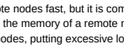
Project No.	Project Title	Project Description	Tasks/Duties Required	Relevant Research Area (academic disciplines)	Other Desirable Skills (programing/desktop)	General Information (personal requirements/academic qualifications)	Division	Location	POC
AOD 01	Tactical Communications Simulations	Under the direction of the supervisor the student will run various monti carlo simulation experiments on software developed to characterise the quality of service and connectivity issues of current and future tactical information exchanges. The software realistically characterises the radio communication environment in the tactical battlespace. The software tool displays the quality of service between any platform or testbed/ node, and adds more realism in a Net Warrior exercise. The tool also has a GIS system (Arc-View, a COTS product) which enables students to add geographic and topographic information relevant to the scenario, including jamming.	Run various Monti Carlo simulations using the Tactical Communication software using the ARC View GIS and Tactical Communications COTS equipment in the Airborne System Connectivity Environment Lab (ASCEL)	Mechanical/ Electrical/ Electronic Engineering			Air Operations Division	DSTO Edinburgh (SA)	Arthur Filippidis 08 8259 5442
AOD 02	Multi-projector alignment optimisation	Super high resolution displays are used for flight simulators to provide 'better than 20:20 vision' or 'eye-limiting resolution'. A number of low cost projectors in an array can provide higher resolution at a fraction of the cost initially, however they require more maintenance over their lifetime. There are five main problems to be overcome: projector rotation/scaling/offset error, overlap blending, colour divergence due to optical path, colour mismatch due to lamp aging, and optical distortion from short-throw (wide angle) lenses. This project is to develop a method, probably using a global optimisation technique such as simulated annealing, to align the projected images (in software) from two to six projectors, using the output from a motorized pan/tilt/zoom or fish-eye lens camera to compute the objective function. Other aspects of the problem will be examined as time permits. Prototyping may be done in Matlab or other high level language, however image warping on the test system requires C programming using the Open GL API. 	Mathematical analysis, software development	Mathematics, Computer Science, Electrical Engineering	basic C programming skills. Desirable: OpenGL and GL Shader Language experience; Linux Students with good mathematical skills can be tutored in the graphics aspects.		Air Operations Division	DSTO Fishermans Bend	Andrew Robbie 03 9626 7547
AOD 03	Tactical Data Link Protocol Analyzer and Visualization toolkit	Military aircraft communicate non-voice data using a Tactical Data Link. Two common protocols are Link-11 (low bandwidth HF radio) and Link-16 (high bandwidth UHF). In training simulators these protocols are used over non-radio links, typically as UDP/IP packets. When debugging a Link Network it can be very useful to see a visual representation of the message stream and decoding of the packet data. This project is to develop a toolkit for processing link messages, for example: a protocol decoder plug-in for the Wireshark protocol sniffer; a simple Qt/OpenGL visualization of Link 11 message traffic; using Google Earth as a tool to plot tracks in real time with a Link to KML gateway. Mathematically oriented students may opt to integrate network jitter measurement/correction using our IEEE 1588 (Precision Time Protocol) equipment. The intention is that source code will be publicly released under the GPL.	Software development of network monitoring and simulation code	Electrical Engineering, Computer Science	Basic to intermediate C/C++ programming, basic TCP/UDP and networking API knowledge, Linux/UNIX experience; optional: queuing theory, basic OpenGL. Skill in using MS Office is not necessary		Air Operations Division	DSTO Fishermans Bend	Andrew Robbie 03 9626 7547
AOD 04	Estimation of ARH fuselage aerodynamic data suitable for Flight Dynamic modelling and Slung Load simulations using CFD/wind tunnel testing.	ARH fuselage aerodynamic data is essential for the development of appropriate flight dynamic modelling in support of Army operations including transporting an ARH as a slung load underneath a Chinook and incident/accident investigations. Currently this data is not available and manufacturers very rarely provide this important information. RWO in AOD has to develop tools and procedures to calculate this data. The work proposed here involves use of CFD tools to estimate ARH fuselage aerodynamic data for a range of operating conditions. It will be a collaborative research with AVD, RWO conducting CFD modelling and AVD providing wind tunnel data to validate selected CFD predictions.	Assist in comprehensive CFD modelling of aerodynamic characteristics of the ARH fuselage. Participate in wind tunnel testing of the ARH fuselage.	Engineering students – Aerospace / Mechanical	The successful student will need to have good skills with CFD tools and familiarity with MATLAB products. Any experience with testing and analysis will also be regarded favourably.	Students must be willing to work independently under supervision, as well as with others in the group. Students must have completed their third year of full-time study (or part-time equivalent) prior to commencement	Air Operations Division	DSTO Fishermans Bend	Thuan Truong / Rami Reddy 03 9626 7294/ 03 9626 6479
AOD 05	Dynamic ship motion algorithm assessment	Using data from an Australian Navy First of Class Flight Trial assess a number of ship motion algorithms that purport to aid the helicopter while landing	The student will be required to perform the data analysis using the appropriate tools.	Helicopter performance, software engineering	Matlab, c programming	Aeronautical/ mechanical engineering.	Air Operations Division	DSTO Fishermans Bend	Robert Toffoletto 03 9626 7341
AOD 06	Helicopter rotor wake modelling to understand complex flow conditions associated with Brownout and Ground Effect operations	Brownout is a challenging operational problem and currently there are no effective solutions. Proposed mitigation techniques include: (i) new control systems (ii) new landing procedures (iii) prepared landing pads and (iv) sensors that can see through the dust. All these will require a good understanding/modelling of the flow field in the vicinity of the helicopter. Proposed research activity is to model the vorticity in the rotor wake and calculate the resulting flow field	Build a simulation model to capture vorticity of the rotor wake and calculate the resulting flow field.	Engineering students – Aerospace / Mechanical	The successful student will need to have good to excellent programming skills, using either MATLAB / C / C++. They will also require a good understanding of fluid mechanics and fluid flows that include vorticity components	Students must be willing to work independently under supervision, as well as with others in the group. Students must have completed their third year of full-time study (or part-time equivalent) prior to commencement	Air Operations Division	DSTO Fishermans Bend	Kate Bourne / Rami Reddy 03 9626 7425/ 03 9626 6479
AOD 07	Attentional and memory limitations in the perception of visual displays	Visual displays are ubiquitous in defence. They are used to convey mission critical information to a wide range of defence personnel in air, land, and sea operations. To deliver maximum benefits, in terms of effectiveness and safety, visual displays need to be optimised to the operators' perceptual and cognitive abilities. This project aims to investigate how bottlenecks in attention and memory affect our ability to perceive changes like those represented in typical military displays.	Assist in the development of vision experiments (may include some programming), administer experimental protocols to themselves and others, conduct literature searches, analyse experimental data, and write a brief report	Psychology or other human factors related discipline	Must have a sound understanding of research design and statistical analysis for behavioural science. Programming experience desirable, but not required.	Must have a keen desire to learn, engage in laboratory work, and develop a deeper appreciation for human perception and cognition	Air Operations Division	DSTO Fishermans Bend	Bradley Wolfgang 03 9626 7268
AOD 08	Visual database enhancement artwork	The Air Operations Simulation Centre has recently increased the capability of its visual simulation systems. This requires new and enhanced visual databases to fully utilise the new systems capabilities. An artist with computer skills is required to develop complex scenes/3D models and determine scene rendering limitations of the new systems.	Development of artworks and evaluation of system capacity, determination of system artwork guidelines.	Fine Arts and computer systems	Computer programming.	Presentation of an artworks portfolio and understanding of computer systems	Air Operations Division	DSTO Fishermans Bend	Tim Fagan 03 9626 7222
AOD 09	Deep packet inspection firewall	Application layer firewalls are now seen as essential because of the difficulty in assuring that endpoint applications cannot be hijacked. Hence, the verification should be done by a device of standardized configuration whose software has been extensively validated and which is hardened against attacks; additionally, once an attack vector is discovered, it can be patched in a single place. The goal of this project is to develop algorithms for the inspection and filtering of a number of protocols with real-time processing requirements, such as Voice-over-IP, video conferencing and IEEE DIS 1278.1A. These algorithms will inspect the application layer data to determine if certain fields are in violation of what is expected/allowed, causing the packet to be dropped. Depending on the student's areas of interest and expertise the implementation could be in C/C++ (running in a real-time scheduler under Linux), FPGA hardware programmed in VHDL with a soft-core coprocessor (e.g. www.netfpga.org) or in a higher level language more amenable to formal verification (e.g. Haskell/Erlang/OCaml or CompCert C). Students interested in information theory and channel coding (i.e. statistics of f faculty, whereby a more tailored research project may be developed	Software development of network filtering and simulation code	Elec Eng / Comp. Sci / Maths	TCP/IP sockets API under Linux, C programming. Optional: VHDL or Haskell.	Strong aptitude/results in either: C programming, VHDL design or mathematics.	Air Operations Division	DSTO Fishermans Bend	Andrew Robbie 03 9626 7547
AOD 10	FUSE interface to distributed cache over Infiniband	In clusters of commodity computers each node only has fast access to a small amount of memory (e.g. 8GB) even though the whole cluster has large memory (e.g. 256GB for 32 nodes). Use of high bandwidth low-latency interconnects such as Infiniband can make accessing memory on remote nodes fast, but it is complex to use it effectively from pre-existing applications. Also, finding if the required data is available in the memory of a remote node can be complex. As a consequence, the same data is often loaded from a central fileserver by many nodes, putting excessive load on the storage system and causing delay. This project is to implement a FUSE (File System in User Space) plug-in which maintains a collection of data items backed by ram/disk on machines in the cluster. When a request is made for an item not held in local RAM, it should be fetched via the network (either TCP/IP or Infiniband) from one of the nodes with the file. This is very like memcached or Bittorrent.	Software development of network caching code	Comp. Sci / Maths	Linux development experience, OS kernel understanding, TCP/IP sockets API under Linux, C/C++ programming		Air Operations Division	DSTO Fishermans Bend	Andrew Robbie 03 9626 7547
AOD 11	Data Distribution Service Software Application	DSTO is undertaking research in the application of Data Distribution Service (DDS) technology to network centric systems utilised in Defence. DDS provides a highly configurable software middleware environment whereby systems exchange data by publishing and subscribing to information topics with defined quality of service. This project will produce a graphical utility to demonstrate the capabilities of DDS in the context of tactical mission systems.	• Development of a graphical utility for managing participants in a DDS based network. • Development of applications that will publish and/or subscribe to given topics with configurable DDS parameters. • Negotiating and documenting the agreed requirements, design, implementation and usage of the developed applications. • Presentation to colleagues at DSTO at the conclusion of the project.	• Computer Systems Engineering • Software Engineering • Computer Science	• High level of competency in Java programming • Additional competency with C++ programming would be highly regarded • Familiarity with distributed computing technology would be an advantage		Air Operations Division	DSTO Edinburgh (SA)	Peter Temple 08 8259 6171
AVD 01	Advanced Fibre Composite Antennas	The student will assist in the design and manufacture of composite slotted waveguide antennas to support the activities of Task NAV 07/058. As part of this project, the student will work closely with DSTO and RMIT scientists on antenna feed geometries, antenna element geometries, manufacturing of composite antennas and measurement techniques.	• The design and computational modeling of feed geometries and antenna elements. • The manufacture of waveguide components from advanced fibre composites. • The measurement of RF and mechanical properties of composite waveguide components. • The design and manufacture of test fixtures or tools to support the manufacture and measurement of the waveguide components.	• Electromagnetic theory. • Antenna design. • Computational electrodynamics. • Advanced composite technologies. • Materials Engineering	• has experience with electromagnetic modeling software packages such as CST or FEKO. • has experience with Matlab. • is capable and interested in working in the laboratory (manufacturing composite antenna components) as well as on the computer (simulating antenna performance).	Third year B.E (electrical) and/or second year B.Sc (physics) is preferable. Students studying toward Bachelor Degrees in Aerospace Engineering, Materials Engineering or Materials Science, with an emphasis on advanced fibre composites or electrical properties will also be considered.	Air Vehicle Division	DSTO Fishermans Bend	Kelvin Nicholson 03 9626 8060

AVD 02	Finite element analysis of adhesively bonded joints	There are three possible topics: 1. Effect of bonded repair on buckling onset load and post buckling behaviour of composite structures. 2. Finite element analysis of helicopter frame-to-frame joint 3. Finite element analysis of adhesively bonded joints The outcome from this research would be great enhancement of knowledge and skill in simulation of aircraft composite structures or bonded repair of composite structures plus possibly a joint publication based on the scientific value of the research discovery. This research suits a student with a strong background in material mechanics and mathematics. Detailed guidance will be provided by the DSTO Supervisor.	Literature review of theory and application; Review the existing experimental work; Review the existing analyses and draft report; Conduct simulation trials using available models; Conduct simulation using novel computational approaches. Review the existing experimental work; Conduct further analyses Complete the report	Mechanical, Aerospace or Materials Engineering	FEM simulation		Air Vehicles Division	DSTO Fishermans Bend	John Wang 03 9626 7208
AVD 03	Development of a Quality Assessment Monitoring Tool for RAAF Boeing Wedge Tests	The Boeing Wedge Test measures the quality of adhesive bonds. Two plates of the adherend material are bonded together using the specified bonding technique. A wedge is driven between the adherends and a crack grows along the bondline. The length and location of the crack are measured as a function of time and compared to acceptable growth rates and crack locations. The Royal Australian Air Force (RAAF) uses Boeing Wedge Tests to qualify personnel that perform adhesive bonded repairs on aircraft and to monitor the quality of adhesive bonding. DSTO is also using this work to develop a case for certifying bonded repairs to primary aircraft structure. A Quality Assessment Monitor has been developed in Microsoft Excel to analyse the results of RAAF Boeing Wedge Tests however this Monitor has not been updated since 2006. The aim of this project is to (i) assess the relevance of this Monitor to current bonding operations, (ii) modify the existing, or develop a new, Monitor to maintain relevance, (iii) populate the new Monitor with RAAF data, (iv) conduct a statistical analysis of the data and interpret the results	• Gain an understanding of the adhesive bonding process • Review the existing Quality Assessment Monitor and identify the areas that can be improved. Possible areas include; ensuring relevant data is captured, ensuring statistical analysis is appropriate and enhancing user interface. • Input RAAF Boeing Wedge Test data • Conduct a statistical analysis on the data • Interpret the results of the statistical analysis	Mathematics, Statistics, Physical Sciences and Engineering (Aerospace, Mechanical or Materials)	Microsoft Excel		Air Vehiches Division	DSTO Fishermans Bend	Eudora Yeo 03 9626 7172
AVD 04	Simulation of a Thermally Soaring Unmanned Aerial Vehicle (UAV)	Air Vehicles Division has an on-going project examining the benefits that autonomous thermal soaring may offer for improving the range and endurance of small, electrically powered UAVs. The proposed project involves the integration of soaring-exploitation software (XCSoar) into an existing aircraft-modelling environment (Amiel) and preliminary analysis of the utilisation of thermal soaring by UAVs. XCSoar is a commercially available system used by glider pilots to predict the heading changes needed to efficiently exploit thermal soaring. This project would initially involve setting up the virtual communications links between the software environments and conducting verification and validation. Following this, the simulation will be used to examine the benefits of thermal soaring for a small UAV by examining the effects of different locations and seasons through statistical analysis.	(1) Integration of communications links with XCSoar into Amiel simulation environment (2) Verification and validation of software (3) Analysis of performance of thermally soaring UAVs of different sizes under varying conditions (4) Report on implementation and analytical results, including statistical analysis	Aerospace/mechanical engineering, electrical engineering.	Windows desktop computing. Good programming skills in C, C++, is essential and MATLAB would be desirable but not essential. Report writing.	At least third year student	Air Vehicles Division	DSTO Fishermans Bend	Jennifer Palmer 03 9626 8047
AVD 05	Aircraft Dynamic Derivative Estimation using high-fidelity Computational Fluid Dynamics	Aircraft flight dynamic modeling relies on accurate estimation of dynamic derivative data. This is generally derived using semi-empirical methods, flight test or model-scale experiments. The advent of highly parallel computing clusters has raised the possibility of performing these "experiments" computationally. The project direction and scope is flexible, but the student must continue the project as a final year student project	(1) This project will assess the feasibility of computing dynamic derivative coefficients of complex aircraft configuration using Computational Fluid Dynamics (CFD). The project will involve using the Fluent flow solver to simulate an aircraft undergoing a number of prescribed maneuvers. (2) Initial simulations will focus a validation case (for which there is extensive experimental data) and then consider a configuration more relevant to DSTO. (3) The resultant data will be used to evaluate the aerodynamic coefficient for maneuvering aircraft flight. (4) The method, results and analysis will be written up into a report	Aerospace engineering	Windows desktop computing. Knowledge of CFD is essential. Basic programming in MATLAB, C, C++, etc would be desirable but not essential. Report writing	At least third year aerodynamics and CFD course.	Air Vehicles Division	DSTO Fishermans Bend	Matteo Giacobello 03 9626 7069
AVD 06	Estimating Gas Turbine Engine Performance	The aim of this project is to identify the general magnitude of errors that can occur when estimating values of engine performance (such as thrust and fuel flow), over the entire flight envelop, when the data available as input to generic gas turbine performance modeling programs is based on only a small number of parameters at a single throttle condition	(1) Identify the open literature engine performance data typically available for any given engine. (2) Identify engines for which DSTO holds comprehensive engine data, and compile into a single database. (3) Use the generic data to estimate performance data across the flight envelope, for engines identified in step two.. (4) Compare the estimated data with actual known values. (5) Compile database of required information for various classes of engine, and determine approximate values and appropriate bounds. (6) Document the "best practice" for creating a new engine model using sparse data, and identify the typical errors associated with such an approach.	Aerospace/mechanical engineering, propulsion (gas turbine performance) and/or aircraft performance.	Windows desktop computing. Basic programming in MATLAB, C, C++, etc would be desirable but not essential. Report writing	At least third year aerodynamic/propulsion/thermofluids course.	Air Vehicles Division	DSTO Fishermans Bend	Shane Hill 03 9626 7811
AVD 07	Development of a Hypersonic Attitude Control Simulation Tool For Re-entry Vehicles	HIFiRE is a 5-year international collaborative experimental flight test program between Australia and the USA that focuses on developing and demonstrating fundamental hypersonic and scramjet technologies. One of the most challenging up and coming flights involves controlling a Mach 8 hypersonic waverider vehicle re-entering the atmosphere. This summer research project involves developing a generic simulation tool that analyses both the exo-atmospheric and in-atmosphere (aerodynamic) vehicle control phases of re-entry for this and other flights. The tool will be developed in MATLAB/SIMULINK and will enable the reconstruction of the vehicle's attitude and trajectory based on given, vehicle configuration, control inputs and characteristics. The model will output and display the time history of vehicle state and represent instantaneous vehicle attitude. The computational model will require solution of the relevant equations of motion and aerodynamic modelling given predefined control inputs, characteristics and vehicle configuration to define and display the vehicle's corresponding attitude and position as a function of time. Validation of the tool will be achieved using existing flight data and known control characteristics.	Development of a sophisticated computational model that incorporates: control, flight dynamics, aerodynamics and mathematical modeling, which: (1) allows a user to specify an arbitrary vehicle configuration (2) reads in time histories of predefined control parameters (3) knowing the vehicles previous attitude/position/state integrate the equations of motion to determine the new state (4) display and write vehicle state data to file Results of this work will be documented and presented to fellow researchers	Mechanical / Aeronautical / Mechatronics Engineering, Applied Mathematics or Physics	Highly proficient in MATLAB / SIMULINK. Ability to research complex problems and possess a strong physics / dynamics / mathematics background. Ability to solve partial differential equations using neumerical tools is essential	Must be enthusiastic and passionate; possess excellent communication skills; be a quick leaner	Air Vehicles Division	DSTO Brisbane	Todd Silvester 07 3212 4417
AVD 08	Finite Element Study of Notch Plasticity and its Effect on the Crack Tip Plastic Zone	It is well known that fatigue crack growth occurs in regions of plastically deformed material at the crack tip. The project will involve modelling the crack tip plastic zone using Finite Element Analysis (FEA) and relating the observed behaviour to various notched geometries. The project may also involve an experimental component relating to the modelling of crack tip plastic zone. This project will help develop a knowledge base key to the understanding of crack growth phenomena.	The student will conduct a parameter study using FEA to study the effect of notch radius and depth on the size of the plastic zone in relation to various remote loading scenarios. The project may also involve liaising with technical staff to execute an experimental test plan.	Aerospace Engineering, Mechanical Engineering, Materials Engineering, Solid Mechanics	Numerical Analysis, Finite Element Analysis, Visual Basic	Must be 3rd year or above	Air Vehicles Division	DSTO Fishermans Bend	Marcus McDonald 03 9626 8684
C3ID 01	Defence Supply Chain Modelling and Analysis	Programming supply chain modelling and analysis algorithms in Java. The modelling examines a network of nodes with probabilistic variables of demand, time between demands, and lead times. The analysis determines the probability of meeting the demand from inventory for each node	Under supervision the student is to conduct research in modelling and analysis of supply chain networks. The student is to contribute to the development of new algorithms in Java language as well as to modify the existing algorithms and GUIs associated with existing supply chain software prototypes	Java programming – essential; Mathematics (particularly Probability)	Interest in solving complex and challenging problems. Understanding mathematical operations with probability distributions (e.g. Convolutions, Joint Distributions, Integrations, etc)	Experience in a number of Java programming projects is desirable	Command, Control, Communication & Intelligence Division	DSTO Edinburgh SA	Mirza Mekhtiev 08 8259 7397
EWRD 01	Pulsed Fibre Lasers for Directed Infrared Countermeasures	Directed Infrared Countermeasures involves using a laser operating in the 2-5um band to jam incoming heat seeking missiles. The most challenging component of such a system is developing a suitable laser source. Fibre Lasers are an especially promising technology. Ideally they are all fibre and thus insensitive to harsh vibrational environments, they have a very large surface area and are thus capable of high average power operation and most importantly they have exceptionally high efficiency in the 2um region. Our generation II DIRCM lasers consist of a Tm fibre laser pumping a Q switched Ho:YAG rod laser which is frequency converted in a ZGP OPO. This project aims to replace the fibre laser pumped Ho:YAG laser with a simpler pulsed fibre laser capable of higher average power operation and with better efficiency.	Under limited supervision construct a high power pulsed fibre laser suitable for frequency conversion to the mid-IR 3-5um region. If time allows this should be frequency converted. Weekly progress presentations to the group will be expected and a detailed report/journal paper should be produced at the completion of the project	Lasers/Optics/Experimental Physics	Experience working with optics, high power lasers and fibre optics such as splicing and cleaving optical fibres	Completion of 3rd year optics at an Australian physics department, although consideration will be given to other students who have displayed outstanding performance	Electronic Warfare & Radar Division	DSTO Edinburgh SA	Shayne Bennetts 08 8259 7311

EWRD 02	Development of an automated fibre component fabrication system	Building high power fibre lasers requires fabricating specialty components such as splitters, tapers, mode couplers, combiners and gratings in custom fibres with outstanding optical performance capable of meeting the required tight specifications and able to withstand the extreme power densities involved. Fabricating complex components with high reliability and yield requires the development of an automated system for translating a beam across an optical fibre while maintaining micron level positioning tolerance relative to the fibre and simultaneously writing a complex optical modulation pattern. This will require tracking the incoming optical beam and maintaining a lock focusing on the optical fibre. It will require controlling the strain on the optical fibre and will require developing a computer control system and user interface for applying the user defined modulation pattern.	Under limited supervision using high performance motorized stages and lasers construct a system capable of translating a high power optical beam across an optical fibre to write a complex computer controlled modulation pattern. It is expected that weekly progress presentations will be given and a detailed report describing the system and software produced. There is also potential for publishing the results of a system able to produce high quality long period gratings. Production of short period gratings using a CO2 laser by this technique would be a world first and finally there is the potential for involvement in laser development utilizing components produced.	Robotics, Engineering, Optics/Experimental Physics	Experience with Labview, Matlab and other lab automation software, working with optics and optical fibre component fabrication systems	Completion of 3rd year Science or engineering, although consideration will be given to other students who have displayed outstanding performance	Electronic Warfare & Radar Division	DSTO Edinburgh SA	Alex Hemming 08 8259 7266
EWRD 03	Tunable Pulsed Fibre Lasers	Defence has a requirement for a tunable, polarized pulsed fibre laser in the 1.03 to 1.2um region of the spectrum suitable for further frequency conversion. Fibre Lasers are an especially promising technology because of their wide tuning range and excellent efficiency. This project aims to demonstrate a polarized, pulsed fibre laser tunable across the required 1um band	Under limited supervision construct a pulsed fibre laser suitable for further frequency conversion which is tunable across the 1um region. Weekly progress presentations to the group will be expected and a detailed report/journal paper should be produced at the completion of the project	Lasers/Optics/Experimental Physics	Experience working with optics, high power lasers and fibre optics such as splicing and cleaving optical fibres	Completion of 3rd year optics at an Australian Physics Department, although consideration will be given to other students who have displayed outstanding performance.	Electronic Warfare & Radar Division	DSTO Edinburgh SA	Shayne Bennetts 08 8259 7311
EWRD 04	Visual Tracking With MATLAB	Implement and evaluate visual (video) tracking algorithms. How can you automatically detect and track a missile approaching your aircraft with an infrared camera? How can you tell the difference between a bushfire and reflections from the sun? Can algorithms developed to detect and track people be adapted for airborne vision sensors? This project will explore the performance of visual tracking algorithms against a range of video data sets. Using a graphical toolbox for MATLAB you will build and explore various visual tracking algorithms. You will write scripts to automate the evaluation of these algorithms against a variety of synthetic and real video sequences. You will record and report on your experimental results. Each student will be given a separate algorithm(s) to code and test and a joint report of the comparative evaluation will be written.	Research into Computer Vision Algorithms (reading technical papers). Software Development in MATLAB.	Computer Science, Electronic/Computer/Mechatronic Engineering.	Ability to program, to write, to work independently and within a team. Skills in Mathematics, Computer Vision or Image Processing desirable. Prior experience in MATLAB helpful.	An interest in Computer Vision, Signal Processing, Optics, Robotics, or AI, and a motivation to learn more about these topics	Electronic Warfare & Radar Division	DSTO Edinburgh SA	Sebastien Wong 08 8259 6612
EWRD 05	Modelling of radar backscatter from a helicopter rotor	Radar returns from rotating helicopter rotor blades and rotor hubs can be quite complex electromagnetic scattering phenomena, which can be used for automatic target identification of helicopter targets. As a first approximation, a rotor blade may be modeled as a rectangular plate, or a cylinder, or a wedge, while the rotor hub may be modeled as a collection of simple rotating objects such as circular disks, rods, and perhaps corner reflectors. The aim of this project is to produce a theoretical model for the radar backscatter from each of these simple objects and combine their signals to model a composite return.	- Applying electromagnetic field theory to solve relatively simple scattering problems - Implement the models in Matlab	Applied mathematics, physics	Matlab programming	This project is appropriate for students with a background in applied mathematics and keen interest in the applications of electromagnetic field theory.	Electronic Warfare & Radar Division	DSTO Edinburgh SA	Hai-Tan Tran 08 8259 5320
EWRD 06	Radio frequency propagation of short range	Establishment of radio frequency communication link and transmission over the various types of terrain. Study of the short range radio frequency propagation and its modelling.	Design of radio frequency propagation experiment, calibration of antennas, set-up of this experiment, measurement, data collection, development of Matlab model, writing report	Radio frequency communication, antenna measurements, Signals and Systems Theory, Matlab modelling	Matlab	At least third year university student with experimental experience.	Electronic Warfare & Radar Division	DSTO Edinburgh SA	Andrew Piotrowski 08 8259 6635
EWRD 07	Random variable approximations of bit error rates in communications	Bit error rate approximations are an interesting area where ones knowledge of communications and probability theory can be utilised. The project wil investigate applying negative binomial and Poisson distributions to approximating these error rates. It involves a lot of analysis of the famous Marcum Q-Function, which is an important function in communications and radar.		Mathematical competence, knowledge of statistics and probability, basic signal processing, Matlab			Electronic Warfare & Radar Division	DSTO Edinburgh SA	Graham Weinberg 08 8259 5390
HPPD 01	UPLC methods for the detection and verification of chemical warfare agents, their hydrolysis products and by-products at trace levels	The study of organophosphorus compounds is of importance to defence and national security. The project will utilize new UPLC/MS equipment to investigate the detection and analysis of organophosphorous compounds at trace levels. This will involve development of LC methods using different stationary phases and MS methods to lower the detection limits of these compounds. The project will generate a library of mass spectra for the compounds analysed.	The student will be generating UPLC/MS and MS/MS data. The student will be performing the analysis on two different instruments, a triple quadrupole MS and an ion trap MS. The student will be expected to handle toxic chemicals in limited quantities at low concentrations (with appropriate training).	UPLC/HPLC/MS	Data analysis		Human Protection and Performance Division	DSTO Fishermans Bend	Stuart Thomson 03 9626 8408
HPPD 02	Eating behaviour - issues for Defence feeding	Review the literature and other information sources and identify eating behaviour issues in the Defence environment.	Conduct a review of the scientific literature and other information sources, identify key issues, prepare a report.	Nutrition, dietetics, behavioural science	Understanding of nutrition principles, experience in researching the scientific literature, ability to use Microsoft Office based programs (Word, Excel)	Students who have completed at least 2nd year of a relevant undergraduate degree, including completion of subjects relevant to the research area. Good organisational, and communication skills and methodological approach to tasks.	Human Protection and Performance Division	DSTO Scottsdale TAS	Julia Carins 03 6352 6614
HPPD 03	Fresh Food Order System	Design a software program that supports an interface between caterers and the ADF fresh food scale, or investigate suitable COTS options.	Conduct requirements analysis, software design and development; or compare and evaluate COTS items.	Software programming, web programming	Some understanding of nutrition principles and/or catering, ability to use Microsoft Office based programs (Word, Excel)	Students who have completed at least 2nd year of a relevant undergraduate degree, including completion of subjects relevant to the research area. Good organisational, and communication skills and methodological approach to tasks.	Human Protection and Performance Division	DSTO Scottsdale TAS	Julia Carins 03 6352 6614
ISRD 01	Ship detection with polarimetric SAR data	Maritime surveillance with SAR (synthetic aperture radar) offers the advantages of all weather, day/night operation and sensitivity to man-made targets. In the past such radars have used a single polarisation channel but current research is assessing the benefits of fully polarimetric capabilities. While the polarimetric properties of backscatter from vessels is expected to be different to that of the ocean (owing to differences in the underlying scattering mechanisms), the best method of exploiting those differences is not clear. Recent work by Canadian researchers has shown the benefits of applying statistical detection theory to this problem. This project aims to verify and analyse the Canadian results using data collected with Ingara - DSTO's in-house airborne SAR system. Comparisons will be made with other detection techniques and performance will asessed using ROC (receiver operator characteristic) curves. Potential for improvements will be considered.	The project can be loosely broken into the following four components: 3 weeks induction into DSTO and background reading; 3 weeks preparing data and coding algorithms; 3 weeks applying the code and analysing the results; 3 weeks finalising the results, writing a report and preparing a presentation.	Electrical Engineering, Physics, Maths	Working knowledge of Matlab, Good report writing and presentation skills		Intelligence, Surveillance & Reconnaissance Division	DSTO Edinburgh SA	David Crisp 08 8259 7153
ISRD 02	Target Tracking and Data Fusion (2 students)	Target tracking is the process where surveillance sensor measurements are used to answer questions such as "how many targets are there". In this project you will learn how to track multiple targets using measurements from multiple surveillance sensors. You will implement and test several tracking and data fusion algorithms using real and simulated data and produce graphical output. Knowledge of state space estimation, Bayesian methods, time series analysis and Kalman filtering will be developed and results are required to be documented.	Researching and implementing algorithms in MATLAB. Testing using real and simulated sensor data. Producing and documenting results	Applied Mathematics, Statistics, Signal and Information Processing, Computer Systems Engineering, Electrical and Electronic Engineering	Programming skills, preferably using MATLAB	Solid background in Mathematics (probability theory, linear algebra)	Intelligence, Surveillance & Reconnaissance Division	DSTO Edinburgh SA	Roslyn Lau 08 8259 5480
JOD 01	Balance of Investment Analysis of Counter Improvised Explosive Device Capability Development	Use or refinement of existing Balance of Investment methodologies to explore the consequences of different levels of future CIED capability and to guide priorities for future technology research.	Understanding of quantitative and/or semi-quantitative operations research methods. Eliciting requirements to enable problem definition. Tailoring or extending methods to address problem definition. Collection of data to populate models. Execution of models and analysis of output to provide advice for decision-making. Scientific report writing.	Operations Research, Applied Mathematics			Joint Operations Division	DSTO Edinburgh SA	Andrew Gill 08 8259 5112
JOD 02	Systems Analysis of Counter Improvised Explosive Device Concept Development	Use of systems analysis or systems engineering methodologies to enable understanding of CIED as a system to determine CIED requirements and develop new CIED concepts.	Understanding of systems analysis or systems engineering research methods. Application of various techniques, such as process mapping, functional flow diagrams, value chains, N2 charts, influence diagrams, other architecture frameworks, to derive system conceptualizations of CIED. Analysis of products to provide advice for decision-making. Scientific report writing.	Systems Analysis, Systems Engineering			Joint Operations Division	DSTO Edinburgh SA	Andrew Gill 08 8259 5112

LOD 01	Using Attractors for obtaining better imagery for use in Human Identification Systems	Attractors are devices that can be used to attract a person's attention towards a target. They can be visual (i.e. a programmable message sign) or auditory (i.e. a beep). While attractors have most commonly been used in marketing and emergency signage, we have recently begun investigating their utility for attracting a person's attention towards a camera source (such as CCTV) for identification purposes. At a trial conducted earlier this year, Land Operation Division's National Security System Analysis Team collected data using both auditory and visual attractors. We intend to analyse the data to determine whether attractors are appropriate for use as aids for human identification systems (such as facial or iris recognition systems). You will become a member of a small team of research psychologists who have been leading this research.	You will conduct an indepth literature review in the area of attractors (which will span the areas of cognitive, perceptual, forensic and organisational and human factors psychology). You will also be involved in the analysis of data obtained during the trial (which includes recorded video footage and some qualitative data) In addition, you will have the opportunity to publish the research and present the findings at a DSTO seminar.	Psychology, Human Factors	Well developed research, writing and analysis skills, including some basic statistical analysis experience (SPSS) would be desirable.	The National Security System Analysis team is multidisciplinary and includes engineers, mathematicians as well as research psychologists. We would ideally like to hear from people who will be entering the final year of their undergraduate degree (majoring in psychology) or Honours/postgraduate students in the same discipline.	Land Operations Division	DSTO Edinburgh SA	Rebecca Heyer 08 8259 4236
MOD 01	Developing of a generic model for ambient ship noise	To implement an initial radiated noise model for ships that can be embedded in ship tracks so as to produce a far field spectrum for calibration of ship sonars – leading to an eventual real-time system using GCSS / TESS and operational trialling	Literature search, development and implementation of model.	Mathematical modelling; literature review.	programming in JAVA or C++;	Interest in modelling and GIS displays	Maritime Operations Division	ATP Sydney	Roy Hughes 02 9381 0132
MOD 02	Investigate the deployment and sustainment options for an amphibious task force.	The Australian amphibious capability will be greatly improved with the introduction of two large amphibious ships. These ships will support more helicopters and landing craft than have previously been possible. This study will use simulation and other appropriate operations research techniques to determine an appropriate mix of helicopters and landing craft for amphibious operations.	Conduct a feasibility study for different simulation packages. Determine variables including limiting constraints for elements within an amphibious system. Produce simulation.	Operations Research / Mathematics/ Physics/ Computer science	Java programming experience and knowledge of the entire software engineering lifecycle	Very good communication, interpersonal and writing skills. Distinction Average preferred.	Maritime Operations Division	ATP Sydney	Anne Quill 02 9381 0061
MOD 03	World model for autonomous underwater exploration	Investigation of strategies for efficient representation and update of a 'world model' for the underwater environment to be incorporated into a robotic vehicle.	Applicant will be required to undertake theoretical studies into processes by which parameters describing the underwater environment (bathymetry, bottom type, currents, obstacles) can be represented and modified efficiently in the context of an exploratory autonomous underwater vehicle (a 'scout') that is tasked with mapping an unexplored underwater area and maintaining a 'safe route to exit' as it explores.	Applied mathematics, physics, mechatronics, computer science	Well-developed programming skills are essential	Position would suit an applicant with an interest in artificial intelligence and ocean research	Maritime Operations Division	ATP Sydney	Stuart Anstee 02 9381 0170
MOD 04	Automation of hydrographic survey	Investigation of strategies for autonomous survey of coastal waters using an autonomous surface vehicle fitted with a bathymetric sonar.	Applicant will be required to undertake theoretical studies into the efficiency of autonomous survey operations. The work will be based on optimisation algorithms and probabilistic models of hydrographic sensor performance and the marine environment. This work is a continuation of a previous SVS project	Applied mathematics, physics, mechatronics, computer science	Well-developed programming skills are essential and exposure to optimisation algorithms would be beneficial	Position would suit an applicant with an interest in ocean research	Maritime Operations Division	ATP Sydney	Stuart Anstee 02 9381 0170
MOD 05	Enhancements of DSTO AIS Recording Systems	DSTO collects position data broadcast by vessels through the Automatic Identification System (AIS). DSTO currently records this data through a system that consists of java programs to receive and rebroadcast data streams, and to collect and database the information. The information is stored in MySQL databases that are becoming large. Depending on the skills and interests of the summer student, this project will look at improving and optimizing one or more of internally developed tools and systems: 1. Data stream redirection software 2. MySQL databases, including storage, replication/redundancy and query optimization 3. Database and stream management software 4. Geospatial presentation of ship current and historic data (using NASA Worldwind GIS System—java version). 5. Historical analysis toolboxes (MATLAB Based)	Software Development and database development and management	Computer Science/Software Engineering OR Mathematics/Physics with strong computing component.	Java Programming (essential), Database (essential) MATLAB (desirable)	The successful applicant will require initiative to understand our existing systems and work with the DSTO team to identify and develop system improvements.	Maritime Operations Division	ATP Sydney	Timothy Surendonk / Tristan Cooper 02 9381 0056 / 02 9381 0083
MOD 06	Scenario Generation and Control Development	The Virtual Maritime System (VMS) is a modeling and simulation framework with a particular focus on the maritime combat system centric domain. The VMS is currently based on a distributed simulation standard (the High Level Architecture (HLA)) that is 10 years old. In that time the HLA has been updated and new simulation standards have appeared. One new simulation standard is the Test and Training Enabling Architecture (TENA) (http://www.tena-sda.org)	This project will explore the implementation of VMS using TENA. This activity will have several tasks: • Evaluating the differences/similarities between HLA and TENA • Comparing the VMS to existing TENA object models for similarities • Porting existing VMS software written to work with the HLA to work with TENA • Possibly developing middleware to allow a simulation model to transition between VMS/HLA and VMS/TENA with no modifications • Writing a report providing an introduction to TENA for those experienced with HLA and advice on porting from HLA to TENA Presentation of work performed during employment.	Software engineering	Software development experience with C++ Experience with CORBA (TENA is heavily CORBA based) Experience with software development best practices (source code management, build systems, release management).		Maritime Operations Division	DSTO Edinburgh SA	Anthony Cramp 08 8259 7602
MOD 07	Cloud Computing Research and Development	Cloud computing is a style of computing in which dynamically scalable and often virtualized resources are provided as a service over the Internet. Users need not have knowledge of, expertise in, or control over the technology infrastructure in the "cloud".	The project will explore the implementation of Cloud Computing onto a small cluster of computers in the ANZAC Combat Systems Integration Laboratory (ACSIL)'s development and production environments. The activity will have several tasks: • For a small set of candidate architectures, evaluate the relative merits of using each • Present the evaluation to a small working group of MOD staff • Install the selected architecture onto a cluster of computers • Integrate, and where applicable, develop solutions to integrate higher-level job and task management functions into the architecture • Contrive and implement policies to govern the management and operation of jobs within the cloud. • Present the work performed during employment.	Familiarity with Distributed Computing principles and practices. Experience with software development best practice (source code management, build systems). Experience with C/C++.			Maritime Operations Division	DSTO Edinburgh SA	Paul Solomon 08 8259 6848
MOD 08	Scenario Generation and Control Development	DSTO has recently embarked on an ambitious project to construct its own Scenario Generation and Control (SGC) program, which can be used to create and drive simulations in the ANZAC Combat Systems Integration Laboratory (ACSIL). The ACSIL has a combination of simulated and actual Maritime platform hardware and is used regularly for human-in-the-loop experimentation. The SGC programme of work is at a relatively early stage; there exists a unique opportunity for a motivated Summer Vacation Student to get involved in extending the extant capabilities of this work by adding additional platform controller mechanisms. The software program is based on Java, JavaScript and Groovy, and operates as a Web Service; it features a novel time-line based viewing mechanism for developing scenarios.	This project will explore different types of advanced platform behaviours to be folded into the SGC programme of work. Using a DSTO-developed specification for the characteristics of scenario 'background traffic', this open-ended activity will involve several tasks: • develop, implement code and visualisations of surface traffic in shipping lanes, with pre-defined behaviours based on the relative times of day, etc • develop, implement code and visualisations of air traffic in air lanes, with aircraft traversing at pre-defined intervals based on the relative time of day, etc • develop, implement code and visualisations of 'fishing fleets' with pre-defined behaviours based on the relative times of day, clustering together and moving as a single unit, etc • present the work performed during employment.	Software engineering	Software experience with Java/JavaScript/C++ Experience with, and an interest in high-level real-world simulations Experience with, and an interest in developing GUI controls Experience with software development best practices (source code management, build systems)		Maritime Operations Division	DSTO Edinburgh SA	Anh Tu 08 8259 7601
MOD 09	Integration of Google Earth with Simulation Tools	The project aims to develop a tool that can act as a bridge between an entity level simulation tool and the public domain software Google Earth. An entity level simulation is used to generate war games and is able to represent most military platforms and people. The reason for this is to enable the use of Google Earth as the common view into the simulation. Using Google Earth has the benefit of any data available in the public domain for Google Earth can be made available during the simulation, making a more immersive simulation possible. The project will aim to enhance and develop on top of some initial prototype work to produce a more robust tool for use in the simulation environment at DSTO Sydney.	Development of a tool to integrate simulation with Google Earth to be utilised during entity level simulations	Software Engineering, IT, Computer Science, Geospatial Information	C/C++, Google Earth		Maritime Operations Division	ATP Eveleigh (Sydney)	Paul Crees 02 9381 0032
MOD 10	GIS Package for Amphibious Assault Toolset	The Amphibious Operations Group has been working on an Amphibious Assault Toolset to aid in the planning and conduct of beach and helicopter assaults. The student will be working towards adding a GIS element to the existing toolset	The project will involve researching GIS user requirements, conducting a study on relevant, existing GIS packages, develop/incorporate an appropriate GIS solution and demonstrate/review its functionality with the end user	Computer Science / Software Engineering	Java programming experience and knowledge of the entire software engineering lifecycle	Very good communication, interpersonal and writing skills. Distinction Average preferred	Maritime Operations Division	ATP Eveleigh (Sydney)	Sean Franco 02 9381 0059

MOD 11	Development of User Interface for Force Protection Games	FPG have in the past been conducted as table-top exercises, however there is an opportunity to develop a software driven version of the FPG.	The student will be required to analyse the project requirements of developing a software driven FPMG and develop a solution to those requirements. Options for further extension of the interface should be considered e.g. remote access, instant messaging, recording tools	Software Engineering	Programming, Human Factors		Maritime Operations Division	ATP Eveleigh (Sydney)	Piers Duncan 02 9381 0055
MOD 12	WebREP integration and support	WebREP is a web-based environmental and geospatial information management tool that provides key information to planners and warfighters. Enhancing WebREP with new and innovative algorithms and adding support for new data sets requires modification to the existing code base. WebREP has been requested for use in the TTCP / NATO REP10 trial in June 2010.	Programming and application support; integration of new data types and web services.	Computing – programming and web design/development	Understanding of Services Oriented Architectures and geospatial data structures		Maritime Operations Division	ATP Eveleigh (Sydney)	Gary Speechley 02 9381 0039
MOD 13	Enhance real-time monitoring and display of resource consumption in component-based cluster software applications	Starting with a distributed component architecture which runs concept sonar processing applications the project is to improve the amount of information available on how the limited system resources (including memory and network bandwidth) are being allocated and consumed from being system-wide (recorded per-computer) to being per-component.	Upgrading various server software components of our in-house component architecture to support monitoring their individual consumption of CPU, memory and network bandwidth. Enhance or replace the existing real-time monitoring tool to include the more detailed statistics. Given a generic test application, investigate and optimise for the performance penalty caused by the monitoring. Manage software using a version control system. Document changes made using comments and design documents.	Computer Science or Software Engineering, with understanding of operating systems, distributed computing and IP networking	Competence in programming in C++ Strong familiarity with Linux or UNIX environment and tools including shell scripts and the Eclipse IDE Understanding of the CVS version control system Desirable familiarity with Qt graphical toolkit and/or Java Able to operate a standard desktop environment including Microsoft Windows and Office		Maritime Operations Division	HMAS Stirling WA	Joshua King 08 9553 4305
MOD 14	Investigate the utility of Virtual World technology for early concept exploration	Virtual world technology is now being applied to many role rehearsal and scenario exploration tasks across a wide range of disciplines. More recently military organizations have been exploring the use of the technology because of the relatively low cost and for the diversity and richness of experiences using these tools. This project will produce exemplar submarine control spaces in a number of available virtual world technologies. These will then be used to examine metrics that might be applied to measuring the relative performance of people in these spaces and how that might translate to real world implementations	The students will build exemplar submarine control rooms using two or more available virtual world technologies (e.g. Open Simulator and Open Cobalt) and at varying levels of fidelity. Using metrics devised for the purpose the students will then quantify the utility of the models produced in evaluating performance of operators in the virtual spaces. Output of the project will be virtual world models of submarine control spaces, an assessment of the maturity of the technologies used and a comparison of the utility of the designs produced.	Human Factors, Computer Graphic Design	Basic programming skills, experience creating virtual world or gaming content.		Maritime Operations Division	HMAS Stirling WA	David Gamble 08 9553 3624
MOD 15	Adaptive beamforming for sonar audio	Sonar audio is an important tool used by sonar operators to assist in classifying contacts. Adaptive beamforming is a preferred processing technique for obtain high quality sonar audio. Using adaptive beamforming technique to improve the quality of sonar audio is still at its infancy stage. In this project, we shall test and compare different adaptive beamforming algorithms using simulated and recorded data, and recommend an appropriate algorithm for sonar audio.	Testing and comparing different adaptive beamforming algorithms using simulated and recorded data	Signal processing	Programming in Matlab	Prefer 3rd year Engineering students.	Maritime Operations Division	HMAS Stirling WA	Chaoying Bao 08 9553 3629
MOD 16	Investigate the use of a time stepping simulation for Monte Carlo study	To support the purchase of the future submarines to replace the Collins submarines, DSTO will be performing analytical studies using simulations. Simulations provide insight into the effectiveness of any proposal under various threats and under different environmental contexts. To have confidence in the result, it is essential to measure the outcomes under numerous starting conditions and contexts in a Monte Carlo fashion.	A set of criteria will be given to the student. The duty of the student is to learn how to use a commercial time stepping simulation VR-Force (http://www.mak.com/products/vrforces.php), and to attempt to use it for traditional Monte Carlo study. In the process identify and quantify any limitations of the tool against given criteria.	Operation research / Statistic, Modeling & simulation/ Computing.	Basic desktop and programming skill.		Maritime Operations Division	HMAS Stirling WA	Thanh Chi Ly 08 9553 3609
MOD 17	New sensor technology for submarine sonar	This project will involve working in the future underwater acoustic sensors group at HMAS Stirling in WA. The focus is to investigate new sensor technology that can be used for submarine sonars. Current work done covers new sensor materials, re-configurable and smart sensor electronics and sensor characterization and calibration at our on site acoustic facility.	The applicant will be expected to participate in one or all of these existing work areas depending on their subject of specialization and interest. The work would be more suited to the experimental scientist.	Physics, Engineering	Computing	3rd year Physics or Engineering students	Maritime Operations Division	HMAS Stirling WA	David Matthews 08 9553 3583
MOD 18	Multi-Sensor Data Fusion for Tracking with Bearings-Only Measurements	When tracking a target using sensors that measure only the approximate bearing to a target, the use of data collected from multiple geographically separated sensors can drastically improve our accuracy. In this project, the student will investigate a data fusion scheme which can be used to track a single target using information from multiple bearings-only sensors. This scheme involves the use of Kalman filters and particle filters to process the sensor data. The project requires using Matlab to analyse the performance of the algorithm on simulated tracking scenarios, and to compare its performance to standard multi-sensor fusion schemes.	- Understanding literature on the algorithm - Implementation and testing of algorithm in Matlab - Produce a report and give a seminar on the results	Engineering (Electronic or Computer Systems), Mathematics, Statistics	Matlab programming Strong mathematical, analytical and problem solving skills		Maritime Operations Division	HMAS Stirling WA	Michael Beard 08 9553 3633
MOD 19	Open Architecture CMS Representative Computing Environment Development – Generic combat system models and test functions	Contribute to the development of a representative combat system computing environment based on open architecture design philosophies and development practices by designing and developing generic combat system models and test functions.	• Participate in the research and design of generic information flow and functional architecture models for a generic combat system • Research and use model driven tools to help with developing UML models and code generation. • Participate in the development of UML models to represent the generic information flows and functional architecture for a generic combat system. • Develop combat system test functions based on the information and functional models developed for a generic combat system	Software Engineer/Computer Scientist	Knowledge of UML, C++ and JAVA		Maritime Operations Division	DSTO Edinburgh SA	Gavin Puddy 08 8259 7522
MOD 20	Open Architecture CMS Representative Computing Environment Development – Generic Sensor Interface and test functions	Contribute to the development of a representative combat system computing environment based on open architecture design philosophies and development practices by designing and developing generic sensor interfaces and test functions.	• Participate in the research and design of generic information flows and interface functionality for a generic sensor interface into the combat system • Research and use model driven tools to help with developing UML models and code generation. • Participate in the development of UML models to represent information flow and interface functions of a generic sensor interface. • Develop the interface code and test functions to test the design of the generic sensor interface.	Software Engineer/Computer Scientist	Knowledge of UML, C++ and JAVA		Maritime Operations Division	DSTO Edinburgh SA	Gavin Puddy 08 8259 7522
MPD 01	Comparative Study of monohull and trimaran hull forms	This project requires the comparison of two different ship hull forms designed to perform the same primary tasks in order to determine the influence of hull form on ship size and propulsion. A monohull design would be used as the base ship and the objective would be to initially develop a high level concept trimaran design able to carry out the same primary roles as the base ship. An estimate of the speed-resistance characteristics and corresponding propulsion demands for both ships would then be conducted to identify other potential implications such as effect on maximum range and/or speed.	This task requires the ability to carry out various naval architectural type activities such as: weight and space calculations, development of concept arrangements and speed - resistance calculations	Naval Architecture	Familiarity with commercial and academic naval architectural software codes is essential	The successful applicant must be able to demonstrate initiative and good time management skills. Only naval architecture students about to enter their final year or currently undertaking final year bachelor degree studies will be considered	Maritime Platform Division	DSTO Fishermans Bend	Bernie Phelps 03 9626 8223
MPD 02	Submarine Surfaced Stability	To investigate the feasibility of using gyro stabilisers to increase roll damping and enhance the stability of a surfaced submarine.	1. Analyse and model the effect of gyro stabilizers on the roll motion of a surfaced submarine. 2. Assess the effectiveness of gyro stabilizers on submarine roll. 3. Design a roll damping capability demonstrator using gyro-stabilise	Engineering/Science	ability to analyse, model and design dynamic systems	completed the third year of an engineering/science degree with good knowledge in engineering or applied mathematics	Maritime Platform Division	DSTO Fishermans Bend	Yan Tso 03 9626 8336
MPD 03	Advanced battery system investigations	Development of infrastructure for advanced battery system test cell.	To assist in the construction and commissioning of the Propulsion and Energy Management group's high current battery cycling test rig and to conduct limited cyclic and classification tests on advanced batteries for submarine and land vehicle applications. If time allows, begin investigations into battery management system architectures in support of these advanced batteries	Electrical engineering	knowledge of Labview	Safety conscience with power laboratory experience	Maritime Platform Division	DSTO Fishermans Bend	Hugh Torresan and Robert Jarvis 03 9626 8240
MPD 04	Structural Evaluation of Composite Propeller Hub Connections	DSTO has established a research program on developing technology for composite marine propellers. A key aspect of the technology is the design of an effective and practical connection between each composite blade and a metallic hub. The project will aim to develop an understanding of how loads can be transferred between an orthotropic composite blade and an isotropic, higher stiffness metallic hub. The connection concept will facilitate removal of a blade from the hub which may also induce special considerations in relation to load transfer.	The student will be required to refine one or more concept connection designs and develop and analyse a basic finite element model. A report shall be prepared to provide a preliminary evaluation of concept design's) investigated, indicating recommendations on further research	Mechanical Engineering, Naval Architecture, Materials Engineering, Marine/Ocean Engineering.	Experience with finite element modelling and analysis and familiarity with composite materials is essential. Familiarity with marine propulsion and marine design is desirable but not essential.	Completion of at least 3 years of an undergraduate engineering/science degree. Australian citizen and eligible to obtain restricted security clearance	Maritime Platform Division	DSTO Fishermans Bend	Craig Gardiner 03 9626 8442

MPD 05	A Review of Fatigue and Performance Models	The Navy Personnel and Material Sustainment Group in MPD are currently involved in a number of research studies where fatigue is one of the key issues. It is well known that fatigue is a persistent occupational hazard and may be an influence in many human factors accidents. Fatigue is also very much part of life within the Royal Australian Navy (RAN), where work demands and stress are high. Part of the research conducted within MPD aims at providing recommendations and initiatives to mitigate against fatigue and improve safety within the RAN. Over the last decade there has been an increased interest in technologies and procedures that are capable of monitoring and predicting fatigue and performance. This interest has largely been brought about by the requirement for more effective fatigue countermeasures in the transport sector. Within this context, the Navy Personnel and Material Sustainment Group in MPDhave purchased and used technologies capable to some extent of detecting and predicting fatigue. An important aspect for these technologies is that they are properly validated and that critical reviews are conducted before use. This means that the models must be a predictor of fatigue-related performance errors. This project aims to compare and contrast the features and capabilities of two fatigue and performance models and to identify critical gaps in fatigue and performance research. The aim is to review, evaluate and validate these models and provide recommendations on the most appropriate technologies for use within MPD's research mandate.The two models under review will be: o The Fatigue Audit InterDyne (FAID) {1}; o Sleep, Activity, Fatigue and Task Effectiveness Model (SAFTE) {2}	o Literature Review o Software Review and Evaluation o Basic Statistical Analysis o Report Writing The two models will be compared using experimental data available from past experiments carried out by the Navy Personnel and Material Sustainment Group. The outcome of this project will include a report which will cover a description of the models and the results from the validation process. The project will be split up into different phases. 1. A literature review with the aim being to collect data on these models. Important aspects of these models are validity, reliability, generisability and sensitivity. This will involve a comparison and critique of these models. 2. Utilising experimental data to evaluate validate and compare the two models. 3. A report which will include information on the review, evaluation and validation results of these models	Human factors:Psychology, Science			Maritime Platform Division	DSTO Fishermans Bend	Michelle Grech 03 9626 8227
PRD 01	Capability Technology Demonstration - Project Maturity Program	Develop options for how the CTD & CTD-EP Programs might improve the ability for existing industry technology projects to enter Defence service	Using imagination and new approaches, consider and develop commercial and technical approaches to improve acceptance of new technology for operational use.	Industrial studies, technical policy, technology commercialisation, engineering & science.	Computer literacy to prepare reporting, tables and presentations. A willingness to look at new and novel commercialisation approaches for high technology industry.	The candidate would be advantaged by having completed some study in commercialisation of technology and an understanding of basic engineering	Projects & Requirements Division	DSTO Canberra	Andrew Arnold 02 612 8 6488
WSD 01	Enhancement of Ground Based Air Defence Planning Tools	Weapons Systems Division has developed a ground based air defence planning tool that is used by the 16th Air Defence Regiment for optimizing air defence layouts. The Air Defence Command Post Automation (ADCPA) tool is a Microsoft Windows based tool that is currently being upgraded based on user requirements. Developments will consider GUI, functionality and potential integration of Geospatial products. This project involves: a) continued updating the existing ADCPA tool; b) design and development work for migration of the tool to a new simulation architecture; and c) general support to the development of simulation architectures. The student will gain experience in software engineering in a research environment, state of the art simulation architectures and an understanding of weapon systems.	Update the existing ADCPA software application with user defined modifications. Assist with the re-design of ADCPA to be compatible with the new simulation architecture developed by Weapon Systems Division. Assist with general simulation application architecture development as directed by MSTARS team leader.	Engineering (Aerospace, Information Technology, Software), Applied Physics, Computer Science.	C++ programming, Visual C++ MFC, wxWidgets, knowledge of GIS products.		Weapons Systems Division	DSTO Edinburgh SA	Matthew Christie 08 8259 5825
WSD 02	Enhancement of Simulink Missile Models using MSTARS	Weapons Systems Division has developed an environment to aid the development of physics-based models of missiles called MSTARS. MSTARS is a Model Architecture developed under Matlab Simulink that provides templates, GUI's and utility blocks to aid the construction of missile models and the export of these models to C++ simulations. Sample missile components and models are included to serve as a worked example to users. This project involves updating some of the sample MSTARS models to enhance their functionality and better represent the capabilities of modern missiles. The student will gain experience in modelling complex systems in Simulink, software engineering in a research environment and an understanding of modern missile technology.	Update example MSTARS model components to represent more advanced missile capabilities, such as launch aircraft to missile datalink and lock-after-launch infra-red seekers. Integrate Simulink models from other missile modeling environments into MSTARS. Assist with general MSTARS architecture development as directed by MSTARS team leader	Engineering (Aerospace, Information Technology, Software), Applied Physics, Computer Science.	Matlab and Simulink, C++ programming.		Weapons Systems Division	DSTO Edinburgh SA	David Wilson 08 8259 7794
WSD 03	Replacement of Safety Status Monitor and Display	The Safety Status Monitor and Display (SSMD) is a critical safety component of the Primary Infrared Scene Projector. Its role is to monitor analog safety sensors and communicate this data to a host PC over an RS232 serial interface. The SSMD must be replaced and this project requires a requirements analysis and specification of new hardware including ADC and communications hardware. This project may be extended to include the development of a TCP/IP interface in FPGA hardware if time is available.	For SSMD replacement • Identification of requirements for replacement hardware • Specification of replacement system • Selection of COTS hardware For TCP/IP project extension • Implement a TCP/IP interface on Xilinx FPGA • Develop a GUI and communications protocol for communication between FPGA development board and host PC	Electronic Engineering or Mechatronic Engineering	• Knowledge of ADCs and how to select appropriate ADC for a given task • Good report writing and communication skills • Some programming skills (C++ or Java) • VHDL design experience • FPGA design experience • MATLAB experience • Simulink experience	Must have good knowledge of Analog to Digital conversion theory and hardware and must possess good communication skills.	Weapons Systems Division	DSTO Edinburgh SA	Craig Eales (8/01/10-19/02/10) and Rob Joyce (30/11/09 – 8/01/10) 08 8259 6466/ 08 8259 6573
WSD 04	Characterisation of fuel vaporisation	Experiments and trials that are done to study the interaction of projectiles in a jet fuel-air mixture require knowledge of the concentration and fractional composition of the fuel as it is introduced to the apparatus and vaporises. Following a short review of relevant literature, this project will firstly study in a laboratory apparatus the vaporisation process from initiation to saturated equilibrium, or to a steady non-equilibrium state using gas chromatography/mass spectrometry or other methods. It will then assess options for rugged sensors that could be used in a larger projectile interaction chamber. The ability of simple gauges to identify conditions in the vapour mixture and methods of calibration will be addressed	Review of available literature; refinement of experimental methodology; design and construction of laboratory apparatus; supervised operation of gas chromatography/mass spectrometer instruments; analysis of results; search and assessment of measurement product options; reporting of conduct and results of the project	Organic Chemistry, Chemical Engineering, Petrochemical engineering, Physical Chemistry	Laboratory skills, desktop analysis and reporting		Weapons Systems Division	DSTO Edinburgh SA	Steve Kollias 08 8259 5621
WSD 05	Design, construction, and evaluation of high current Helmholtz coils	Using computer simulation and analytical tools design Helmholtz coils for high current applications. Suitable designs will be constructed and then evaluated. Magnetic fields will be measured and mapped for a variety of current inputs. A final report detailing results will be provided.	Simulation, construction, experiment, report writing	Physics, mechanical, electrical, electronic engineering	Mechanical design	This is not a desk job	Weapons Systems Division	DSTO Edinburgh SA	John Waschl 08 8259 3810
WSD 06	Target Detection Algorithm Development for Ground Penetrating Radar Data Algorithms	Real-time detection and discrimination of targets of interest at a standoff distance is a major issue in efforts to develop defence against improvised explosive devices (IED). Threat Mitigation (TM) group, Defence Science Technology Organization (DSTO) in collaboration with universities has developed a number of target detection algorithms applicable to Ground Penetrating Radar (GPR), metal detector array data, and Visual & Infrared (IR) images. This project focuses on development and testing of enhanced target detection algorithms to reduce clutter signal due to the reflection from the ground surface in ground penetrating radar (GPR) measurements. The proposed technique will be applied to a GPR, which has been used to detect subsurface anti-personnel (AP) landmines. A very simple model will be is used to model the GPR clutter and the target signal	Data analysis, report writing	Electronic and electrical engineering	Matlab competency		Weapons Systems Division	DSTO Edinburgh SA	Canicious Abeynayake 08 8259 6804