

Research Associate in data science for digital twins

Job Ref: REQ240713

Feasibility of Digital Twins from Multiple Data Sources for Improved Decision-Making

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

About the School of Architecture, Building and Civil Engineering

Research and teaching in the School of Architecture Building and Civil Engineering is driven by 80 academic staff, 34 technical and clerical support staff, 40 contract researchers and over 120 doctoral students. The School benefits by having academic staff from a wide variety of backgrounds, with a resulting rich diversity of perspectives. The undergraduate programmes include Architecture, Civil Engineering, Construction Engineering Management, Commercial Management and Quantity Surveying, Air Transport Management, and Transport and Business Management and Urban planning. In all courses, the academic content is directly aligned to the needs of the industry and there is a high level of sponsorship in our portfolio of programmes. Our record of graduate employment is second to none and we have been ranked 1st or 2nd in the National Student Survey for the last 6 years. Further information is available at: <http://www.lboro.ac.uk/departments/abce/>

The School of Architecture, Building and Civil Engineering delivers zero-carbon, resilient buildings, infrastructure and cities in a world under pressure from rising urban populations, ageing infrastructure, resource constraints and multiple hazards. In the 2021 Research Excellence Framework (REF), Loughborough University ranked second place for Architecture, Built Environment and Planning and the research undertaken in the School was rated 'world-leading'. The international standing of our research is exemplified by our growing portfolio of collaborations with other leading universities and research institutes worldwide. These include: the UNSW Sydney, University of California at Berkeley, MIT, Chongqing, Hong Kong, Iowa State, Oklahoma State, RMIT, Georgia State and Penn State.

We are equally proud of our collaborations with industry such as HS2, Mace, Skanska, Aecom, Arup, Willmott Dixon, BRE, Anglia Water and many others, as well as influential organisations such as the Construction Leadership Council (CLC), Constructing Excellence, BSI and others. Built Environment research is increasingly informing government policy through, for example, the Department for Business, Energy and Industrial Strategy and The Committee on Climate Change, and working with for organisations such as the NHS, HS2, Network Rail and others. For more on our research go to: <http://www.lboro.ac.uk/departments/abce/research/>

Job Description:

Job Grade: Specialist and Supporting Academic Grade 6

Job Purpose

The aim of this project is to establish the feasibility of using Digital Twins of aircraft and physical infrastructure such as hangars, enriched by multiple data sources, in support of flight operations.

The Research Associate will be responsible for designing, developing and implementing an optimum configuration of sensors' network within a typical aircraft hangar and means of data communication to a proposed prototype digital twin, which links into other sensors present within the hangar. The digital twin's multiple sourced data will then be analysed using machine learning in real-time and amalgamated into a pilot data repository component of the digital twin, working with the academics and partners to deliver the project's aim and objectives.

Job Duties

- Conduct a state-of-the-art literature review, identifying the most appropriate sensors to measure the pertinent variables within the hangar such as temperature, pressure and humidity.
- Design and implement an optimum sensors' configuration with associated data communication system for a typical hangar and ensure compatibility with other sensors present within the hangar, writing connecting code to support this.
- Build a prototype digital twin to fuse the data from all sources and output in a format ready for future processing, such as undergoing machine learning processes, decision-making, and send back to sensors.
- Create a pilot data repository as a substantial component of the digital twin.
- Work as part of a multi-disciplinary, multi-location team that addresses different aspects of the design and test/validation cycle of the prototype digital twin with integrated components.
- Write software code where necessary to ensure the success of the project.
- Be responsible for conducting the day to day running of the project.
- Formulate detailed plans for the project based on broad guidance from the project team.
- Feed back to the project team on progress, to make recommendations for next steps.
- Write up regular progress reports and present outcomes to all partners.
- Travel to visit a case study hangar, attend meetings and make presentations both within the project partners and to external stakeholders.
- Support the project team by enhancing relationships with existing collaborators and by assisting the establishment of relationships with new collaborator, while contributing to project promotion and public engagement events.
- Write research papers suitable for publication in high quality academic journals.
- Attend and contribute to conferences.
- Contribute ideas for new research and enterprise directions.
- Maintain confidentiality at all times and ensure that intellectual property (IPR) agreements are not violated.
- 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, and where appropriate, deliver lectures and tutorials to students.
- Undertake other duties as may be reasonably requested and that are commensurate with the nature and grade of the post.

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: Ashraf El-Hamalawi, Peter Demian and Iain Philips

Person Specification

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 working with environmental sensors and associated data, with machine learning	1,3
	Significant relevant experience within a high-quality research and development environment	1,3
	Significant experience of collecting, analysing and interpreting large datasets from sensors and other hardware sources	1,3
	Experience in developing code, especially machine learning models for time-dependent data, within a suitable IDE and working with Python and appropriate ML libraries (eg Pandas, Keras, TensorFlow, NumPy, etc)	1,3
	Production of technical/research reports and/or guidance materials on engineering design or science topics	1,3
	Authoring original work for academic journal papers, conference papers or technical reports	1,3
Skills and abilities	Ability to undertake the duties and responsibilities of the post and work independently and as part of a team	1,3
	Ability to organise resources to support and further own and the team's research activities within the scope of their work	1,3
	Ability to fuse data from multiple sources into a central database	1,3
	Self-motivated with ability to meet deadlines and to work independently and as part of a multi-disciplinary team, meeting deadlines	3
	Excellent interpersonal and organisational skills	3

Training	Willingness to undertake appropriate further training and to adopt new procedures as and when required	1
Qualifications	At least a 2:1 Bachelor's or Master's level Degree and a PhD in Mathematics, Physics, Engineering, Computer Science or related discipline	1
Other	Commitment to observing the University's Equal Opportunities policy at all times.	1,3
	Willingness to undertake field work and write software code	3
	Commitment to maintain confidentiality at all times	3

Desirable Criteria

Area	Criteria	Stage
Experience	Experience of creating digital twins, integrating machine learning models to analyse sensor data	1,3
	Teaching and / or supervision of students	1,3
	Proficiency in modern computing scientific language(s) such as Java, C++, Julia	1,3
	Experience in hardware interfacing with use of sensors for data collection	1,3
	Experience of multi-partner and cross-disciplinary working	1,3
Skills and abilities	Knowledge of digital twin platforms	1,3
	Working knowledge of analytical, numerical, and statistical methods	1,3
	Authoring original work and producing high-quality publications	1,3
Other	Valid licence for driving in the UK	1
	Able and willing to travel independently	3

Conditions of Service

This position is full time and fixed term until 31 October 2025, available to start as soon as possible. Salary will be within Specialist and Supporting Academic (Research) Grade 6 (£33,966 to £44,263 per annum); starting salary to be confirmed on offer of appointment.

The appointment will be subject to the University's normal Terms and Conditions of Employment for STAFF GRADE 6 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 equity 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/>