## Section 1
### Role Overview

<table>
<thead>
<tr>
<th>Job title:</th>
<th>Research Fellow in Reinforcement Learning for Engineering</th>
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<tbody>
<tr>
<td>Vacancy reference:</td>
<td>3358</td>
</tr>
<tr>
<td>School/Professional Service Unit:</td>
<td>School of Aerospace, Transport and Manufacturing</td>
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<tr>
<td>Job type:</td>
<td>Full time Fixed Term Contract for 3 years</td>
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<tr>
<td>Hours of work:</td>
<td>37 hours per week, normally worked Monday to Friday. Flexible working will be considered.</td>
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<tr>
<td>Salary details:</td>
<td>Salary level 5 – range £33,309 to £37,127 per annum with additional performance related pay up to £46,409 per annum</td>
</tr>
<tr>
<td>Line Manager:</td>
<td>Professor Weisi Guo, Professor of Human Machine Intelligence</td>
</tr>
<tr>
<td>Start date:</td>
<td>As soon as possible</td>
</tr>
<tr>
<td>Closing date for applications:</td>
<td>30 August 2020</td>
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Section 2
About Cranfield University

As the UK's only exclusively postgraduate university, Cranfield's world-class expertise, large-scale facilities and unrivalled industry partnerships is creating leaders in technology and management globally. Cranfield's distinctive expertise is in our deep understanding of technology and management and how these work together to benefit the world.

Find out more about Cranfield, our history, and our rankings and awards [here](#).

Corporate Plan (415i)

Our corporate plan is designed to raise the ambition and enhance the distinctiveness of our University through our people (staff, students and alumni), the industry partners we work with and our unrivalled research facilities. To strengthen our distinctive position in higher education and to grow our University, we have raised our ambition through our 415i goals:
What we value

We value ambition, impact, respect and community. These values inform how we work together and our relationships with our partners and students. We believe that success is not only about what we achieve, but how we achieve it. Our values help to define who we are, guide the way we work together and help to shape our decisions. Our shared values were developed with the active engagement of colleagues across the University:

**Ambition** – We aim high. We do all we can to achieve excellence.

**Impact** – We change people’s lives. We make the world a better place.

**Respect** – We value everyone’s expertise. We support each other.

**Community** – We build and cherish our Cranfield community. We embrace diversity.

Our shared, stated values help to define who we are and underpin everything we do. Find out more here.

Section 3

About School of Aerospace, Transport and Manufacturing

The School of Aerospace, Transport and Manufacturing (SATM) is a leading provider of postgraduate level engineering education, research and technology support to individuals and organisations. At the forefront of aerospace, manufacturing and transport systems technology and management for over 70 years, we deliver multi-disciplinary solutions to the complex challenges facing industry.

Visit the Cranfield website to learn more about the School’s current research activities, taught programmes and impact:

[Learn more about Aerospace](#)

About the Centre for Autonomous and Cyberphysical Systems

Our reputation for leading in the field of autonomous and space systems, applied artificial intelligence and signal processing has been established through more than thirty years of research into this field. We cover all types of autonomous vehicles including airborne, ground and marine as well as space.

Recent research includes the airborne monitoring of ground traffic behaviour for hidden threats by autonomous sensor platforms, developing an analytical framework for understanding the behaviours of multiple unmanned aerial aircraft and creating collision avoidance and path-planning algorithms for Unmanned Surface Vessels operating out of human eye sight.

We work in partnership with industrial clients and research organisations 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 (MSc and PhD) and research. Research works span from fundamental research and development to single client contract research and development.

Learn more about the Centre for Autonomous and Cyberphysical Systems.

Organisational Chart

Section 4
Job Details

Job Purpose

As Research Fellow you will contribute to the research and teaching activities of the Centre for Autonomous and Cyberphysical Systems, especially concerning the Artificial Intelligence research group. You will be expected to collaborate with the existing staff working in the area, and have communications and meetings with our collaborators within the university or in other international universities.
# Key Deliverables

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<th>Description of Deliverables</th>
<th>% of time</th>
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|1  | **Research**  
Develop and carry out a research plan in the area of Machine Learning and Reinforcement Learning for autonomous systems.  
Plan and carry out the work programme for own independent research contribution, using methodology and techniques appropriate to this type of research, e.g.  
   - investigations leading to the discovery of new knowledge  
   - analysing and illuminating data, interpreting and bringing new insights  
   - through integration  
   - application of knowledge in practice out of which new intellectual understanding emerges.  
   - Investigate models and approaches to test and develop them.  
Authoring and submission of academic journal articles to high quality journals for publication and dissemination. | 50%       |
|2  | **Teaching**  
Contribute to teaching and marking in the Centre MSc courses in the area of: (i) Statistical machine learning, (ii) Deep Learning, (iii) AI for Autonomous Systems.  
Supervise or assist in the supervision of group and individual research projects through the academic year. | 35%       |
|3  | **General**  
Support colleagues in research, student supervision, teaching and grant proposal writing.  
Contribute to supporting Cranfield’s research culture and taking on citizenship roles, as may be relevant.  
Contribute to the effective operation of the Theme.  
Carry out other activities as directed by your manager.  
Ensure that Environmental, Health and Safety policies are adhered to as required by the School and University. | 15%       |

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

You must adhere to delivering the research work and teaching support within the time-scales 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 inter-personal 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 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 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 expectation that at least two high-quality peer reviewed journal papers will be published from this project.

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 expected to 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 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.
Decision making

I) Decisions you will take without reference to others

- Day-to-day management and planning of on-going 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 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.

II) Decisions you will refer to your manager/colleagues

- Developing new research ideas, 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 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 through to final submission.
- Research support for PhD and MSc students.

Guiding framework

You will be expected to follow Cranfield University’s usual policies, rules, systems and procedures and also those of the funding project. In this role, once activities are agreed with your line manager, you are expected to work with minimal supervision, liaising with senior Centre staff as required. It is common practice within the research group to have weekly meetings in order to discuss the major issues about the ongoing research activities, though contacts may intensify during research-intensive periods.

Impact

The role will be focused on meeting the aims and objectives of the research group, as discussed with your line manager and course directors.

It is very important to conduct high quality research to maintain and enhance the reputation and performance of the institute and School. 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 all our post-doctoral researchers to take an active role within the School to both inform others of their on-going work and to make best use of existing knowledge and expertise. It is going also to be essential to develop linked project bids and to work with colleagues in responding to research calls, as appropriate.

www.cranfield.ac.uk
You will be expected to present work at national and international meetings/conferences and to write peer reviewed journal papers.

**Facts and Figures**

You will be reinforcing the Artificial Intelligence research group working within the Centre for Autonomous and Cyberphysical systems. You will mainly be involved in the support to the teaching and research activities of the group. The group is responsible for the successful MSc Course in Applied Artificial Intelligence. It is expected that you will also assist the research group in increasing the research capabilities in the reinforcement learning and explainable artificial intelligence area. You will have access to the world-class research facilities of the university such as:

- Aerospace Integration Research Centre.
- Digital Aviation Research and Technology Centre.
- Intelligent Mobility Engineering Centre.
- Multi-User Environment for Autonomous Vehicle Innovation.

**Section 5**

**Am I suited to this role?**

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<tr>
<th>Criteria</th>
<th>Essential</th>
<th>Desirable</th>
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<tr>
<td><strong>Education / Qualifications</strong></td>
<td>PhD (or close to completion) in a relevant machine learning discipline (e.g. engineering, computer science, statistics, mathematics or related disciplines.)</td>
<td>PhD in AI, Machine learning, Reinforcement Learning or Autonomous Systems.</td>
</tr>
<tr>
<td><strong>Experience</strong></td>
<td>A good record of accomplishment in research outputs through peer-reviewed publication and conferences of the sector (NeurIPS, ICML, etc.). Evidence of significant independent contribution to the design and execution of research.</td>
<td>Experience in teaching at higher education level on relevant subjects. Experience of generating research or knowledge exchange income.</td>
</tr>
<tr>
<td><strong>Knowledge</strong></td>
<td>Experience in designing, training and validation of machine learning algorithms.</td>
<td>Experience in deployment of AI algorithms on embedded systems.</td>
</tr>
<tr>
<td><strong>Skills / Aptitudes</strong></td>
<td>High proficiency in programming with languages such as Python, Matlab, R or C++.</td>
<td>Excellent knowledge of deep learning frameworks. Knowledge of Explainable AI techniques.</td>
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</tbody>
</table>
| Practical experience with reinforcement learning models, especially in an engineering context.  
| Ability to prioritise and meet deadlines.  
| Familiarity with adversarial learning.  
| Knowledge of ROS/Gazebo is a plus.  
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<tr>
<th>Teaching in classroom and project supervision levels.</th>
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| **Values**  
| Ability to demonstrate our values: Ambition, Impact, Respect and Community.  
| Excellent communication and presentation skills, with the ability to interact with different type of customers: students, industrial and research partners. |
| **Other**  
| Capable of interacting effectively with senior technical staff and with colleagues in an academic research group. |