

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

Title of Requirement	NT20-800: Polarisation diversity and ultra-wideband antenna for feature extraction
Requisition No.	61180500
SoR Version	1.0

1.	Statement of Requirements
1.1	Summary and Background Information
	<p>The Missile Defence Centre (MDC) seeks to explore the PhD route to conduct low technology readiness level (TRL) work in to the use of polarimetry for feature extraction from ultra-wideband antenna.</p> <p>Recent advances in high speed digital technology make the direct digital synthesis and direct sampling of radiofrequency (RF) waveforms an affordable and technically feasible proposition. This opens up the possibility of using pulses with wide instantaneous bandwidths (100's of Mhz), in a number of different RF radar bands (L, S, X) to extract target features for classification purposes. The advent of ultra-wideband antennas with polarisation diversity adds another dimension to the toolkit that radar designers can work with, in that it permits a single radar to operate across a number of radar bands concurrently and with dual polar transmissions. This PhD will investigate the potential of such waveforms to extract target features such as spin, tumble and precession of ballistic objects using signal processing techniques such as time frequency transforms, combined with Machine Learning, to successfully classify objects in space. Crucially, it will investigate whether the combination of features extracted across the ultra-wide bandwidth of the antenna, with differing polarisations, can yield any benefit when classifying space objects.</p>
1.2	Requirement
	<p>The PhD study will involve a 3.5 year effort from the selected PhD candidate, supervised by Redacted from Cranfield University. Redacted is a Radar Lecturer, who heads the Cranfield University Ground-Based SAR Laboratory (GBSAR Lab), and has an interest in pursuing research into Ultra Wide-Band, polarimetric and microdoppler SAR phenomenology. Redacted has worked previously with DERA, QinetiQ and Dstl and has a wealth of experience supporting students through to PhD completion. Redacted is thus well placed to support the successful candidate on this study.</p> <p>From the successful candidate, the outputs required are:</p> <ul style="list-style-type: none"> • Quarterly reporting – a progress report containing a summary of the work completed throughout the last quarter and planned work through the next quarter. • Annual Progress Presentations – to MDC and BAE. • Final PhD Thesis – submission of final thesis for successful PhD award. • Viva Voce– successful defence of work completed for PhD award. • Final Presentation - to stakeholders from across MDC, BAE, and wider MoD. <p>The PhD is fully-funded by the MDC. The successful candidate will receive an enhanced stipend, Redacted above the UKRI rate (£15,609 for FY 21/22), of Redacted per year. Course costs,</p>

	<p>training, materials and attendance at conferences are also to be covered by the MDC funding. The PhD is expected to start in September 2022, with completion in December 2025.</p> <p>This PhD is industry-linked through BAE Systems Maritime Services, as one of the MDC's Tier 1 partners. Support from BAE is expected to include a joint supervision for the PhD candidate, as well as offering the candidate the opportunity to spend 12 weeks working on-site with BAE integrated in to a relevant team. This support ensures that there will be adequate pull-through from the PhD research into industry and the continued development of relevant systems and technology. BAE's involvement is to be confirmed by, and contracted through, the academic institution to which the the PhD study is awarded.</p> <p>The candidate for this PhD study must be a UK national and undergo a basic BPSS clearance to undertake this research work.</p>
1.3	Options or follow on work
	There are no direct options for follow on work from this study.
1.4	Contract Management Activities
	The Task shall be managed in accordance with the terms of R-Cloud v4 with assessment of progress reports and other key deliverables.
1.5	Health & Safety, Environmental, Social, Ethical, Regulatory or Legislative aspects of the requirement
	N/A

1.6	Deliverables & Intellectual Property Rights (IPR)					
Ref.	Title	Due by	Format	Expected classification (subject to change)	What information is required in the deliverable	IPR Condition
NT20-800_1	Progress Reporting	Quarterly	Report (.pdf or .docx)	Redacted	Summary of work completed in the previous quarter.	Default RCloud Agreement Terms and Conditions shall apply
NT20-800_2	Progress Presentations	Annually	Presentation	Redacted	Summary of work completed in the previous year, and direction for future research.	Default RCloud Agreement Terms and Conditions shall apply.
NT20-800_3	Final Technical Report	T0 + 39months	PhD Thesis	Redacted	Submission of final thesis for PhD award.	Default RCloud Agreement Terms and Conditions shall apply
NT20-800_4	Viva Voce	T0 + 39months	Presentation	Redacted	Completion of Viva Voce examination for PhD award.	Default RCloud Agreement Terms and Conditions shall apply
NT20-800_5	Final Presentation	T0+40months	Presentation	Redacted	Final presentation to MDC, BAE, and other key stakeholders.	Default RCloud Agreement Terms and Conditions shall apply

1.7	Deliverable Acceptance Criteria
	<ul style="list-style-type: none"> ○ 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; substantive performance; 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. ○ 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. The report shall be of a standard suitable to award the PhD. ○ All Reports included as Deliverables under the Contract e.g. Progress and/or Final Reports etc. must comply with the Defence Research Reports Specification (DRRS) which defines the requirements for the presentation, format and production of scientific and technical reports prepared for MoD. ○ 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>Failure to comply with the above may result in the Authority rejecting the deliverables and requesting re-work before final acceptance.</p>

2	Evaluation Criteria
2.1	Method Explanation
	Please provide a proposal that addresses all aspects of the SoR.
2.2	Technical Evaluation Criteria
	The Contractor shall provide evidence to demonstrate that they can meet the full requirement as outlined in Section 1 of this Tasking Form Part B.
2.3	Commercial Evaluation Criteria
	The Contractor shall provide evidence to demonstrate that they can meet the following:

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| | <ul style="list-style-type: none">• Compliance with the Task specific terms and conditions as stated within the Tasking Forms Part A and B. The Contractor shall provide a completed Tasking Form Part C confirming that an offer in made in accordance with R-Cloud Version 4 Terms and Conditions.• The supplier must provide completed Research Worker Forms for all individuals expected to undertake work on the Task, unless SC clearance or above is already held. A document is provided for completion where Research Workers do not already hold SC Clearance. If SC clearance is already held, the Contractor shall provide the individual's clearance details.• The Contractor must provide their full FIRM price breakdown for all costs to be incurred to fulfil this requirement, including: what rates are being used for what grade (using their respective agreed R-Cloud grades), quantity of manpower hours per grade, materials costs, facility costs, profit rate applied, any sub-contractor costs and the level of sub-contracting required, any other costs applicable to this requirement. The Authority will assess the proposal to ensure that all costs are fully detailed and in line with the R-Cloud rates, and that the price is commensurate with the work to be undertaken. |
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When placing any contract the Authority is required to satisfy itself that the agreed price represents Value for Money (VFM). The Authority reserves the right to not enter into any contract that is unacceptably priced or unaffordable.