## Job Description & Person Specification

### Section 1
Role Overview

<table>
<thead>
<tr>
<th>Job title:</th>
<th>Research Assistant or Research Fellow in Electromagnetic Actuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacancy reference:</td>
<td>3374</td>
</tr>
<tr>
<td>School/Professional Service Unit:</td>
<td>School of Water, Energy and Environment</td>
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<tr>
<td>Job type:</td>
<td>Full time</td>
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<td></td>
<td>Fixed Term Contract for 21 months</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>
</tr>
<tr>
<td>Salary details:</td>
<td>Research Assistant: Salary level 4 – range £24,739 to £28,338 per annum with additional performance related pay up to £35,420 per annum</td>
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<tr>
<td></td>
<td>Research Fellow: Salary level 5 – range £33,309 to £37,127 per annum with additional performance related pay up to £46,409 per annum</td>
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<tr>
<td>Line Manager:</td>
<td>Professor Patrick Luk, Professor of Electrical Engineering</td>
</tr>
<tr>
<td>Start date:</td>
<td>As soon as possible</td>
</tr>
<tr>
<td>Closing date for applications:</td>
<td>14 August 2020</td>
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</table>
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:

- Creating leaders through our education and research in technology and management

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

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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 Water, Energy and Environment

Cranfield’s excellence in Water, Energy and Environment is recognised internationally. Industrial-scale facilities underpin our research and development in energy technologies, including biofuels, biomass for energy, carbon capture and offshore oil and gas. Our environment activities include internationally recognised centres of excellence in Environmental Risk and Futures, and Water Science. Agrifood has been a core area since taking over the National College of Agricultural Engineering in the 1970s and we own the soil map for England and Wales.

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

- [Learn more about Water](#)
- [Learn more about Energy and Power](#)
- [Learn more about Environment and Agrifood](#)

The core research activities in the Energy & Power theme ranges from production and clean utilisation of fossil fuels (including CCUS), combustion and power generation through bioenergy, utilisation of wastes as fuel and the offshore renewables and oil & gas engineering. The location for the proposed post will be within the theme with its strength in low carbon supply, renewable power generation, innovative cooling technologies and concentrated solar power systems. This will strengthen interdisciplinary research between academic Centre’s within the SWEE, as well as foster international collaborations.

We offer a wide range of near-industrial scale experimental research facilities for our masters and doctoral students, as well as commercial clients. Many of our facilities are unique in the higher education sector including:

- Energy technology and process laboratory
- Oil and gas laboratory
- Structural integral laboratory
- Algae and pilot scale anaerobic digester laboratory
The Centre for Thermal Energy and Materials (CTEM) has achieved significant growth in the past few years from funding success with a number of established government research investors as well as commercial organisations.

An opportunity for an electrical/electronic researcher has arisen to join a multi-disciplinary consortium to develop novel thermal management technologies for a wide range of applications including EV battery cooling.

Organisational Chart
Section 4
Job Details

Job Purpose

This post is a fixed term 2 year contract starting in March 2020 to contribute collaboratively within a 3-partner consortium consisting of City University London, Cranfield and Oxford Universities, to the delivery of a £0.8M EPRSC-funded project. The main aim is to perform rigorous experimentation using novel electromagnetic actuation, to understand the mechanism and to verify the concept of “scan cooling” previously developed by the consortium partners.

You will work on the following aspects of this consortium project:

- Model, design and build novel high performance micro-scale electromagnetic actuators
- Design and setup of a scaled multi-channel with the novel actuators
- Development of control algorithms for the actuators
- Implementation of scan cooling and investigation of its thermal/cooling performance

Key Deliverables

<table>
<thead>
<tr>
<th>Description of Deliverables</th>
<th>% of time</th>
</tr>
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<tbody>
<tr>
<td>High performance micro-linear motorised pumps/actuators will be purposely designed, developed and tested at Cranfield’s EPAD lab.</td>
<td>80%</td>
</tr>
<tr>
<td>A hardware platform of a high-fidelity multi-channel cooling network is designed and built for ‘scan cooling’, with each channel equipped with a linear micro-pump, and furnished with full optical access and thermal sensors</td>
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<tr>
<td>Based on the optimised scan cooling patterns developed in partner’s laboratory, corresponding control algorithms will be concurrently developed, and then tested in real-time hardware environments using on-board controllers, to be ready for implementation.</td>
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<tr>
<td>Optimised control algorithms will be implemented on the cooling network in selected real-world applications (e.g. a Tesla battery pack). The heat transfer augmentation due to scanning flow will be evaluated by IR thermal measurement.</td>
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<tr>
<td>Present and disseminate key research findings in high quality journals (at least 2) and relevant conferences (at least one)</td>
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</table>
Please be advised that the percentages allocated for the key deliverables may be adapted to take into account the needs of the School and University.

**Planning and organising**

You should adhere to delivering the research work within the time-scales set by your line manager, which requires regular (quarterly) review meetings, and summary presentations and planning for the future work schedule.

You will be self-motivated 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 wide-range project management responsibilities such as interactions with the wider project team and organising project meetings with other researchers.

Work will need to be documented regularly, showing a clear research progression. 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 collaborate with other research institutions and with industry partners in the UK, Europe and ODA countries. 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 from the supply chain manufacturers, energy and utility companies and energy regulatory sectors. An active and collegiate team mentality is the expected norm at Cranfield. There is also an expectation that you will lead and contribute to peer-reviewed journal papers (at least two papers per year).

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 high-impact peer-reviewed journals. There is an expectation that at least two 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 will already be a confident and independent researcher with specialist knowledge of thermodynamics. 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**

1) 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, 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 – 415i.

The School of Water, Energy and Environment’s Academic Plan is the principal reference point for all our activity and sets out our School ambitions, operating strategy and tone of delivery. It supports the University’s Corporate Plan which is focused on the application of scientific excellence in a financially viable operating environment.

There are established working practices, processes, systems and procedures that you will learn and must be used. Alterations to any of these must be agreed with the line manager. You can expect close support from the line manager in research, career development, mentoring, project management and publications/proposals.

Our performance and development review scheme provides a set of objectives agreed with the line manager for the year ahead and expected SMART targets.

Duties and responsibilities should be carried out with due regard and compliance with the General Data Protection Regulations, Health and Safety and the Equality Act 2010. All staff must conform to the requirements of the Financial Manual. The role will be subject to normal school and university systems and procedures. A very high emphasis is placed in particular on conformity with health and safety, environmental and ethical policies of the university.

There may be occasions when existing procedures may not cover new circumstances and where you need to work collaboratively with the Head of Department, academic staff and the Department administrators to develop new processes for the future.

You must respect the fundamental code of conduct for academic and scientific work. You may be privy to confidential information relating to staff and students and it is imperative that absolute discretion and confidentiality is shown at all times.

For specific projects, there will likely be documentation which will outline the tasks, milestones and deliverables related to the project. If applicable, the specific responsibilities of each of the participants in the consortium would also be outlined in a consortium agreement / grant agreement.
Impact

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 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 Institute and more widely within the School to both inform others of their on-going 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 is in the top five English higher education providers for consultancy income per academic and a six-time winner of the prestigious Queen's Anniversary Prize.

We are one of the biggest employers in the region (Central Bedfordshire) with around 1,200 staff based at the Cranfield campus.

In particularly for the Energy & Power theme:

- Second largest provider for energy and power postgraduates in the UK.
- Over three-quarters of our Energy and Power learners come from outside the UK, representing over 34 countries. (UK 22%, EU 20%, Overseas 58%)

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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<tbody>
<tr>
<td>Education / Qualifications</td>
<td>PhD in Electrical/ Electronic/ mechanical engineering/ Mechatronic/ industrial engineering.</td>
<td>Research applications in: power generation technologies, renewable systems or systems engineering</td>
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<tr>
<td>Experience</td>
<td>Proven experience in electromagnetic and/or electric circuit design/ electrical drives/ electrical power storage and generation</td>
<td>Application of smart materials in electrical systems Peer-reviewed publications in a related field of work</td>
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<tr>
<td>Knowledge</td>
<td>Skills / Aptitudes</td>
<td>Values</td>
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<td>-----------------------------------------------</td>
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<tr>
<td>Proven experience in developing and programming bespoke engineering modelling software using Matlab or other software</td>
<td>Ability to work independently and deliver high quality research to milestones and deliverables on this project, including ability to design and deliver high-quality research papers and presentations</td>
<td>Ability to demonstrate our values: Ambition, Impact, Respect and Community.</td>
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<tr>
<td>Demonstrable experience in developing and testing electrical/electronic circuits</td>
<td>Good IT and data management skills.</td>
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<tr>
<td>Presentation of work at meetings or academic conferences</td>
<td>Excellent oral and written communication and presentation skills and good technical writing skills, to communicate complex information clearly to partners so that they can use the developed models for their alternative cooling strategies</td>
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</tr>
<tr>
<td>Production of research reports and/or academic papers</td>
<td>Ability to find appropriate solutions to academic and technical problems</td>
<td></td>
</tr>
<tr>
<td>Expertise knowledge in the electromagnetic design</td>
<td>Ability to find appropriate solutions to academic and technical problems</td>
<td></td>
</tr>
<tr>
<td>Advanced knowledge in modelling of electrical machines/actuators</td>
<td>Good presentation skills</td>
<td></td>
</tr>
<tr>
<td>Good knowledge of high frequency electronic circuit design</td>
<td>Team-player</td>
<td></td>
</tr>
<tr>
<td>Expertise knowledge in the electromagnetic design</td>
<td>Good presentation skills</td>
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<td>Advanced knowledge in modelling of electrical machines/actuators</td>
<td>Team-player</td>
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<tr>
<td>Good knowledge of high frequency electronic circuit design</td>
<td>Good presentation skills</td>
<td></td>
</tr>
<tr>
<td>General knowledge of smart electromagnetic materials such as ferrofluid</td>
<td>Knowledge of setting up experimental test platform</td>
<td></td>
</tr>
<tr>
<td>Knowledge of setting up experimental test platform</td>
<td>Knowledge in programming data acquisition and sensor modules</td>
<td></td>
</tr>
<tr>
<td>Knowledge in programming data acquisition and sensor modules</td>
<td>Knowledge of setting up experimental test platform</td>
<td></td>
</tr>
</tbody>
</table>

Experience of supporting students, e.g. through research supervision, lecturing, tutorials)
| **Other** | Must be proactive and take initiative and adapt to a wide variety of tasks with tight deadlines  
| Ability to work as a member within a dynamic team  
| Interest, enthusiasm and commitment to deliver research with industrial relevance  
| Work with partners in the project effectively  
| Multidisciplinary thinking & approach | Good interpersonal skills to build a good working relationship with industrial/academic partners.  
| The willingness and ability to travel and work overseas with national and international partners. | Delivery-focused |