# Job Description & Person Specification

## Section 1
### Role Overview

| | |
|---|---|
| Job title: | Research Fellow in Positioning, Navigation and Timing |
| Vacancy reference: | 5431 |
| Faculty /Professional Service Unit: | Faculty of Engineering and Applied Sciences |
| Theme: | AI, Robotics and Space |
| Job type: | Full time<br>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: | Salary level 5 – range £38,655 to £46,492 per annum with potential progression to £53,108 per annum |
| Line Manager: | Professor Ivan Petrunin, Professor of Singal Processing and Intelligent Systems |
| 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

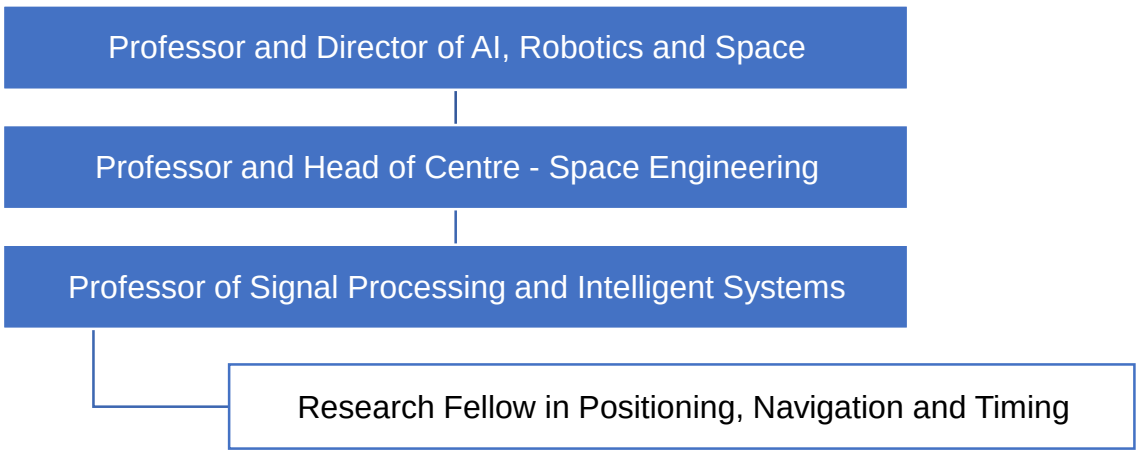
Cranfield's research and educational excellence is recognised internationally, and is brought together in the Faculty of Engineering and Applied Sciences. The Faculty hosts the associated core research and education 'Themes', which in turn host a number of world-class Centres and Institutes. The Themes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

We work in partnership with our industrial partners to provide high-quality training, research, development and consultancy to meet the challenges of these competitive markets. We have an outstanding international reputation for the quality of our work and our capability of performing both theoretical and experimental studies. Our work covers academic provision and research, with our research work spanning from fundamental research and development, to single-client contract research and development

## Organisational Chart



# Section 4
## Job Details

### Job Purpose

This is a post to support the delivery of research on the development of a new generation of high-performance, resilient and integrity-aware Positioning, Navigation and Timing (PNT) solutions. The research will address the challenges of providing reliable timing and positioning information in complex and degraded operational environments, including those where GNSS signals are unavailable or compromised. The role will contribute to the development of advanced singal processing, estimation and integrity monitoring algorithms for resilient timing and positioning, as well as experimental PNT systems, supporting applications in critical infrastructure, transport and autonomous systems.

The main aim of the work is to advance resilient multi-source PNT solutions through the development and integration of complementary timing and positioning technologies, robust estimation techniques and integrity monitoring methods. Wtihin the project on resilient timing for airports supported by the role, particular attention will be given to terrestrial radio-navigation technologies, including eLoran, and their potential contribution to improved PNT resilience of critical national infrastructure and transport. Research activities will include RF signal acquisition and processing, software-defined radio (SDR) applications, timing algorithms development, sensor/ information fusion, integrity monitoring and assessment of system performance under interference and degraded operating conditions.

Proposed solutions and algorithms will be developed and validated through simulation, laboratory experimentation and field testing, using Cranfield's PNT research facilities and experimental testbed to be developed within the project. The work will involve practical experimentation with RF receivers, antennas and associated data acquisition systems, alongside the development of software tools for signal processing, timing and positioning performance evaluation. The postholder will work closely with colleagues in the Centre for Space Systems, and in the Digital Aviation Research and Technology Centre (DARTeC), as well as with external project partners.

The postholder will take responsibility for the development and evaluaton of algorithms and experimental systems, preparation of technical reports and project deliverables, and dissemination of research findings through high-quality publications and conference presentations. The postholder will also be encouraged to contribute to wider research development, collaborative activities, student supervision, and teaching within the Centre.

## Key Deliverables

| | Description of Deliverables | % of time |
|---|---|---|
| 1 | Work with existing colleagues in the Centre and with industrial partners to develop and deliver future PNT research.<br><br>Manage and deliver contract research and reporting tasks using methodology and techniques appropriate to the research of high-performance, safe and robust timing and positioning solutions at an internationally-leading level.<br><br>Develop and implement algorithms and software tools for processing navigation and RF measurement data, including applications involving complementary timing and navigation technologies, such as eLoran.<br><br>Contribute to the development and integration of experimental PNT systems, including SDR platforms, RF receivers, antennas and associated data acquisition and processing tools.<br><br>Plan and conduct simulations, laboratory experiments and field trials to assess system performance under representative operational and degraded conditions.<br><br>Engage with and visit academic partners across the UK to inform the research.<br><br>Integrate key research from academic partners across the UK into our testbeds.<br><br>Develop a research vision and roadmap. | 75% |
| 2 | Write and publish in high-quality journals suitable for the Research Excellence Framework.<br><br>Participate in international conferences to disseminate the results of your work. | 15% |
| 3 | Contribute to and support MSc and PhD student supervision, grant proposal writing and supporting teaching activities. | 5% |
| 4 | Contribute to supporting Cranfield's research culture, and take on citizenship roles as may be relevant.<br><br>Contribute to the effective operation of the AI, Robotics and Space theme.<br><br>Carry out any other activities as directed by your line manager.<br><br>Ensure that Environmental, Health and Safety policies are adhered to as required by the Faculty and the University. | 5% |

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

You will be expected to deliver the research work and teaching support within the timescales agreed with your line manager.

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

You will need to be able to demonstrate excellent interpersonal skills to communicate with staff from all organisations across a wide range of disciplines to discuss project methodologies and to interpret results.

You will be expected 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 key informants. An active and collegiate team mentality is the expected norm at Cranfield.

You will be expected to communicate scientific results effectively through reports and presentations at national and international meetings/conferences, and to prepare articles suitable for publication in peer-reviewed journals that will have the widest dissemination and engagement for the relevant user community. There is an expectational that high-quality peer-reviewed journal papers will be published from the projects supported by this role.

There will be opportunities to present project outputs at industry and science conferences through oral presentation, and a need to be able to actively contribute to workshops, technical meetings and seminars. A confident approach to presentation and delivery is required.

## Problem solving

You are expected to be an early career but promising researcher. You will be able to work independently for a significant part of your time, with reference to your line manager and other project colleagues for points of clarification.

You will be able to think through and solve problems that may be encountered in terms of methodology, analysis, model development, and interpretation of results. You will be involved in making design decisions for the architectures, methodologies and approaches in close collaboration with project partners and Cranfield colleagues, selecting and implementing hardware and software components of the test/demo platforms, researching and developing data processing along with the timing and positioning algorithms. You will also be responsible for planning and conducting test and validation activities for the developed components and technologies.

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

## Decision making

### I) Decisions you will take without reference to others

- 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 standards.
- Writing draft journal and conference papers.
- Preparing material for jointly-authored papers and conference presentations.
- Active 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.
- Writing journal and conference papers through to final submission.
- Engaging with industrial and defense stakeholders.

### II) Decisions you will refer to your manager/colleagues

- Developing new research ideas and proposals, 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 influence the success of the project in meeting the goals.
- Budgetary issues related to research contracts.
- Decisions that involve modifications to contracted deliverables.
- Research support for PhD and MSc students.
- Teaching support in MSc courses.

## 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.

## Impact

You will have a significant role in making sure that the presearch project you are involved in achieves its aim, and you will be expected to provide a high-quality research contribution in the field of autonomous systems, and in its interactions with industry partners.

You will have access to the world-class research facilities of the University, such as:

- Time and Frequency Innovation Node
- Digital Aviation Research and Technology Centre
- Intelligent Mobility Engineering Centre
- Multi-User Environment for Autonomous Vehicle Innovation

Much of the research carried out could be commercially sensitive, therefore any technical papers that involve contribution/results from the project might first need to be approved by the project partners involved in the project. No direct responsibility for the budge or other staff/students is associated with this role.

However, opportunities to co-supervise PhD/MSc students will be provided, and we expect all our 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. There will also be scope to develop linked project bids and to work with colleagues in responding to research calls, as appropriate. You will be expected to present work at national and 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 quality. We are in the top 30 in the world for Engineering – Mechanical, Aeronautical and Manufacturing (QS World 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 flexible 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 in Engineering, Computer Science, Signal Processing, Telecommunications or a related discipline. | PhD research in PNT, radio-navigation, or related sensing technologies. |
| **Experience** | Evidence of independent contribution to the design and execution of research.<br><br>Practical experience in estimation, signal or sensor data processing with application to timing and positioning problems.<br><br>Proven track record of publishing in high-quality journals. | Experience in sensor/signal/ data processing for timing and positioning.<br><br>Experience in timing algorithm development, RF signal processing, multisensor integration or experimental PNT systems. |
| **Knowledge** | Good understanding of signal processing and estimation methods, and principles of positioning, navigation or timing systems. | Knowledge of resilient PNT, integrity monitoring, GNSS, eLoran, SDR-based receivers, interference mitigation or AI/ML applications. |
| **Skills / Aptitudes** | Proficiency in MATLAB, Python, C/C++ or comparable programming environments, and ability to analyse experimental data and evaluate algorithm performance.<br><br>Ability to prioritise and meet strict deadlines.<br><br>Excellent communication and presentation skills, with the ability to interact with different types of customers, e.g. students, industrial and research partners.<br><br>Ability to write reports and journal papers to a high standard.<br><br>Ability to work with others and collaborate effectively. | Multidisciplinary research collaboration, including integration of technical solutions developed by different project partners.<br><br>Experience with SDR platforms, RF receivers, antennas, laboratory instrumentation, simulation tools or sensor fusion implementations. |
| **Values** | Ability to demonstrate our values: Ambition, Impact, Respect and Community. | |
| **Other** | Ability to travel independently across the UK to meet academic partners.<br><br>Willingness and ability to travel overseas to attend conferences. | |