



University of  
**Sheffield**

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Place to Work

# Research Associate in Transport and Power Systems

Faculty of Engineering,  
Department of Automatic Control and  
Systems Engineering

## Overview

We are seeking to appoint a Postdoctoral Research Associate (PDRA) in transport and power systems. You will play a key role in modelling and integration of transport electrification into electrical power systems. You will be expected to work in the interdisciplinary research fields of power, energy and transport systems. You will be a part of team to explore the novel concept of 'Aviation-to-Grid' by developing the multiscale system modelling and integration methods between electrified air transport and electrical power systems. A novel application of this research is to unlock the energy flexibility that electrified air transport can provide to the power grid.

This PDRA post is funded by the EPSRC New Investigator Award project 'Aviation-to-Grid: Grid flexibility through multiscale modelling and integration of power systems with electrified air transport'. This is an exciting research project with strong collaboration that brings together the leading partners from academia and industry, including the power system operators, airport operators, transport policy as well as the two EPSRC academic communities in energy networks and transport electrification.

Applicants should have a PhD (or near completion) in power systems, transport, aerospace propulsion, electrical engineering or a closely related discipline. The programme of work requires a range of skills and knowledge across the boundaries of power system engineering, air transport modelling, computer simulation and laboratory demonstration.

Specifically, this PDRA will develop models and tools for power system modelling and analysis, with strong motivation to extend their work in transport modelling and electrification technologies. For example, the PDRA will be expected to work on airport microgrid modelling and multi-energy control, electric propulsion and energy management strategies, multiscale modelling and integration of transport-power systems, grid flexibility quantification and cost-benefit analysis, as well as the demonstration in a simulation platform with case studies.

The PDRA post is based in the Sheffield Control and Power System Lab (<https://www.sheffield.ac.uk/acse/department/facilities/control-and-power-systems-lab>), led by Prof Xin Zhang as the Chair in Control and Power Systems. We are part of the Department of Automatic Control and Systems Engineering (ACSE) within Sheffield Engineering Faculty.

The research will contribute to our mission of developing net-zero energy and transport systems that play a major role in addressing future societal needs. This research will tackle the sustainable aviation, which is arguably one of the most difficult sectors to be decarbonised. The research will address the key challenges in Energy Theme across both Sheffield Engineering and EPSRC on sustainable energy networks, transport operation and management, as well as energy storage.

## Person Specification

You should provide evidence in your application that you meet the following criteria. We will use a range of selection methods to measure your abilities in these areas including reviewing your online application, seeking references, inviting shortlisted candidates to interview and other forms of assessment action relevant to the post.

The University of Sheffield is proud to be a Disability Confident Employer, we commit to recruit and retain disabled applicants and support positive action. We encourage disabled people to apply for our jobs and to have the opportunity to demonstrate their skills, talent and abilities at the interview stage. We commit to offer an interview to disabled applicants who meet the minimum criteria for the job. For further information

on the Disability Confident Scheme, please follow the [link](#).

Criteria		Essential	Desirable
1.	Hold or be close to completion of a PhD degree in power systems, transport, aerospace propulsion, electrical engineering or a closely related discipline.	X	
2.	Research experience in power, energy, transport and aerospace. Specifically regarding at least one of the below topics: <ul style="list-style-type: none"> <li>• Power system modelling, analysis and control</li> <li>• Transport system modelling</li> <li>• Sustainable aviation electrification systems &amp; technologies</li> <li>• Electric propulsion for vehicle and aerospace</li> <li>• Energy management strategies and integrated control systems in transport and aerospace</li> <li>• Transport energy systems integration</li> <li>• Electrification of energy and transport systems</li> <li>• Energy systems flexibility, resilience and security</li> <li>• Electric vehicles, train electrification</li> </ul>	X	
3.	Experience in developing software to a high standard using a range of computer languages and tools (e.g. C++, Python, MATLAB Simulink), ideally for applications involving the modelling, simulation and analysis of the large, complex and dynamic systems (e.g. power, energy and transport)	X	
4.	Experience in power system simulators (e.g. DIgSILENT PowerFactory, PSCAD/EMTDC, OPAL-RT, RTDS) or aerospace propulsion modelling and simulators (e.g. Siemens Amesim)	X	
5.	Established track record of publishing high-quality peer-reviewed articles in leading international journals and conferences	X	
6.	Ability to work effectively in teams and engage in effective collaborative research	X	
7.	Effective communication skills across a variety of contexts, including technical reporting, presentations at conferences, and public outreach	X	
8.	Having the tenacity to solve challenging research problems, leveraging existing knowledge, learning new skills, and developing both innovative and pragmatic solutions	X	
9.	Ability to assess and organise resources, and plan and progress work activities to meet agreed deadlines	X	
10.	Ability to keep up to date with research related to the project	X	
11.	Ability to engage effectively with project stakeholders from a range of backgrounds, including industry, academia, government, consultancy, advocacy, and the wider public realm		X
12.	Ability to effectively organise a scientific workshop at an international conference and to lead on a series of outreach activities (e.g. International Women in Engineering Day and British Science Week)		X
13.	Experience of working in an inter-disciplinary research team		X
14.	Experience of developing and maintaining a network of contacts throughout own work area		X
15.	Technical Professional Registration or the willingness to work towards it.		X

## About the Team

The Department of Automatic Control and Systems Engineering (ACSE) is one of the largest departments devoted to the subject in Europe, with 35 academic staff, 49 research staff, 29 professional and support staff and nearly 600 taught and research students.

Our Vision is to be a world-leading research, innovation and education centre in Energy, Transport, Aerospace, Control and System Engineering.

At ACSE, we believe the success of our department is driven by the passion of the people that work here. That is why we strive to support you to achieve your best, creating an equal, diverse and inclusive community for our staff and students. We are very proud to have been awarded our Athena SWAN Bronze award for our commitment to equality and diversity within the department.

We are a world-leading research department, as evidenced by the results of the 2021 Research Excellence Framework (REF2021) exercise. We are proud to have come 8th in the REF 2021 in terms of the quality of our research. 96 per cent of our research is rated in the highest two categories in the REF 2021, meaning it is classed as world-leading or internationally excellent.

We are rated as top nationally for the quality of our research environment, showing that the research, innovation, knowledge exchange, impact, and public engagement at Sheffield are supported by a strong research community and outstanding facilities that help our colleagues achieve their research ambitions.

We have a vibrant culture that supports collaborative research, and a strong programme of training and development for our researchers, from postgraduate research students to our research leaders. Our high quality physical infrastructure facilitates excellent research, spanning all aspects of Energy, Transport, Aerospace, Control and System Engineering.

The post holder will join the Sheffield Control and Power System Lab (<https://www.sheffield.ac.uk/acse/department/facilities/control-and-power-systems-lab>), led by Prof Xin Zhang as the Chair in Control and Power Systems. The Control and Power Systems Laboratory (CAPS) focuses on advanced energy and transport system modelling, control systems, optimisation, and electrification technologies in vehicle and aerospace propulsion systems. The Control and Power Systems Laboratory (CAPS) brings academics, research associates, engineers, and PhD students together to find new ways to integrate aerospace and transport electrification into power grids. We are a part of the Department of Automatic Control and Systems Engineering at the University of Sheffield, located in the Sir Frederick Mappin Building on Mappin Street. The research carried out in CAPS is a step towards the design, commissioning, and operation of resilient renewable-based power grids, which will pave the way towards sustainable, affordable, and resilient electrical energy and a low carbon energy future.

Whilst based at the University of Sheffield, the role will involve close cooperation with academic and industry leaders including the power system operators, airport operators, transport policy as well as the two EPSRC academic communities in energy networks and transport electrification.

## Job Description

### Main Duties and Responsibilities

- You will develop models and tools for power system modelling and analysis, with strong motivation to extend your work in transport modelling and electrification technologies.
- You will explore the transport and aviation electrification technologies and their impacts on the power grid. For example, electric propulsion systems and energy management strategies, energy requirements for hybrid-electric aircraft, electric aircraft charging requirements, etc.
- You will develop airport energy systems modelling with multi-scale, multi-vector energy control and optimisation.
- You will quantify the roles and values of grid flexibility through transport and aviation electrification, with associated cost-benefit analysis.
- You will demonstrate the integrated and coordinated transport-power systems control, on a simulation platform with case studies in the Control and Power Systems Lab.
- You will prepare high-quality articles for publication in journals and technical reports for meeting the project reporting requirements.
- You will prepare and deliver presentations to a range of audiences, and lead on a series of public outreach activities such as co-organisation of workshops, help at several planned major international conferences.
- You will make a full and active contribution to the principles of the 'Sheffield Academic'. These include the achievement of excellence in applied teaching and research, and scholarly pursuits to make a genuine difference in the subject area and to the University's achievements as a whole.
- As a member of staff you will be encouraged to make ethical decisions in your role, embedding the University sustainability strategy into your working activities wherever possible.
- Any other duties, commensurate with the grade of the post.

## Reward Package

**Terms and conditions of employment:** Will be those for Grade 7 staff.

**Salary for this grade:** £35,333 - £39,745 per annum.

**This post is fixed-term** for 30 months to start as soon as possible.

### **This post is full-time:**

This role has been identified as a full-time post, but we are committed to exploring flexible working opportunities with our staff which benefit both the individual and the University. Therefore, we would consider flexible delivery of the role subject to meeting the business needs of the post. If you wish to explore flexible working opportunities in relation to this post, we encourage you to call or email the departmental contact listed below.

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If you join the University you will have access to a Total Reward Package that includes a competitive salary, a generous Pension Scheme and annual leave entitlement, as well as access to a range of learning and development courses to support your personal and professional development. You will have access to your own personalised portal where you can also access a comprehensive selection of benefits and offers to suit your changing lifestyle needs, for example financial wellbeing, travel options, shopping and cinema discounts.




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The University is committed to tackling the global climate emergency. Our sustainability strategy forms an integral part of all we do. We strive to embed this in all areas of university life, from our students' education,

the globally impacting international research we contribute, to campus life.

We aim to empower staff to work sustainably by giving them the knowledge to make ethical decisions at work and home. Staff have the opportunity to be involved in impactful sustainability projects through the nationally recognised Green Impact scheme.



Staff have access to excellent green benefits including the cycle to work scheme with discounts and free secure bike storage, as well as many greener choices across campus.

If you have an interest in this area, the university will strive to passionately support you in these commitments. Check out [www.sheffield.ac.uk/sustainability](http://www.sheffield.ac.uk/sustainability) for more information.

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The University of Sheffield recognises the importance of creating a positive environment, whereby all staff feel able to talk openly and with trust about wellbeing and mental health.

Our Staff Wellbeing offer, encourages and supports staff to maintain their own positive health and wellbeing through a range of accessible, inclusive and supportive services and activities.

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Our leadership development has been designed to ensure that our leaders have the knowledge, skills and behaviours needed by the University.

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Inclusion at Sheffield is everyone's responsibility. Our vision is to build a University community that actively attracts, engages and develops talented individuals from many different backgrounds.



We are proud of our award-winning equality, diversity and inclusion action, and we continue to work to create a fully inclusive environment where everyone can flourish.

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To find out more about the benefits of working at the University, visit [www.sheffield.ac.uk/jobs/benefits](http://www.sheffield.ac.uk/jobs/benefits)

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## Selection – Next Steps

**Closing date:** For details of the closing date please view this post on our web pages at [www.sheffield.ac.uk/jobs](http://www.sheffield.ac.uk/jobs)

Following the closing date, we will contact you by email to let you know whether or not you have been shortlisted to participate in the next stage of the selection process. Please note that due to the large number of applications that we receive, it may take up to two working weeks following the closing date before the recruiting department will be able to contact you.

It is anticipated that interviews and other selection action will be held on 5 April 2023. Full details will be provided to invited candidates.

For more information on our application and recruitment processes visit [www.sheffield.ac.uk/jobs/application-tips](http://www.sheffield.ac.uk/jobs/application-tips)

## Informal enquiries

For informal enquiries about this job and the recruiting department, contact: Prof Xin Zhang on [xin.zhang1@sheffield.ac.uk](mailto:xin.zhang1@sheffield.ac.uk) or on 0114 222 5134.

For administration queries and details on the application process, contact the lead recruiter: Lucy Nurser on [acse-resadmin@sheffield.ac.uk](mailto:acse-resadmin@sheffield.ac.uk).

For all online application system queries and support, visit: [www.sheffield.ac.uk/jobs/faqs](http://www.sheffield.ac.uk/jobs/faqs)

## Creating a remarkable place to work

We build teams of people from different heritages and lifestyles from across the world, whose talent and contributions complement each other to greatest effect. We believe diversity in all its forms delivers greater impact through research, teaching and student experience.

We are consistently ranked in the top 100 of the world's universities, but there's so much more to us than that. By joining the University, you will be joining award-winning teams and departments who are all working together to make the University of Sheffield a remarkable place to work.