Loughborough University

Research Associate in Next generation Visualization Platform for Aerospace Manufacturing Operations
Job Ref: REQ230290

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

Job Description

Job Grade: Specialist and Supporting Academic Grade 6

Project Description

Loughborough University (AVRRC) is researching development of new digital engineering and manufacturing techniques with a focus on providing advanced visual displays to support smart assembly tooling for the manufacture of large components such as commercial aircraft wings. A new research project (DELTA - Digitally Enhanced Low-cost Technology for Aerostructures) has been funded by InnovateUK/Aerospace Technology Institute and is a collaboration with Airbus and other partners.

This project involves integration of Industry 4.0 technologies including smart networked enabled tooling, Internet of things, artificial intelligence, augmented reality, machine learning, and other information technologies. By supporting difficult human operator tasks (such as drilling, fastening, quality inspection, worker task completion and remote collaboration) at the point of operation there is significant benefit in terms of reduced rework and increased production rate. Research will develop advanced assistive visualization solutions involving eXtended Reality (XR), also known as augmented, mixed, and virtual reality to provide at point of operation information overlays.

A Research Associate is sought to join the team to develop XR systems to assist/guide operators to perform difficult manual tasks by providing spatially aligned information/graphical overlays and virtual target markers onto large scale manufactured components. Accuracy of the 'projected' information display is critical – the research will investigate requirements and acceptable tolerances for the static and dynamic accuracy of the augmented display. At the heart of the project is the definition of a framework for the information/data architectures to facilitate data connectivity between sensors, digitally enabled tooling, and the associated data backbone. The information architecture will play an important role for integrating systems across the whole project.

This will involve coupled sensor networks as part of the factory infrastructure with possibility for assistive (intelligent) machine learning technologies to enable effective interaction through multimodal interfaces and techniques to overcome system latencies whilst enabling greater accuracy. The use of new smart assembly tools will create significant opportunities to process live data streams by novel analytical methods. The research will explore different visualization architectures to provide intelligent task navigation, tasking information and a record of work undertaken for quality approval. The research being undertaken at Loughborough builds on previous work and includes the design, development, and demonstration of prototype visualization solutions.

Job Purpose

The Research Associate will be predominantly involved in i) Development of information/data architectures for facilitating data connectivity between sensors, digitally enabled tooling and the Airbus data backbone and ii) Development of an 'open' visualization 'server' platform that supports the use of advanced assistive visualization involving eXtended Reality (XR), thus enabling a range of visualization systems to be used ranging from AR, VR

and projection displays. This open aspect is particularly important as new XR technologies become available, meaning the underpinning visualization server needs to ideally support future systems.

Job Duties

- To be responsible for conducting the day to day running of the project in collaboration with other team members.
- To be responsible for undertaking the main research activities as follows:
- Capturing use cases across the whole project at various time points with a view to understand the requirements for a digital-twin of the different manufacturing processes as the research evolves.
- To support the definition of the information/data architectures for facilitating data connectivity between sensors, digitally enabled tooling and the associated data backbone.
- To conduct scientific and technological research into new advanced assistive visualization technologies.
- To support the development of the associated visualization server involving eXtended Reality (XR), also known as Augmented, Mixed, and Virtual Reality.
- To be responsible for developing prototype visualization server solutions
- Design and undertake experiments to determine the operational performance of visualisation systems.
- To explore opportunities for integration of the visualization technologies with machine learning to provide intelligent task navigation, tasking information and a record of work undertaken for concession approval.
- Develop and commission experimental test systems and characterise the performance of a range of prototype systems
- Identify optimal assistive visualization strategies when used to support manual tasks.
- To assist in the dissemination of results arising out of the project.
- To travel to collaborators' locations within the UK and potentially overseas to report on the progress of the project.
- To provide feedback to the project team on progress and assist in preparing interim and final project reports.
- To work as a committed member of the project and university team.
- To plan, manage and conduct the work to agreed deadlines.
- To write reports, papers and make presentations to industry and academia.
- To maintain confidentiality where appropriate and to ensure that intellectual property (IP) agreements are met.

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. There is an assumption that the successful applicant will be competent at programming in a modern computer language such as Python.

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 the Project Investigator, Professor Roy S. Kalawsky

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 Engineering, Science or other suitable subject related to aerospace engineering	1, 3
	Experience of designing and undertaking a complex programme of experimental work	1, 3
	Experience of developing code in a modern computing language such as Python. (Not novice level)	1, 3
	Experience of having produced technical reports and / or guidance materials on engineering or science topics	1, 3
Skills and abilities	Knowledge of advanced visualization techniques, ideally involving XR	1, 3
	Excellent written and oral communication and IT skills	1, 3
	Self-motivated with ability to meet deadlines	1, 3
	Excellent interpersonal, and organisational skills	1, 3
	Ability to work independently and as part of a team, interacting with different academic and industrial partners	1, 3
	Ability to write project reports and make technical presentations to industrial and academic research groups	1, 3
	Knowledge of relevant Health & Safety issues	1, 3
Training	Demonstrate evidence of having undertaken further training	1, 3
Qualifications	PhD (or near completion) in an engineering, or relevant computing subject	1, 3
Other	Commitment to observing the University's Equal Opportunities policy at all times.	1, 3

Desirable Criteria

Area	Criteria	Stage
Experience	Current or recent relevant work experience at post-doctoral level in an academic or industrial environment	1, 3
	Practical experience of working with visualization systems	1, 3
	Experience of authoring original work for academic journal papers, conference papers or technical reports for industry	1, 3
	Knowledge of machine learning applications and coding	1, 3
	Experience with visualization techniques – ideally use of VR solutions such as Unity or UnrealEngine (not novice level)	1, 3

Skills and abilities	Authoring original work, in the highest quality refereed academic journals	1, 3
	Knowledge of aerospace engineering/manufacturing	1,3
	Working knowledge of a range of software packages and excellent ability in a programming language	1, 3
	Previous experience of detailed experimental data analysis	1, 3
	Previous experience of prototype system validation and performance analysis	1, 3
	Previous experience of producing reports	1, 3
	A strong publication track record	1, 3
Qualifications	A good honours degree in Engineering, manufacturing, or other suitable computing subject	1
Other	Travel / Able to travel Independently / Willing to work flexibly	1, 3

Conditions of Service

The position is FULL-TIME and FIXED TERM for 3 years (not extending beyond the project end date). Salary will be on Specialist and Supporting Academic Grade 6 (£33,348 to £43,155 per annum), at a starting salary to be confirmed on offer of appointment.

The appointment will be subject to the University's Terms and Conditions of Employment for STAFF GRADES 6 AND ABOVE, 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 are available at http://www.lboro.ac.uk/services/hr/a-z/family-leave-policy-and-procedure---page.html.

The University offers a wide range of employee benefits which can be found here.

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/