A detailed report will be written by the student to describe the experimental techniques and results.	Familiarisation with provided literature, gaining an understanding of relevant fatigue testing standard, operation of an electrically driven test instrument and associated software, analysis of test data, Fractographic analysis using optical and scanning electron microscopy, materials characterisation and scientific report writing	Materials Science or Engineering, Physics or Mechanical Engineering	Excel or other data manipulation software familiarity Scientific writing	A minimum of three years of study in a relevant discipline; aptitude for teamwork as well as ability to work independently; desire to work in a research environment
SVS MD 05	**EDINBURGH**	**Real-time Assimilation of Geographically dispersed ocean SVPs for enhanced 3-D ocean modelling**	The performance of ship sonar systems is highly dependent on the temperature of the ocean. Sonar trials take account of this by measuring temperature at various depths across the area in which these trials take place. These measurements are made using expendable bathythermograph (XBT) probes dropped from trials ships and with autonomous ocean gliders that send data back via satellite.	Maritime Division would like a student to develop some software that organises and visualises this information live. Depending on the rate of progress, this will involve: 1. Reading XBT and GPS data from a file written by existing XBT interface software. 2. Reading Glider temperature and GPS data from a file written by existing Glider interface software. 3. Visualising the temperature and GPS data: a) At a selected Latitude/Longitude location. b) Along a transect between two locations, using an	Sonar, oceanography, GIS	C++, Matlab, GIS database design	

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				interpolation algorithm developed with DSTO staff. 4. Creating a composite file of XBT, GPS and Glider data for export to other code. 5. Extending the existing XBT interface software to log sea surface temperature using a temperature probe. 6. Write a report assessing the implementation and recommend improvements.			
SVS MD 06	**EDINBURGH**	**Environmentally Adaptive Binary Classification Techniques for Underwater Acoustic Signals**	An important task in sonar system operations is separating detections caused by objects of interest (man-made) from irrelevant detections caused by other (natural) objects. It can sometimes be possible to classify an object into interesting and uninteresting by careful examination of the acoustic return that allowed the object to be detected. Unfortunately acoustic propagation in the sea imposes a highly variable distortion upon returns from underwater objects. This project is to investigate the degradation of acoustic object classification by the environment. It is also to determine if incorporating environmental measurements into the analysis of acoustic returns can improve classification accuracy.	The student will be required to assist with measurement of acoustic returns from laboratory models in a test tank. They will then use existing tools to identify features of the returns that distinguish between objects made from different materials. They will use an existing underwater propagation model to examine the distortion that undersea propagation imposes on these features and the resultant ability to distinguish the objects. They will attempt to use knowledge of the ocean environment to compensate for the degradation.	Electrical/Electronic Engineering Applied mathematics, statistics	Programming Skills in MATLAB Signal processing knowledge would be useful but is not required or expected.	
SVS MD 07	**EDINBURGH**	**Development of a method for the generation of wide-band acoustic transmission for undersea acoustic scattering measurements**	The use of wideband acoustic pulses has become a topic of interest in active sonar because it may lead to improved echo detection and classification. Conventional active sonar systems generally operate in a narrow-band mode. Research has shown several approaches in generating wideband transmitting signals which have nearly uniform magnitude as a function of frequency. This can be done by pre-compensating the electrical driving input of the transmitting pulse or to de-convolve with the transmitting signal so that the desired acoustic output pressure waveform maybe achieved. The student participating in this project will work in a multi-discipline team to refine the requirements, implement and perform some rigorous experimental experiments in the Maritime Division's Underwater Acoustic Scattering Laboratory as well as analyse the data and document the findings.	- Become familiar with underwater acoustic and sensor technologies. - Refine the preliminary designs. - Develop and implement the approach. - Test and integrate the capability. - Document the technique.	- Electrical&Electronic Engineering - Software Engineering, Computer Science - Computer - Systems Engineering.	- Knowledge of analog and/or digital filtering, correlation functions, Fourier Transforms. - Programming Knowledge of: Matlab, LabVIEW	
SVS MD 08	**EDINBURGH**	**Underwater Acoustic Ray Tracing in OpenGL**	The aim is to implement acoustic ray tracing in OpenGL to run on a Graphics Processing Unit (GPU). Current GPU architectures lend themselves to the type of parallel processing needed to calculate the many thousands of acoustic ray paths necessary to make real time forecasts of SONAR performance.	1. Work with DSTO scientists and engineers to define the requirements, algorithms and software architecture needed. 2. Implement a simple ray tracing algorithm in OpenGL/Qt/C++ to verify the feasibility of the approach. 3. Review the approach/architecture and modify as necessary. 4. Implement the ray tracing algorithm. 5. Test the implementation against the requirements. 6. Write a report assessing the ray tracing implementation performance and recommend improvements.	Sonar, real time processing and architectures.	C++, Qt, OpenGL, mathematics.	
SVS MD 09	**SYDNEY**	**Development of an advanced photonics-based magnetic sensor**	Photonics is a fast growing field and it has led to various disruptive military capabilities. A number of critical defence applications using photonics technologies, e.g. stealth, secure communications, countermeasures, and remote sensing, have been developed and demonstrated at many research institutes and defence organisations such as Defense Advanced Research Projects Agency (DARPA). Additionally, Defence Science and Technology Organisation (DSTO), Australian Department of Defence has recently employed photonics in numerous remote sensing applications, including hyperspectral imaging and electro-optic hydrophone. An optical fiber-based sensor, whose fiber glass is the sensing element, has been considered as an alternative approach which offers numerous advantages over electronic methods, namely electromagnetic interference immunity, compactness, relatively short acquisition time, and multiple spatially-separated sensors configured as a sensing network. Thus, the aim of this project is to develop a highly sensitive photonics-based magnetic sensor. The key component of this device is a two-dimensional photonic crystal fiber (PCF) modified with magnetostrictive materials such as metals, metallic liquids, or vapours. This fiber-based approach is made viable by the enhancement of the light-matter interaction within a resonant optical cavity, which would enable ultra-high sensitivity of the sensor. Additionally, the relative compactness, robustness, and low power consumption of a fiber-based sensor makes it ideal for many defence sensing applications.	Perform various numerical studies of a photonic crystal nanostructure-based magnetic sensor via Matlab and COMSOL Carry out some experiments to characterise a commercial magnetic sensor and a state-of-the-art photonics-based magnetic sensor	Photonics Physics Electrical and Electronics		
SVS MD 10	**SYDNEY**	**Mission IM-possible**	Field robotics are increasingly being adopted by Defence forces to do "dull, dirty and dangerous" jobs like detection and neutralisation of mines. Robotic mine disposal on land is relatively straightforward, since the devices can be visually monitored and driven by remote control. However, radios and cameras don't work very well underwater, so robots looking for sea mines have to be a bit smarter and make the most of the few opportunities there are for communication. Typically, control of underwater robots involves a good deal of detailed mission pre-planning on the keyboard, something most people would rather not have to do. On the other hand, people generally like talking on their mobile phones, or using online chat ('instant messaging' or IM). Wouldn't it be great if we could chat to our	The task is to develop a mobile phone app to perform mission planning for a REMUS 100 unmanned underwater vehicle. Use of existing mobile apps, open source code or online tools (such as Google maps) is encouraged. From a science and technology perspective, the challenge will be to make best use existing "real estate" on a smart phone screen (preferable) or tablet, and communicating the minimum amount of information required to complete a mission. An interesting aspect of the problem involves how machine intelligence can be used to minimise the load on	Mechatronics Command & Control	Java programming Android O/S or similar Image/signal processing Mobile communications Geospatial Information Management	While a mobile phone app may be more appropriate for the control of ground or air robots, this task will demonstrate proof-of-concept, application and feasibility in the most difficult case of infrequent and/or low bandwidth communications, and will provide useful guidance towards a general

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			robots as well?	the mobile phone app. For example, the solution will consider how and when a robot should report its status, including any departures from the original mission plan (e.g., "I found something interesting, shall I investigate?" or "I thought I found something interesting. I had a look, but now I think it's not important. Here's why..." An initial course of action will consist of (1) replicating some or all basic "real-time" commands (e.g., "start/run", "abort", "request mission status") currently available with the REMUS RANGER acoustic modem; (2) developing an interface to announce/display vehicle responses; and (3) conducting a careful analysis of concepts of operations, such as when to use a mobile phone rather than a laptop.			framework for ubiquitous mobile communications with robotic systems.
SVS MD 11	**FISHERMANS BEND**	**Shock isolator performance on naval platforms subjected to underwater explosions**	This project will investigate the dynamic response of a shock isolated raft in terms of the mitigation of shock loads transmitted to equipment.	1. Learning to use computer modelling software 2. Generating a computer model 3. Running the model to generate structural response results.	Mechanical Engineering Applied Physics Mathematical modelling	Excellent computer skills, report writing and presentation experience.	
SVS MD 12	**FISHERMANS BEND**	**Ultimate Strength Assessment of A Surface Combatant**	Several important developments in naval surface combatant design have occurred in recent years, including the appearance of welded aluminium hulls and novel hull forms; the adoption of classification society design rules for naval construction; and the inclusion of requirements for ultimate strength in naval design standards. Furthermore, it is increasingly expected that naval vessels be designed to operate in a damaged condition – albeit at a reduced level. Thus, explicit limit state criteria for residual hull girder strength in damaged condition are now established. Verifying that new designs satisfy these criteria requires the assessment of structure in a damaged condition, and this is a driver to improve analysis tools as well as improve understanding of how to apply the tools in the presence of possible complex damage geometries. In this project, ultimate/residual strength of a naval surface combatant design will be performed using compartment based Ultimate Strength Assessment method in MAESTRO and/or a nonlinear FE method such as TRIDENT. The study will utilise the design based on the US notional destroyer (this is unclassified data which was previously used in an ISSC 2012 study) for the assessment of ultimate strength in the intact and pre-agreed damaged conditions. The intact design assessment will also be carried out for a series of design variants featuring different sizes of transverse framing. Design variants with smaller transverse frames are more likely to collapse in an overall, or grillage, mode, and are therefore of greater relevance to unconventional designs.	Literature review on Ultimate strength of ships Establishing the aim ANALYSIS Development of surface combatant baseline design and design variants. Identification of damage cases to be assessed and methods to be used Analysis of intact cases Analysis of damaged cases Preparation of a draft report Comment and feedback provided Finalization of report and presentation	Naval Architecture, Marine Engineering, Structural Engineering, Mechatronics, Civil Engineering	Familiarity with Finite Element Modelling and Analysis tools, Excel, Word, familiarity with ship structure and its systems.	A student currently enrolled to obtain a bachelor of engineering degree in relevant disciplines. Preferably the student should have completed his/her first three years of studies and progressed to their final year of study.
SVS MD 13	**STIRLING**	**Investigation of Using PVDF Films for Modal Shape Measurement.**	The resonant frequencies of a structure are conventionally measured using accelerometers positioned at various locations on the structure. One problem with this is that the mass of the accelerometers themselves can change the natural frequencies of the object being measured. These effects can be eliminated by using a laser interferometer to scan the surface but this equipment is expensive and cumbersome to use. This project will involve using a thin film of piezoelectric Polyvinylidene fluoride (PVDF) to investigate the feasibility of using it to measure the surface vibration of a vibrating plate. The results will be compared to existing conventional results done on the same plate using accelerometers and laser interfermometry.	The successful applicant should be competent (and/or have a keen interest) in experimental methods in acoustics and vibration.	Physics, Engineering	A good knowledge of Matlab and A/D acquisition systems would be desirable.	The project will be conducted at HMAS Stirling, Garden Island (GI), WA. This is situated 50km South of Perth. There is a bus shuttle service from Rockingham train station to GI that runs in the early morning and late afternoon for those needing to use public transport.
SVS MD 14	**STIRLING**	**Construction and Characterisation of a 3-axis Underwater Vector Geophone Sensor.**	The objective of this project is to construct and evaluate a stand-alone 3-axis geophone sensor suitable for measuring low frequency interface waves at the water/ seafloor boundary. In such a situation (fluid/solid) the type of wave that can propagate at the interface is called a Scholte wave. These waves have similar properties to Rayleigh waves and can propagate for very large distances with little attenuation. The sensor in this project will be designed to measure such waves and investigate it's capability for detecting and classifying low frequency sources at large distances. One example would be the detection of blue whale vocalisation off our local coastline. Provided time permits the sensor will ideally be configured via an on board Arduino (or equivalent) microcontroller thus allowing it to be deployed on the seabed as a stand-alone unit.	The successful applicant should enjoy hands on experimental work and have an interest in underwater acoustics.	Physics, Engineering.	A knowledge of Matlab and A/D acquisition systems would be desirable. Some experience with Arduino and Beagle Board microcontrollers would also be an advantage.	The project will be conducted at HMAS Stirling, Garden Island (GI), WA. This is situated 50km South of Perth. There is a bus shuttle service from Rockingham train station to GI that runs in the early morning and late afternoon for those needing to use public transport.
SVS NSID 01	**EDINBURGH**	**ADSS Hypertemporal Imaging (HTI)**	Imaging sensors employed at frame rates well beyond standard video can provide a unique method for exploitation of interesting temporal phenomena. This project is looking for two highly motivated individuals to expand upon existing ADSS developed Hypertemporal Imaging (HTI) algorithms by providing advanced processing capabilities through implementation and development of other spectral techniques such as those used for hyperspectral exploitation.	• Become familiar with HTI concepts. • Become familiar with the ADSS framework and existing HTI implementation • Collaborate with researchers and software developers to augment the development of advanced HTI processing capabilities	Signal Processing, Mathematics, Computer Science, Software Engineering, Electrical & Electronics Engineering, Computer Vision	Experience with and/or an interest in: • Signal and/or Image Processing techniques • Matlab • C/C++ software	Team software project experience is desirable as well as an interest in open source software. High academic achievement is regarded favourably.

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			The Analysts' Detection Support System (ADSS) is a successful Australian GEOspatial INTelligence (GEOINT) data processing software platform in national and international operational use. The system contains a sophisticated computational and high transaction data processing engine within a custom web application framework. Target detection algorithms and the majority of the framework are implemented in C/C++. The software is typically developed and deployed on x86_64 Linux platforms using open-source tools.	• Gain an understanding of existing hyperspectral techniques and develop methods for applying them to HTI data • Develop required algorithms in Matlab and/or C/C++ • Transition algorithms to the ADSS HTI Processor and evaluate its performance • Document the design, implementation and results of the project • Demonstrate the application of the algorithm to the Intelligence Systems Branch		development • Linux as a development platform • Software version control	
SVS NSID 02	**EDINBURGH**	**ADSS Hypertemporal Imaging (HTI)**	Imaging sensors employed at frame rates well beyond standard video can provide a unique method for exploitation of interesting temporal phenomena. This project is looking for two highly motivated individuals to expand upon existing ADSS developed Hypertemporal Imaging (HTI) algorithms by providing advanced processing capabilities through implementation and development of other spectral techniques such as those used for hyperspectral exploitation. The Analysts' Detection Support System (ADSS) is a successful Australian GEOspatial INTelligence (GEOINT) data processing software platform in national and international operational use. The system contains a sophisticated computational and high transaction data processing engine within a custom web application framework. Target detection algorithms and the majority of the framework are implemented in C/C++. The software is typically developed and deployed on x86_64 Linux platforms using open-source tools.	• Become familiar with HTI concepts. • Become familiar with the ADSS framework and existing HTI implementation • Collaborate with researchers and software developers to augment the development of advanced HTI processing capabilities • Gain an understanding of existing hyperspectral techniques and develop methods for applying them to HTI data • Develop required algorithms in Matlab and/or C/C++ • Transition algorithms to the ADSS HTI Processor and evaluate its performance • Document the design, implementation and results of the project • Demonstrate the application of the algorithm to the Intelligence Systems Branch	Signal Processing, Mathematics, Computer Science, Software Engineering, Electrical & Electronics Engineering, Computer Vision	Experience with and/or an interest in: • Signal and/or Image Processing techniques • Matlab • C/C++ software development • Linux as a development platform • Software version control	Team software project experience is desirable as well as an interest in open source software. High academic achievement is regarded favourably.
SVS NSID 03	**EDINBURGH**	**Advanced Web Application Development**	The Evolutionary Layered ISR Integration eXemplar ARchitecture (ELIIXAR) is a hardware/software stack that is comprised of a number of layers including both a services layer and a visualisation layer. The visualisation layer consists of a number of 'widgets', which are modular web applications designed to work with other widgets to allow users to visualise and manipulate data in a web browser. Widgets often rely on services in the services layer to perform any computationally complex functions. This project (x3) will focus on extending current ELIIXAR functionality by adding features to current widgets and developing new widgets. As part of this project, students will also be required to develop or extend services to support the new widget functionality.	Software Development, Documentation, Team work, Technical Presentations.	Software Engineering. Computer Science.	Java, Java EE, JavaScript, HTML / HTML 5, CSS Android SDK.	Student studying in a software engineering related field.
SVS NSID 04	**EDINBURGH**	**Advanced Web Application Development**	The Evolutionary Layered ISR Integration eXemplar ARchitecture (ELIIXAR) is a hardware/software stack that is comprised of a number of layers including both a services layer and a visualisation layer. The visualisation layer consists of a number of 'widgets', which are modular web applications designed to work with other widgets to allow users to visualise and manipulate data in a web browser. Widgets often rely on services in the services layer to perform any computationally complex functions. This project (x3) will focus on extending current ELIIXAR functionality by adding features to current widgets and developing new widgets. As part of this project, students will also be required to develop or extend services to support the new widget functionality.	Software Development, Documentation, Team work, Technical Presentations.	Software Engineering. Computer Science.	Java, Java EE, JavaScript, HTML / HTML 5, CSS Android SDK.	Student studying in a software engineering related field.
SVS NSID 05	**EDINBURGH**	**Advanced Web Application Development**	The Evolutionary Layered ISR Integration eXemplar ARchitecture (ELIIXAR) is a hardware/software stack that is comprised of a number of layers including both a services layer and a visualisation layer. The visualisation layer consists of a number of 'widgets', which are modular web applications designed to work with other widgets to allow users to visualise and manipulate data in a web browser. Widgets often rely on services in the services layer to perform any computationally complex functions. This project (x3) will focus on extending current ELIIXAR functionality by adding features to current widgets and developing new widgets. As part of this project, students will also be required to develop or extend services to support the new widget functionality.	Software Development, Documentation, Team work, Technical Presentations.	Software Engineering. Computer Science.	Java, Java EE, JavaScript, HTML / HTML 5, CSS Android SDK.	Student studying in a software engineering related field.
SVS NSID 06	**EDINBURGH**	**Geo-locating Targets from Video Tracking**	Target tracking is the process where surveillance sensor measurements are used to answer questions such as "how many targets are there?", "where are they located?" and "where are they going?" Video Moving Target Indication can track multiple targets from video imagery of a road network by identifying changes from frame to frame over a series of video images. Pixel positions for targets in these images are known; however, it is not easy to obtain the absolute latitude and longitude of targets or their location in the road network accurately. Your contribution will help us develop a method for accurately locating a target. Possible solutions involve the registration of images and the tracking of features in an image to extract the road network. The knowledge of a target's absolute position enhances models used for tracking, the stitching of track segments representing a single target and identifying anomalous behaviour.	Researching and implementing algorithms using tools such a MATLAB, Elastix and OpenCV. Testing using real sensor data. Producing and documenting results.	Image Processing, Computer Systems Engineering, Electrical and Electronic Engineering	Programming skills, preferably using MATLAB.	Solid background in Mathematics (probability theory, linear algebra)

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SVS NSID 07	**EDINBURGH**	**Imaging radar texture exploitation**	Imaging radar systems are capable of generating fine-resolution imagery of a scene and find use in a wide variety of civilian and military applications. Typically, radar returns from natural land or ocean scenes are described by single point statistics for which suitable statistical models have been developed and are routinely employed for automated scene classification, target detection and image segmentation. Modern radar systems, however, offer unprecedented resolutions such that highly variable radar returns can now be observed from scenes that were previously considered homogeneous: this raises questions as to the applicability of existing models and whether newer approaches may be better able to exploit finer-resolution radar images. In this project, the candidate will examine the use of texture and spatial variability in radar imagery with a view to improving techniques for radar image processing and exploitation.	Under direction from the project supervisor the candidate will be expected to undertake literature reviews to develop an understanding of imaging radar techniques and the properties of radar images. The candidate will implement algorithms in software and apply these to simulated and real radar data. Under guidance the candidate will interpret the results and produce a report and presentation on their findings.	Electrical engineering, maths/statistics, physics	Working knowledge of MATLAB (or similar technical computing environments) or C programming languages. Good mathematical/statistics background.	
SVS NSID 08	**EDINBURGH**	**Web 2.0 interactive development for the ADSS GEOINT system.**	The Analysts' Detection Support System (ADSS) is a successful Australian GEOspatial INTelligence (GEOINT) data processing software platform in national and international operational use. The system contains a sophisticated computational and high transaction data processing engine within a custom web application framework. The ADSS has a number of mature web 2.0 capabilities. This project is for a two student web engineering team to (under the guidance of a supervisor) work with project sponsors and software developers, architects and end-users to prototype some new system capabilities. The project will involve creating an app within the ADSS web stack to expose some powerful graphical controls which drive the ADSS compute engine, as well as a rich GUI to present GEOINT data. Presentation of this sort typically takes the form of multi-layer maps, image and video overlays and annotations.	Under the guidance of your project supervisor: - use agile and iterative methods for product delivery - interact with software engineers and the project sponsors to understand the problem domain and elicit requirements - effectively prioritise proposed features - design an app to leverage the ADSS web application framework and satisfy stakeholders - implement your app - integrate your app with our product mainline by creating appropriate tests and participating in code review - present your work to interested stakeholders in the DSTO-E ADSS and GEOINT communities - get to know our team, make some new friends and have some fun!	Any of the following: Computer Science, Software Engineering, Geospatial Information Systems, Computer Vision, Computer Graphics, Information Technology.	Experience with and/or an interest in any of: - PHP, JavaScript, Python, HTML5, Bash, C++ - OpenStreetMap (OSM) - the Web Map Service (WMS) protocol - web engineering and development - high interaction, web driven user interfaces - Linux as a development platform - agile team software development methodologies	Team software project experience is desirable as well as an interest in open source software. High academic achievement is regarded favourably.
SVS NSID 09	**EDINBURGH**	**Web 2.0 interactive development for the ADSS GEOINT system.**	The Analysts' Detection Support System (ADSS) is a successful Australian GEOspatial INTelligence (GEOINT) data processing software platform in national and international operational use. The system contains a sophisticated computational and high transaction data processing engine within a custom web application framework. The ADSS has a number of mature web 2.0 capabilities. This project is for a two student web engineering team to (under the guidance of a supervisor) work with project sponsors and software developers, architects and end-users to prototype some new system capabilities. The project will involve creating an app within the ADSS web stack to expose some powerful graphical controls which drive the ADSS compute engine, as well as a rich GUI to present GEOINT data. Presentation of this sort typically takes the form of multi-layer maps, image and video overlays and annotations.	Under the guidance of your project supervisor: - use agile and iterative methods for product delivery - interact with software engineers and the project sponsors to understand the problem domain and elicit requirements - effectively prioritise proposed features - design an app to leverage the ADSS web application framework and satisfy stakeholders - implement your app - integrate your app with our product mainline by creating appropriate tests and participating in code review - present your work to interested stakeholders in the DSTO-E ADSS and GEOINT communities - get to know our team, make some new friends and have some fun!	Any of the following: Computer Science, Software Engineering, Geospatial Information Systems, Computer Vision, Computer Graphics, Information Technology.	Experience with and/or an interest in any of: - PHP, JavaScript, Python, HTML5, Bash, C++ - OpenStreetMap (OSM) - the Web Map Service (WMS) protocol - web engineering and development - high interaction, web driven user interfaces - Linux as a development platform - agile team software development methodologies	Team software project experience is desirable as well as an interest in open source software. High academic achievement is regarded favourably.
SVS NSID 10	**EDINBURGH**	**Antenna Control System**	To specify, design, build and set to work an antenna controller that will track the trajectory of a known space vehicle with sufficient accuracy to maintain acceptable received signal levels. Required elements including software to select and control the desired track, software to control the antenna servos (may be separate from previous), means to orient the antenna system, and means to control the actuators.	Electrical / Electronic Engineering, Control System Theory, Electromechanics, Real Time / Embedded Software.			An existing antenna with actuators and servo amplifiers exists and may be modified or adapted as necessary.
SVS WCMD 01	**EDINBURGH**	**Aerodynamic Data Generation Tool**	The Missile Modelling and Simulation Group has developed a number of software architectures, libraries and tools to assist in the modelling and simulation of weapons. One current gap in the Group's tool-set is a capability to automatically drive current-generation empirical aerodynamic data generators (e.g. Missile DATCOM) to create aero data files in formats and coordinate systems specific to our missile model architectures. This project's objective is to develop a tool that fills that capability gap. It will require a combination of software development skills, vector mathematics and ideally an understanding of basic aerodynamics. The project will conceptually draw on an older tool that did a similar job, but re-engineered to new requirements. The new tool will need to complement the Missile DATCOM file editor called Missile Lab and drive Missile DATCOM to generate up to four different types of output based on the user-selected target and desired data breakpoints such as Mach number and angle of attack. It is desirable, but not essential, that the tool can be run without a Matlab license.	- Elicit detailed user requirements for the new tool, where aerodynamics analysts are the target user group. Requirements include identifying target model file formats and user-editable data fields. - Establish high-level solution design in terms of system decomposition and key external and internal interfaces. Candidate solution concepts include command line tool, stand-alone GUI tool or integrated GUI tool. - Select implementation language. Candidate languages include C++, C# with WPF and Matlab. - Implement solution under the direction of the task supervisor and the software engineering advisor. - Conduct user acceptance testing. - Present on achievements and lessons learnt.	Computer Science, Software Engineering, Aerodynamics analysis techniques	C++, C# or Matlab programming, Vector mathematics, Object-oriented design principles, Software development experience (design, implement, test), Configuration management (Subversion or similar).	Ideally should have pre–existing software development experience, either from university level studies or another source.
SVS WCMD 02	**EDINBURGH**	**Plugin Development for SWAT**	The Weapons Capability Analysis (WCA) Group within Weapons and Countermeasures Division (WCMD) contributes to the development of a number of software libraries, used by modellers and analysts to support analysis tasks on a	The project duties will include: - Develop understanding of in-house developed SAA framework and SWAT application	Computer Science, Software Engineering, Computer Systems	C++ programming, Object-oriented design principles, Software development	This project would suit a student interested in programming and software

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			number of Defence projects, such as Ground Based Air and Missile Defence and Maritime Strike. This project will involve the development (or enhancement) of a number of software plugins for inclusion into the SWAT analysis application. The plugins will be developed using an in-house developed component based “plugin” architecture, the Simulation Application Architecture (SAA). The SAA plugins to be developed will be focussed around providing SWAT users additional capability as well as streamlining the application workflow. These plugins will typically be focused around new visualisation techniques and/or analytical data processing routines.	- Discuss required plugin(s) with WCMD modellers and analysts - Design, implement, test and document plugin(s) - Work in a team environment of WCMD staff and software contractors	Engineering	experience (design, implement, test), Configuration management (Subversion or like), Graphical User Interface (GUI) design and implementation, 3D graphics toolkits (such as OpenSceneGraph, OpenGL)	development, and experience working in an integrated software team.
SVS WCMD 03	**EDINBURGH**	**Software development of Missile Simulation Environments**	The Missile Modelling, Simulation and Analysis group has developed a number of software architectures, libraries and tools to assist in the modelling and simulation of weapons. Some of our key products include: • MECA (Missile Engagement & Coverage Analysis) - This application allows analysts to create custom scenarios with multiple entities and weapons, and then analyse the performance of the weapons. • Mars (Modelling Architecture Standard) - Used by modellers to define and build weapon model components in C++. • SAA - Supports rapid application development, through maximizing reuse of components whilst minimizing the integration effort of those components. • Progeny - Supports development in multiple build environments through providing a generic framework for defining software project structure, from which specific development environment solutions may be generated. The project will involve performing software development tasks on these products to enhance the modelling and simulation capability of WCMD. The primary goal is to develop high-priority features for use by modellers and warfighters in support of Defence operations and tactics development. The student will complete the scholarship program with improved C++ programming skills and a greater understanding of and ability to apply Software Development practises. The student will also have the opportunity to be involved in group discussions, software meetings and other activities within the Missile Modelling Simulation and Analysis Group.	• Develop an understanding of the MARS architecture. • Writing software documentation. • In discussion with stakeholders, develop a prioritised list of features and software changes. • Use software design skills to develop solutions and/or designs for the new features or software fixes. • Use software programming skills to implement the solutions, including developing associated unit-tests and documentation. • Apply good software engineering principles such as version control and change control to the tasks. • Work in a team environment of WCMD staff and software contractors.	Computer Science, Software Engineering, Computer Systems Engineering.	C++ programming, Object-oriented design principles, Software development experience (design, implement, test), Configuration management (Subversion or similar).	Ideally should have pre–existing software development experience, either from university level studies or another source.
SVS WCMD 04	**EDINBURGH**	**Statistical analysis of weapon simulations**	Weapons Capability and Analysis Group uses modelling and simulation to analyse the capabilities of ADF weapons systems. Software tools are designed and built in-house using either C++, Simulink or MATLAB. The project will allow the student to develop and test novel methodologies for designing experiments and analysing data from weapon engagement simulations. The outcome of the project will be to optimise the information gained from weapon simulations in maritime, air or land environments.	Research into design of experiments, statistics. Implementation of methods in C++ or MATALB. Documentation of findings.	Statistics/Applied Maths/Engineering Design of Experiments Monte Carlo Methods Regression analysis Bayesian inference	MATLAB, C++, Excel skills are desirable	
SVS WCMD 05	**EDINBURGH**	**Use of Colour to Influence the Detection of Military Symbols**	The colour and shape of symbols used in military tactical displays can have a significant influence the ability of operators to detect the presence of new entities and changes to existing entities. The project aims to develop and test a set of colours that produce equivalent detection performance for all symbols within a range of symbol sets.	Design, conduct and analyse an experimental study to evaluate the extent to which various colours influence symbol detection performance across a range of symbol sets.	Experimental psychology, perception and decision making		