

RCloud Tasking Form – Part B: Statement of Requirement (SoR)

Title of Requirement	Advanced Electronic Surveillance DSP and ML Techniques
Requisition No.	Redacted under FOI Exemption
SoR Version	0.1

1.	Statement of Requirements
1.1	Summary and Background Information
	<p>Electronic Surveillance (ES) is facing an increasingly complex environment to operate. As radar and communications systems develop in their adaptability, the requirements on ES systems increase significantly.</p> <p>Recently there have been attempts to bring the machine learning (ML) advances and apply them to the understanding of the EME (Electromagnetic Environment). Little academic research has been completed on real world applied problems considering low SNR, congested and contested environments.</p> <p>Many open research questions exist in the application of ML to the Electromagnetic Environment (EME), and these questions are present across many of the problems within ES that ML could address.</p> <p>Redacted under FOI Exemption currently undertakes a Redacted under FOI Exemption funded study along with Redacted under FOI Exemption. This PhD, in collaboration with Redacted under FOI Exemption, and with the use of their facilities, will allow many of the open research questions that exist in the application of ML to the Electromagnetic Environment (EME) to be investigated.</p>
1.2	Requirement
	<p>The PhD will therefore focus on a particular research area; detecting, counting and separating signals in a congested EME using ML. Through this the PhD student will be able to leverage previous time-frequency transforms developed at Redacted under FOI Exemption for pre-processing along with current Redacted under FOI Exemption work to create datasets for testing and to deploy algorithms on.</p> <p>In addition, there are a number of hardware platforms available at the university which include the Xilinx RFSoc system the AIR-T SDR, BladeRF SDR, LimeSDR and many more. These devices can be utilized to create datasets to apply newly generated ML techniques on, enabling both experimentation and innovative algorithms development within this single PhD. The AIR-T system is an ideal solution that could be exploited within this PhD and the Redacted under FOI Exemption group has 2 of these devices currently. This device can leverage GPU processing while also having a re-configurable SDR</p>

solution all on the same PCB. Examples that look to use CUDA GPU acceleration into ES application area already obtainable and the PhD candidate can use these as starting points for the practical aspects of the research. The answers to these fundamental questions will help form the future of modern ES system research within UK MoD.

The new PhD student will maintain a strong relationship with [Redacted] in the area of signal processing for electronic warfare and compliment current on-going research programmes.

Training opportunities at [Redacted] include compressed MSc modules that will provide the necessary core capabilities to deliver high quality research. External technical training can also be arranged during the PhD. Additional training opportunities are actively encouraged at [Redacted] for PhD students in the areas of personal and professional skills.

Engagement with the [Redacted under FOI Exemption] will enable the student to learn about the latest ML processing methodologies and how to implement them in algorithm form. This overlap between ATI, [Redacted under FOI Exemption] is a unique opportunity for world class research environment to complete a PhD.

The PhD student will obtain access to the [Redacted] site to enable close integration with the scientists and engineers.

The planned PhD aims to bring together [Redacted under FOI Exemption] in a unique way that will provide an excellent research environment for the prospective student. This represents a fantastic opportunity to cover work from both the practical hardware end all the way to the cutting-edge ML algorithm side. The technical approach of the work will be to break up the outputs into 4 areas.

[Redacted under FOI Exemption]
















[Redacted]

NOTE: Payment will be annually in arrears, and upon satisfactory completion of all deliverables at the end of each PhD Year.

Additional Definitions

"PHD Year" A consecutive twelve (12) Month period during the Term, commencing on the date that the Authority formally confirms approval of the student in writing

	Redacted under FOI Exemption
1.3	Options or follow on work <i>(if none, write 'Not applicable')</i>
	Not Applicable - Total duration is a 4 year agreement, starting on 2nd October 2023 with the final report due on 30 th September 2027.
1.4	Contract Management Activities
	<p>Year 1 – 3 Annual progress report</p> <p>Year 4 - Submission of final thesis</p>
1.5	Health & Safety, Environmental, Social, Ethical, Regulatory or Legislative aspects of the requirement
	Working across both Redacted under FOI Exemption sites and adhering to current policy and guidelines for both organisations.

1.6	Deliverables & Intellectual Property Rights (IPR)				
Ref.	Title	Due by	Format	Expected classification (subject to change)	What information is r deliverab
<i>D - 1</i>	<i>Year 1 Report</i>	<i>T0+12 Months</i>	<i>Report Format</i>		Redacted under FOI Exemption   
<i>D - 2</i>	Year 2 report	T0+24 Months	Report Format		Redacted under FOI Exemption   
<i>D - 3</i>	Year 3 Report	T0+36 Months	Report Format		Redacted under FOI Exemption   
<i>D - 4</i>	Year 4 Final Report	T0+48 Months	Report Format		Redacted under FOI Exemption  

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1.7	Deliverable Acceptance Criteria
	<p>All Reports included as Deliverables under the Contract e.g. Progress and/or Final Reports etc. must comply with the Redacted under FOI Exemption which defines the requirements for the presentation, format and production of scientific and technical reports prepared for MoD.</p> <p>Interim or Progress Reports: The report should detail, document, and summarise the results of work done during the period covered and shall be in sufficient detail to comprehensively explain the results achieved; a description of current substantive performance and any problems encountered and/or which may exist along with proposed corrective action. An explanation of any difference between planned progress and actual progress, why the differences have occurred, and if behind planned progress what corrective steps are planned.</p> <p>Final Reports: shall describe the entire work performed under the Contract in sufficient detail to explain comprehensively the work undertaken and results achieved including all relevant technical details of any hardware, software, process or system developed there under. The technical detail shall be sufficient to permit independent reproduction of any such process or system.</p> <p>All Reports shall be free from spelling and grammatical errors and shall be set out in accordance with the Statement Of Requirement (1) above.</p> <p>The Report shall summarise the results of work performed during the period covered in sufficient detail to comprehensively explain the results achieved, provide a description of current substantive performance and details of any problems encountered and/or which may exist along with proposed corrective action. The Report must contain sufficient detail to explain the work undertaken in that period, this could include supporting information such as raw data in an Excel or GraphPad Prism format, relevant scientific graphs and diagrams.</p> <p>If upon review of the progress reports and/or the final PhD thesis, the Redacted under FOI Exemption does not accept the deliverables, the Contractor shall provide acceptable replacements at no additional cost to the Authority.</p>

2	Evaluation Criteria
2.1	Method Explanation
	Evaluating this based on technical compliance and affordability

2.2	Technical Evaluation Criteria														
	Confirmation that the proposal fully meets the Authority's Statement of Requirement. Pass/Fail Within budget Pass/Fail														
2.3	Commercial Evaluation Criteria														
	<p>Tenderer has submitted a commercially compliant bid.</p> <table> <tr> <td>Firm priced version submitted within budget of [Redacted under FOI Exemption]</td> <td>Pass/Fail</td> </tr> <tr> <td>Labour rates and price as per single source rates uploaded to R Cloud</td> <td>Pass/Fail</td> </tr> <tr> <td>Completion of Research Workers Form's</td> <td>Pass/Fail</td> </tr> <tr> <td>Completion of Statement Relating to Good Standing</td> <td>Pass/Fail</td> </tr> <tr> <td>Completion of SAQ</td> <td>Pass/Fail</td> </tr> <tr> <td>Confirm acceptance of R Cloud Version 4 Terms and Conditions</td> <td>Pass/Fail</td> </tr> <tr> <td>Completion of DEFFORM 711</td> <td>Pass/Fail</td> </tr> </table>	Firm priced version submitted within budget of [Redacted under FOI Exemption]	Pass/Fail	Labour rates and price as per single source rates uploaded to R Cloud	Pass/Fail	Completion of Research Workers Form's	Pass/Fail	Completion of Statement Relating to Good Standing	Pass/Fail	Completion of SAQ	Pass/Fail	Confirm acceptance of R Cloud Version 4 Terms and Conditions	Pass/Fail	Completion of DEFFORM 711	Pass/Fail
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