

Research Associate in Battery Systems and Thermal Modelling for Electric Vehicles (Fixed-term for 24 months)

Job Ref: REQ190110

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

The Department of Aeronautical and Automotive Engineering (AAE) is one of three departments that make up the **School of Aeronautical, Automotive, Chemical and Materials Engineering**. The School is highly research active; entering 98% of academic staff members in the 2014 REF, achieving a UK ranking of 3rd based on research intensity (GPA x Volume). Overall, 83% of our research was rated 4* or 3*. Research is funded by EPSRC, Innovate UK, industry, and the European Community amongst other sources. The Aeronautical and Automotive Engineering department's annual research grants and contracts income is currently around £5 million per annum, and this supports a research community of almost fifty post-doctoral research associates, seventy research students and a number of technical and administrative staff. In both research and teaching, the Department enjoys strong industrial links that support research sponsorship and collaboration, student placement and graduate employment. Research highlights and key partnerships include:

- Advanced Propulsion Centre (APC), with significant projects with Ford, JLR and Caterpillar.
- Host to the UK Institute for Digital Engineering (formerly DETC) and APC spoke in Digital Engineering.
- Host to Caterpillar Innovation and Research Centre.
- Fuel Cell research and spin outs.
- Rolls-Royce University Technology Centre in Gas Turbine Combustion and National Centre for Combustion and Aero-thermal technology.

The successful applicant will also be expected to collaborate with the UK Institute for Digital Engineering (UK-IDE) based at **Loughborough University London** that is tasked with driving the uptake of digital tools across the UK automotive sector. It is a component of the delivery mechanism for the APC funded Loughborough Spoke in Digital Engineering. In addition to the UK Institute for Digital Engineering (UK-IDE) our QEOP campus-based partners include the Advanced Propulsion Centre and the TRL-led Smart Mobility Living Lab project for connected and autonomous vehicles.

Project Description

ViVID - Virtual Vehicle Integration and Development project

The ViVID project is a Ford led collaborative research project that aims to develop digital engineering tools for a model-based systems design and verification of the next generation electric and electrified vehicles. The total value of the project is £39 m and is co-funded by the APC (Advanced Propulsion Centre) through the APC11 competition, Ford and its partners, which include McLaren Advanced Technologies, IPG Automotive and Loughborough University as the academic partner.

Loughborough has been awarded £3.1m by the APC to offer enhanced modelling/simulation methods, tailored to the virtual product development and integration workflow for the next generation electrified vehicles. The aim is to push the boundaries in the modelling and simulation of electric components such as batteries, motors, power-

electronics and to offer systems level integration including optimal control of powertrain, thermal management, NVH and vehicle dynamics.

The successful candidate will be part of a team of 8 Research Associates working on the project and will collaborate closely with all industrial partners. The project will be supported by extensive experimental facilities including a new HIL (Hardware-in-the-loop) facility for electric powertrains as well as battery testing, NVH and power-electronics laboratories. Funding is also available for the dissemination of work at international conferences and workshops.

Job Description

Job Grade: Specialist and Supporting Academic Grade 6

Job Purpose

To conduct research in the modelling and experimental evaluation of batteries with application to fully electric and hybrid vehicles, including degradation modelling, lifetime testing, thermal management and electrochemical analysis. The position will also involve working closely with industrial project partners.

Job Duties

- To develop battery degradation and thermal models suitable for accurate lifetime prediction of electric vehicle batteries
- To be responsible for experimental testing, data collection and analysis of battery cells and packs
- To integrate the battery thermal model into a complete vehicle thermal model
- To collaborate with industrial partners to develop new methodologies for improved vehicle design process through the use of simulation and digital tools
- To formulate detailed plans for the project based on broad guidance from the project team.
- To feed back to the project team on progress, to make recommendations for next steps.
- Write up regular progress reports and present outcomes to all Investigators and Collaborators.
- Travel to attend meetings and make presentations both within the project partners working group and to external stakeholders.
- To write research papers suitable for publication in high quality academic journals.
- To attend and contribute to conferences.
- To contribute to project promotion and public engagement events.
- Contribute ideas for new research and enterprise directions.
- Maintain confidentiality at all times and ensure that intellectual property (IPR) agreements are not violated.
- To assist the academic staff in the project team with the supervision of undergraduate MSc and PhD project work and day-to-day supervision and support of other researchers.
- Where appropriate, to deliver teaching, tutorial and laboratory sessions to students.
- Engage in training programmes in the University (or elsewhere) that are consistent with the needs and aspirations of the project and those of the Department.
- Undertake other duties as may be reasonably requested and that are commensurate with the nature and grade of the post.
- To participate in other activity areas within the ViVID project as directed by the PI

Points To Note

The purpose of this job description is to indicate the general level of duties and responsibility of the post. The detailed duties may vary from time to time without changing the general character or level of responsibility entailed.

Special Conditions

All staff have a statutory responsibility to take reasonable care of themselves, others and the environment and to prevent harm by their acts or omissions. All staff are therefore required to adhere to the University's Health, Safety and Environmental Policy & Procedures.

All staff should hold a duty and commitment to observing the University's Equality & Diversity policy and procedures at all times. Duties must be carried out in accordance with relevant Equality & Diversity legislation and University policies/procedures.

Successful completion of probation will be dependent on attendance at the University's mandatory courses which include Respecting Diversity and, where appropriate, Recruitment and Selection.

Organisational Responsibility

Reports to Dr Ashley Fly - the VIVID Project Battery Systems sub-project lead and Prof. Gary Page

Person Specification

Your application will be reviewed with respect to meeting the essential and desirable criteria listed below. Your application will be reviewed against the essential and desirable criteria listed below. Applicants are strongly advised to explicitly state and evidence how they meet each of the essential (and desirable) criteria in their application. Stages of assessment are as follows:

- 1 – Application
- 2 – Test/Assessment Centre/Presentation
- 3 – Interview

Essential Criteria

Area	Criteria	Stage
Experience	Background in Science or Engineering	1
	Experience of developing and using detailed simulation models	1, 3
	Significant practical experience of experimental analysis techniques	1, 3
	Authoring original work for academic journal papers, conference papers or technical reports	1, 3
Skills and abilities	Competence and ability to demonstrate knowledge of lithium-ion batteries	1, 3
	Significant understanding of electric and hybrid vehicles	1, 3
	Excellent written and oral communication skills	1, 3
	Self-motivated with ability to meet deadlines	1, 3
	Excellent interpersonal, and organisational skills	1, 3
	Ability to write project reports and make technical presentations to industrial and academic research groups	1, 3
Training	Demonstrate evidence of having undertaken further training	1, 3
Qualifications	PhD (or near completion)	1, 3
Other	Commitment to observing the University's Equal Opportunities policy at all times.	1, 3

Desirable Criteria

Area	Criteria	Stage
Experience	Experience in the modelling of batteries and electrochemical systems	1, 3
	Experience in the operation and experimental analysis of lithium-ion batteries	1,3
	Experience in numerical modelling techniques and Computational Fluid Dynamics (CFD)	1,3
	Experience in thermal modelling and device thermal management	1,3
	Developing proposals for funding from external agencies	1,3
	Working in a high quality academic research environment	1,3
	Experience of teaching and / or supervision of students in relevant areas	1,3
Skills and abilities	Authoring original work, in the highest quality refereed academic journals	1,3
	A strong publication track record	1,3

	Knowledge of electrochemical analysis techniques such as electrochemical impedance spectroscopy	1,3
	Ability to develop automated experimental test protocols	1,3
	Understanding of fluid mechanics and fluid flow	1,3
Qualifications	PhD (or near completion) in battery multi-physics simulation	1,3
Other	Full UK Driving Licence	1,3

Conditions of Service

The position is FULL TIME and for a FIXED TERM of 24 months. Salary will be on Specialist and Supporting Academic Grade 6, £30,395 - £37,345 per annum, at a starting salary to be confirmed on offer of appointment. Subject to annual pay award.

The appointment will be subject to the University's Terms and Conditions of Employment for Grades 6 and above staff, details of which can be found [here](#).

The University is committed to enabling staff to maintain a healthy work-home balance and has a number of family-friendly policies which can be found [here](#).

The University offers a wide range of employee benefits which can be found [here](#).

We also offer an on-campus nursery with subsidised places, subsidised places at local holiday clubs and a childcare voucher scheme (further details are available at: <http://www.lboro.ac.uk/services/hr/a-z/childcare-information---page.html>)

In addition, the University is supportive, wherever possible, of flexible working arrangements. We also strive to create a culture that supports equality and celebrates diversity throughout the campus. The University holds a Bronze Athena SWAN award which recognises the importance of support for women at all stages of their academic career. For further information on Athena SWAN see <http://www.lboro.ac.uk/services/hr/athena-swan/>

Applications

The closing date for receipt of applications is **28 February 2019**.