

THE UNIVERSITY OF MANCHESTER
PARTICULARS OF APPOINTMENT
FACULTY OF SCIENCE & ENGINEERING
SCHOOL OF NATURAL SCIENCES
DEPARTMENT OF
VACANCY REF: SAE-031051

Salary: £37,694 - £46,049 per annum depending on relevant experience

Hours: Full time

Duration: Fixed term for 18 months

Location: Oxford Road, Manchester

Enquiries about the vacancy, shortlisting and interviews:

Name: Professor Alessandra Parisio

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Background

The Department of Electrical and Electronic Engineering (The University of Manchester) is one of the largest departments of this discipline in the UK and as such we are home to a full range of activities within the spectrum of electrical and electronic engineering. The great breadth and depth of the research interests of our academic staff ensures a very high standard of lecture courses and provides excellent opportunities for challenging and stimulating projects. The Department has been, for decades, one of the largest in the UK in the area of electrical and electronic engineering. As a result, it has been able to establish very strong, internationally recognised, research activities that span the entire spectrum of topics in the discipline. The research activity covers all the way from the nano-feature scale of opto-electronic devices to the global scale of communications systems. Along the way, the different research groups pass through “human-scale” topics like neural perception of visual scenes, “industry-scale” issues in sensing, imaging and control systems, and topics of “continental-scale” such as energy-efficient machines and electrical power transmission and distribution networks.

Overall, Purpose of the Job

We are looking for one Research Associate to work on the development, implementation and testing of predictive control algorithms for the optimal coordination of available multi-energy resources and network infrastructure and thus support and improve the operation of the energy networks and the performance and the sustainability of the urban energy system. Learning-

based techniques (e.g., deep neural networks) will be used to automatically learn the system dynamics and the modelling errors, as well as to obtain an automatic tuning of the cost parameters/constraints or approximators of the control law. This will alleviate the modelling complexities and the online computational requirements of the control algorithms and provide them with learning, self-regulating and adaptive capabilities.

The appointed Research Associate will collaborate with researchers from other UK universities working in the area of multi-energy networks and multi-energy technologies, in particular focusing on their modelling, optimisation and control, within the EPSRC-funded project *Supergen Energy Network Hub*. This research will contribute to provide leadership, research and networking for the energy networks and systems community to grow and come together to develop a deeper understanding of the interconnected and interdependent energy network infrastructure, e.g. electricity, heat, gas, hydrogen, as well as of the urban energy systems.

Please note this post will also require UK travel to collaborating universities, as well as opportunities to present research at leading international conferences, as well as the ability to interact effectively with researchers from other disciplines and industrial partners. The post duration is likely to be extended by a time period depending on the available funds and the performance.

Key Responsibilities, Accountabilities or Duties

- Develop and implement suitable learning-based optimization models and predictive control frameworks to derive the optimal setpoints to multi-energy technologies, such as multi-energy storage systems, running at multiple time scales (including close to real time) and facilitate flexible and sustainable network and urban system operation under uncertainty, through the provision of grid support services, such as pre-fault and post-fault frequency services.
- Close research collaboration with multinational and multidisciplinary team of researchers from collaborating institutions.
- Participate regularly in research meetings and teleconferences when required.
- Prepare and present reports on research progress.
- Write high quality research papers for top international scientific journals.
- Support, to a reasonable extent, teaching of the MSc course in Electrical Power Systems Engineering and supervision of undergraduate and postgraduate research students.
- Contribute to grant applications and proposals for funding, if required.

Person Specification

Essential:

- PhD degree in the general area of machine learning and distributed and predictive control of uncertain dynamic systems.
- Proven experience with dynamic modelling, as well as with machine learning and distributed control/predictive control with power system applications.
- Proven experience in modelling and optimisation studies within Matlab/Julia or DigSILENT/PowerFactory environments.
- Track record in publishing high quality research papers in top international journals in one or more project related areas.
- Proven experience in presenting highly complex technical material to general audience.
- Ability to effectively liaise and collaborate with multinational and multidisciplinary team of academic and industrial partners.

- Ability to work independently and write high quality technical reports.
- Ability to develop project plans.
- Demonstrate a flexible approach to working, with the willingness to travel and participate to the project meetings and international events.
- Ability to supervise and guide research of small teams of postgraduate students and engineers.
- Ability to work to tight deadlines and deliver high quality results on time.
- Proven, high proficiency in spoken and written English.

Desirable:

- Proven experience in modelling of power systems and studies within the DigSILENT/PowerFactory or RTDS environments.
- Background knowledge of event-driven decision-making, and operational research. Experience with embedded optimisation, networked control and fast predictive control techniques.
- Experience with stochastic constrained control.
- Experience with working on international projects.