



University of
Sheffield

A Remarkable
Place to Work

Research Associate in Digital Power Systems (x 2 posts)

Faculty of Engineering,
Department of Automatic Control and
Systems Engineering

Overview

We are seeking to appoint two long-term Postdoctoral Research Associates (PDRAs) in digital power systems. You will play a key role in developing the advanced digital technologies to improve the control, monitoring and operation of future power systems with up to 100% renewable energy. You will be expected to work in the multidisciplinary fields of digitalisation including cyber-physical, power, energy, information and computing. You will be a part of team to develop the cyber-physical power system modelling methods and real-time digital simulation tools, with novel applications of cyber-security, machine learning and digital twins to the power and energy systems.

The two PDRA posts (PDRA1, PDRA2), each for four years, are funded by the prestigious UK Research and Innovation (UKRI) Future Leaders Fellowship on 'Digitalisation of Electrical Power and Energy Systems Operation'. Applicants will be part of seven years' Fellowship programme to develop as potential future research leaders in the digitalisation of power and energy systems.

Applicants should have a PhD (or near completion) in power systems, power electronics, cyber-physical systems, computer science, information and communications technology or related fields. The programme of work requires a range of skills and knowledge across the boundaries of power system engineering, information technology and computing theory. Specifically:

PDRA1 will work on cyber-physical power system modelling. PDRA1 requires specialist skills in power system modelling and analysis, control and modelling of power electronics, energy system modelling, information and communications technology, with PhD qualifications in Power Systems Engineering, Communication Engineering or a closely related discipline.

PDRA2 will work on digital simulation platforms development in the lab. PDRA2 requires specialist skills in the design and development of experimental high-performance computing and data platforms, real-time digital simulators for power and energy systems, with PhD in Computer Science or Information Systems and significant experience in these areas.

The two PDRA posts are 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 power and energy systems that play a major role in addressing future societal needs. The research will address the key challenges in Energy Theme across both Sheffield Engineering and EPSRC on energy security, flexibility and resilience challenges using digital technologies as the novel solutions.

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, cyber-physical systems, computer science, information and communications technology or related fields	X	
2.	Research experience in power systems, cyber-physical systems, computer science, information and communications technology. Specifically regarding at least one of the below topics: <ul style="list-style-type: none"> • Power system modelling, analysis and control • Control and modelling of power electronics • Smart grids • Energy system modelling and integration • Information and communication system modelling • Cyber-security • Cyber-physical systems • Real-time digital simulator for power and energy systems • Design of computing and data platforms 	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. cyber, physical systems)	X	
4.	Experience in power system simulators (e.g. DlgSILENT PowerFactory, PSCAD/EMTDC, OPAL-RT, RTDS) or communication system simulators (e.g. NS-2/3, OMNet++, OPNET Modeler)	X	
5.	Experience in working in a technical laboratory (e.g. power, electronic, control, or computing lab) with the capabilities to design, conduct and coordinate hardware and experimental facilities		X
6.	Established track record of publishing high-quality peer-reviewed articles in leading international journals and conferences (e.g. IEEE Transactions)	X	
7.	Ability to work effectively in teams and engage in effective collaborative research	X	
8.	Effective communication skills across a variety of contexts, including technical reporting, presentations at conferences, and public outreach	X	
9.	Having the tenacity to solve challenging research problems, leveraging existing knowledge, learning new skills, and developing both innovative and pragmatic solutions	X	
10.	Ability to assess and organise resources, and plan and progress work activities to meet agreed deadlines	X	
11.	Ability to keep up to date with research related to the project	X	
12.	Ability to engage effectively with project stakeholders from a range of backgrounds, including industry, academia, government, consultancy, advocacy, and the wider public realm		X
13.	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
14.	Experience of working in an inter-disciplinary research team		X

15.	Experience of developing and maintaining a network of contacts throughout own work area		X
16.	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 Power, Energy, 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 Power, Energy, Control and System Engineering.

The two post-holders 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 cyber-physical systems, control systems, optimisation, and cybersecurity with applications to power systems, smart grids, microgrids, and power electronics converters. The Control and Power Systems Laboratory (CAPS) brings academics, research associates, engineers, and PhD students together to find new ways to integrate renewable energies 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.

We have a range of state-of-the-art facilities that enable us to have a laboratory testbed for power grids and a demonstration platform for power electronics converters and advanced energy technologies.

- Hardware-In-the-Loop/Real-time digital simulators (5 x OPAL-RT and one Typhoon HIL)
- 30kVA Chroma Regenerative Grid Simulator
- 3x200k VA power converters with reconfigurable connections to form a microgrid system
- Remote monitoring and control of the Translational Energy Research Centre (TERC)
- Precision Power Analyser and DC Electronic Load

- Multiple power electronic converters (DC/AC and DC/DC)

Whilst based at the University of Sheffield, the role will involve close cooperation with academic and industry leaders from the whole system industry partners including National Grid ESO, UK Power Networks (UKPN), Scottish and Southern Electricity Networks (SSEN), SSE Renewables and HVSS Ltd. The role will also collaborate with digital technology industry partners including Hitachi ABB as digital solutions experts, Opal-RT as real-time digital simulation specialists and Cloudera as cloud computing platform experts in order to develop innovative digital modelling and co-simulation techniques. The role will regularly participate in international societies of SuperGen (UK), CIGRE (EU) and IEEE (US) who offered support to this Fellowship programme.

Job Description

Main Duties and Responsibilities

- You will investigate the cyber-physical power system modelling methods, by using advanced mathematical and theoretical methods such as graph theory, Markov chain, Monte Carlo simulation and hybrid computing methods.
- You will explore and understand the interdependency and interoperability between cyber-physical power systems as coupled entities.
- You will develop and optimise the cyber-physical power systems operation based on the state estimation, coordinated control, resilience and recovery strategy of cyber-physical systems.
- You will design and develop real-time digital simulation tools and platforms in the Control and Power Systems Lab.
- You will implement the cyber-physical modelling methods and real-time digital simulation tools in both lab environment and real industry energy management systems support by industrial partners.
- You will lead the refurbishment and development of Control and Power Systems Lab with detailed plan to develop digital energy research facilities.
- You will contribute to developing novel applications of cyber-security, machine learning and digital twins to the power and energy systems.
- 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 48 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.

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.



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 for more information.

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.

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

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.

To find out more about the benefits of working at the University, visit www.sheffield.ac.uk/jobs/benefits

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

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 30 March 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

Informal enquiries

For informal enquiries about this job and the recruiting department, contact: Prof Xin Zhang on 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.

For all online application system queries and support, visit: 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.