Job Description & Person Specification

Section 1
Role Overview

Job title:	Research Assistant or Research Fellow in Smart Polymer Electrospray Propulsion
Vacancy reference:	5440
Faculty/Professional Service Unit:	Faculty of Engineering and Applied Sciences
Theme:	AI, Robotics and Space
Job type:	Full time Fixed Term Contract for 18 months
Hours of work:	37 hours per week, normally worked Monday to Friday. Flexible working will be considered.
Salary details:	**Research Assistant (if PhD close to completion):** Salary level 4 – range £29,950 to £35,019 per annum with potential progression to £40,984 per annum **Research Fellow (if PhD obtained):** Salary level 5 – range £38,655 to £46,492 per annum with potential progression to £53,108 per annum
Line Manager:	Dr Enric Grustan, Lecturer in Space Engineering
Start date:	As soon as possible

Section 2
About Cranfield University

Cranfield's world-class expertise, large-scale facilities and unrivalled industry partnerships is creating leaders in technology and management globally. Find out more about our unique impact, and our vision, mission and values here.

We aim to create and maintain a culture in which everyone can work and study together and realise their full potential. We are a Disability Confident Employer. We are committed to actively exploring flexible working options for each role and have been ranked in the Top 30 family friendly employers in the UK by the charity Working Families. Find out more about our key commitments to Equality, Diversity and Inclusion and Flexible Working here.

Section 3
About the Faculty of Engineering and Applied Sciences

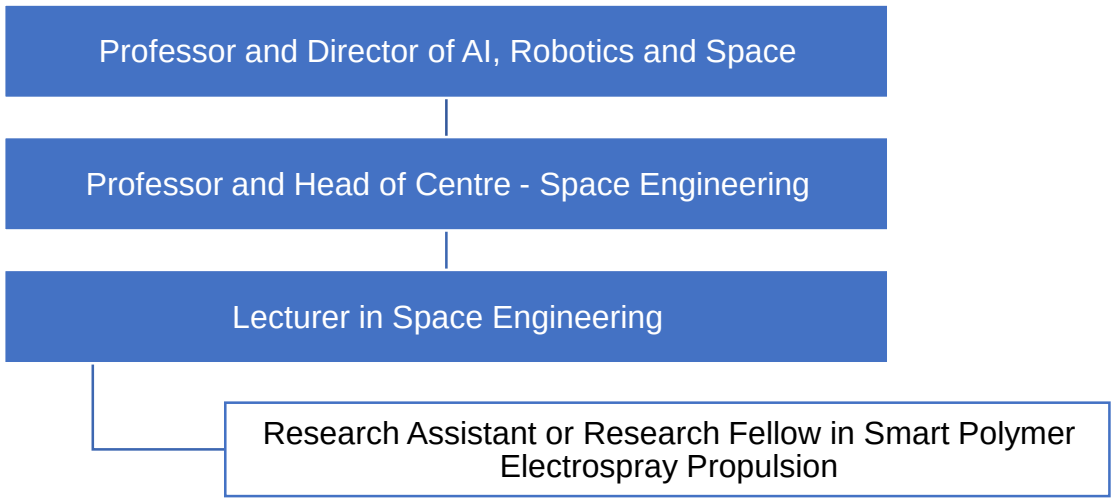
Cranfield's research and educational excellence is recognised internationally, and is brought together in the Faculty of Engineering and Applied Sciences. The Faculty hosts the associated core research and education 'Themes', which in turn host a number of world-class Centres and Institutes. The Themes define their own research challenges and educational missions, with the Directors of Theme working closely with the Interim Pro-Vice-Chancellor (FEAS).

About the Centre for Space Systems

Our reputation for leading in the field of aerospace, space, and cyber-physical systems, their autonomy, communication systems and signal processing has been established through more than thirty years of research into this field.

The Centre has expertise spanning spacecraft and mission design, electric and chemical propulsion, space debris mitigation, and space systems manufacturing. This role sits within the Centre's electric propulsion research activities, which develop novel thruster technologies for small satellites in collaboration with the European Space Agency and industry partners. For more details of our current activities, please visit the Centre's webpage here.

Organisational Chart



Section 4
Job Details

Job Purpose

The purpose of this role is to support the delivery of research in pioneering a new generation of low-cost, demisable propulsion hardware for small satellites. The postholder will need to design, fabricate and experimentally characterise a large, scalable array of demisable electrospray emitters manufactured from shape-memory polymers, and establish the operational feasibility, stability and performance of this novel propulsion technology relevant to conventional MEMS-based approaches, in support of a European Space Agency-funded (OSIP) research project.

Key Deliverables

	Description of Deliverables	% of time
1	Work with existing colleagues in the Centre and the project partners to develop and deliver future research. Plan, carry out and deliver contract research and reporting tasks using methodology and techniques appropriate to the research. Investigations leading to the discovery of new knowledge. Analysing and illuminating data, interpreting and bringing new insights through integraton. Application of knowledge in practice, out of which new intellectual understanding emerges. Plan and produce independent original research. Investigate models and approaches to test and develop them. Contribte to the development and integration of project outputs. Plan and conduct simulations and laboratory experiments. Develop a research vision and roadmap.	80%
2	Write and publish in high-quality journals suitable for the Research Excellence Framework. Participate in conferences to disseminate the results of your work.	10%
3	Contribute to and support MSc and PhD student supervision and grant proposal writing, and support teaching activities.	5%
4	Contribute to supporting Cranfield's research culture, and take on citizenship roles as may be relevant. Contribute to the effective operation of the AI, Robotics and Space Theme.	5%

	Carry out other activities as directed by your line manager. Ensure that Environmental, Health and Safety policies are adhered to as required by the Faculty and University.	

Please be advised that the percentages allocated for the key deliverables may be adapted to take into account the needs of the Faculty and / or University.

Planning and organising

The postholder will plan and sequence experimental work across the project's five work packages over an 18-month period, moving from single-emitter characterisation through to large-array fabrication, integration of flow-resistive channels, and a 100-hour long-duration stability test. This requires forward planning of laboratory and equipment access (CNC machining, vacuum chamber, SEM, DMTA), coordination of fabrication and test campaigns to meet work package milestones and deliverables, and adaptive re-planning where experimental results (e.g. material behaviour or emitter performance) require iteration of the design or test plan.

You will need to adhere to delivering the research work within the timescales set by the line manager and reporting against ESA milestones and deliverables (D1-D5) on a rolling basis throughout the project.

You will be self-directed and well organised. You should be able to develop a forward research plan for yourself over both short and extended timescales. You should have excellent project and time management skills, ensuring that milestones and deliverables are achieved to time and to high quality.

The role will involve short-term responsibilities, such as day-to-day project management, interaction with the wider project team and organising project meetings. As different tasks will require different time periods for planning, flexibility and good coordination skills will be important.

Work will need to be clearly documented on a day-to-day basis, showing a clear development path for the project. On an ad-hoc basis, you may be required to assist with other related projects where your skills may be relevant.

Communicating and influencing

The postholder will work closely with the Principal Investigator/Project Supervisor on a regular basis to discuss progress, results and direction. You will liaise with laboratory and workshop technicians to plan machining, fabrication and test activities, and with other researchers and PhD students within the Centre for Space Systems' Electric Propulsion Group to share equipment, facilities and expertise.

You will need to be able to demonstrate excellent interpersonal skills to contribute to progress reporting to the project's funder (European Space Agency), and you will be expected to present findings at project review meetings, internal seminars and external conferences, as well as through high-impact peer-reviewed publications, requiring clarity and precision in communicating complex technical results to both specialist and non-specialist audiences. A confident approach to presentation and delivery is required.

You will be expected to be able to articulate information about your work in a clear and concise manner, and to discuss problems constructively with your line manager and colleagues. You will

also need to be confident in engaging with stakeholders, and an active and collegiate team mentality is the expected norm at Cranfield.

You will be expected to communicate scientific results effective through reports and presentations, and to prepare articles suitable for publication in high-impact peer-reviewed journals.

Problem solving

The postholder will encounter a range of technical problems typical of experimental propulsion and materials research, including diagnosing causes of emitter fabrication defects (e.g. burr formation, closed orifices, dimensional deviation from CAD design), interpreting current waveform and emission data to identify unstable or pulsating spray regimes, analysing DMTA and SEM characterisation data to understand material behaviour during shape-memory activation, troubleshooting vacuum chamber and high-voltage test setups, and designing new experimental approaches (e.g. hydraulic resistance channel integration, multi-emitter activation strategies) where no established method exists. Many of these problems require the postholder to develop novel solutions, since the use of shape-memory polymers in electrospray systems has not previously been demonstrated.

You are expected to already be a confident and independent researcher. You will be expected to be able to work independently for most of the time, with reference to the line manager and other project colleagues for points of clarification.

You will be expected to think through and solve problems which may be encountered in terms of methodology, the analyses and development of models and interpretation of results.

Most problems will be solved through experience and through the guidance and mentoring available. You will be expected to discuss problems constructively with the line manager or other colleagues.

You will be responsible for ensuring that appropriate risk assessments are carried out for any new procedures to meet the University specification.

Decision making

I) Decisions you will take without reference to others

- Day-to-day experimental design and scheduling (e.g. choice of emitter geometries to test, test sequencing), selection of characterisation and analysis methods, interpretation of experimental data and drawing of technical conclusions, minor adjustments to machining or test parameters based on observed results, and day-to-day laboratory and equipment scheduling.
- Day-to-day management and planning of ongoing research within the overall specifications provided by the project terms of reference/proposal.
- Draft delivery of high-quality research and reports to deadline and quality.
- Writing draft journal and conference papers.
- Preparing material for joingly-authored papers and conference presentations.
- Activte participation in the implementation of health and safety procedures in the areas in which you work.
- Drafting reports, minutes, actions and papers.
- Identifying, collating and communicating associated research papers and reports.

II) Decisions you will refer to your manager/colleagues

- Changes to the overall research plan, work package scope or project timeline, any issue likely to affect delivery of contractual milestones/deliverables to the funder, requests for additional equipment or budget, co-authorship and content of publications and external presentations, health and safety concerns or incidents, any ouput intended for external dissemination.
- Developing new research ideas, proposals, consultancy work, and identifying sources of funding.
- Balancing ongoing research commitments, project management and publication/proposal-related activities.
- Activities to enable the dissemination and exploitation of research results.
- Aspects potentially affecting the operation of the project or the outcome of the results, such that they will have influence on the success of the project meeting the goals.
- Budgetary issues related to research contracts.
- Decisions that involve modifications to contracted deliverables.
- Writing journal and conference papers – final submission.
- Research support for PhD and MSc students.

Guiding framework

The guiding framework for this role is the University's Corporate Plan – Ambition 2027.

Our performance and development review (PDR) scheme provides a set of objectives agreed with the line manager for the year ahead, and expected SMART targets. All staff must conform to the requirements of the Financial Manual. The post will be subject to normal Faculty and University systems, policies and procedures.

You will be provided with every opportunity to develop and grow a successful research activity which complements and enhances the existing research and teaching skills within the Faculty.

The role is specifically guided by the ESA OSIP project's agreed research plan, work package structure, milestones and deliverables, as well as Cranfield University's research governance, data management and research integrity policies. The postholder must follow Cranfield's health and safety procedures for laboratory work, including safe operation of CNC machining equipment, vacuum systems and high-voltage electrospray test rigs (up to 4kV). Any change to the agreed scope, timeline or budge of the ESA-funded project must be agreed with the Principle Investigator and, where required, the funder.

Impact

The postholder's work will directly determine the technical success of the project, including whether the SMP-based electrospray emitter array meets its TRL4 display and demonstrates feasibility relative to conventional MEMS and glass-based approaches. Results will have visibility within the Cranfield Centre for Space Systems and the wider Faculty, and through publications and ESA reporting, will contribute to the international electrospray propulsion and smart materials research community, potentially influencing the future direction of demisable, low-cost propulsion hardware for small satellites. The postholder has primary responsibility for the day-to-day experimental results, working under the overall supervision and shared accountability of the Principal Investigator for the delivery of the project's contractual milestones to ESA.

The role will be focused on meeting the aims and objectives of the project.

It is very important to conduct high-quality research to maintain and enhance the reputation and performance of the Centre. This will have impact on colleagues in related areas of research and could facilitate further internal and external collaborations.

No direct responsibility for budget or other staff/students is associated with this role. However, opportunities to co-supervise PhD/MSc students will be provided, and we expect postdoctoral researchers to take an active role within the Centre, and more widely within the Faculty, to both inform others of their ongoing work, and to make best use of existing knowledge and expertise.

You will be expected to present work at national or international meetings/conferences, and to write peer-reviewed journal papers.

Facts and Figures

Cranfield University excels in strategic and applied research. In the latest 2021 Research Excellence Framework (REF), 88% of our research was considered 'world leading' or 'internationally excellent' in its uality. We are in the top 30 in the world for Engineering – Mechanical, Aeronautical and Manufacturing (QS Work University Rankings by Subject 2023). As an institution, Cranfield has the second-highest income of all UK universities in terms of income per FTE from industry (source: HESA 2019/20 data). Our world-class academics, with proven research records, are in constant touch with industry through research, consultancy and product development. Over 5,000 students from over 100 countries study either full- or part-time, or in parallel with their career.

At Cranfield, we value Diversity and Inclusion, and aim to create and maintain a culture in which everyone can work and study together harmoniously, with dignity and respect, and realise their full potential. We particularly welcome female applicants and actively consider flexible working options such as part-time, compressed or flexbile hours, and/or an element of homeworking. To further demonstrate our commitment to progressing gender diversity in STEM, we are members of WES & Working Families, and sponsors of International Women in Engineering Day.

Section 5
Am I suited to this role?

Criteria	Essential	Desirable
Education / Qualifications	PhD (or close to completion) in Aerospace Engineering, Mechanical Engineering, Materials Science, Physics, or a closely related discipline.	PhD specifically in electric propulsion, MEMS/ microfabrication, or polymer/ smart-materials science.
Experience	Experience conducting experimental research in a laboratory environment, including designing experiments, collecting and analysing data, and reporting results.	Experience with electrospray/ colloid thrusters or other micro-propulsion systems. Experience of vacuum systems and high-voltage test equipment. Experience of micro-fabrication or precision manufacturing (e.g. CNC machining, MEMS).

Knowledge	Knowledge of electrohydrodynamics/ electrospray principles and space propulsion fundamentals. Knowledge of materials characterisation techniques (e.g. SEM, DMTA).	Knowledge of shape-memory polymers or other smart/ adaptive materials. Knowledge of spacecraft re-entry/demisability requirements and space debris/sustainability regulations.
Skills / Aptitudes	Excellent analytical and problem-solving skills. Ability to plan and conduct experimental work independently. Ability to work collaboratively within a research team. Ability to communicate complex information clearly in English. Excellent project and time management skills, ensuring that milestones and deliverables are achieved to time and to high quality. Excellent teamworking and technical writing skills. Proven ability to undertake original research. Ability and “drive” to produce high-quality manuscripts with others. Ability to find appropriate solutions to academic and technical questions.	CAD and CNC programming skills. Data analysis/programming skills (e.g. MATLAB, Python). Experience preparing content for peer-reviewed publication.
Values	Ability to demonstrate our values: Ambition, Impact, Respect and Community.	
Other	Willingness to work with laboratory equipment involving high voltages (up to 4kV) and vacuum systems, in accordance with University Health and Safety procedures. Willingness to travel occasionally for project meetings, conferences or collaborative testing.	