Wolfson School of Mechanical, Electrical and Manufacturing Engineering

Loughborough University

Research Associate - Cyber-Physical Digital Validation of Multifunctional Materials and Structures

Job Ref: REQ240466

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.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 Wolfson School of Mechanical, Electrical and Manufacturing is one of the leading Engineering Schools in the country. With a strong tradition in Manufacturing and in the discovery and application of Materials for applications in a broad range of industrial sectors (e.g., electronics, bioengineering & healthcare, automotive, food industry, etc), we strive for academic excellence and research at the leading edge.

Project Description

This post can be held FULL or PART-TIME.

Re-Imagining Engineering Design (RIED) is a multi-institutional Programme Grant, co-funded by the EPSRC and a consortium of Industrial Collaborators. The project will involve development of new approaches to integrating design, manufacturing and physical verification of processes, products, services and supply chains. Contribution to the workpackages that comprise process parameterisation, manufacture, digital simulation for the purpose of design validation, as well as addressing the challenges of verification/validation to a standard that can inform (and be informed by) new Design Methodologies, considering the various stakeholders along a supply chain.

Job Description

Job Grade: Specialist and Supporting Academic Grade 6

Job Purpose

To manufacture CAD structures using Additive Manufacturing techniques. To conduct research in the areas of physical manufacture and digital characterisation and validation of multifunctional materials and structures (nominally engineered porous structures and lightweight materials, composites, ceramics, metals and alloys). To develop new scientific understanding of materials processing and manufacturing techniques by creating 'smart testing' protocols that parameterise the process. To generate high quality scientific reports and papers suitable for publication in International Journals.

Job Duties

- To develop and implement Design of Experiments techniques and protocols that support manufacturing, materials characterisation, process simulation and validation.
- For the manufacture, to be able to operate Additive Manufacturing equipment using metal powders and also polymers.
- For the digital validation, to create CAD models, manipulate them in a cyber space and test them to support decision making prior to their realisation through a manufacturing technique.
- For the physical characterisation, to perform, as appropriate to the application, physical, chemical, microstructural, thermomechanical, electrical, and/or electromagnetic characterisation and analysis of the products and processes, incl. materials under study (e.g., SEM, TEM, DSC, XPS, micro-CT, mechanical testing, AFM, XRD, etc)
- To apply experience in data gathering and analysis using tools such as MatLab, Origin, GraphPad, SPSS

- To work as part of a multi-disciplinary, multi-location team that addresses different aspects of the design, manufacturing, validation cycle of porous materials and structures.
- To conduct research of academic rigour and scientific standard, carry out authoritative literature reviews, and publish in top quality journals, consistent with the School's and Research Lab's quality and ambition.
- To be responsible for the day-to-day running and maintenance of the specific resources required in these roles that are pertinent to the project.
- To carry out Risk Assessments and COSHH inventories to ensure a safe environment in the labs and working place(s) for all the team members involved.
- 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.
- Write up regular progress reports and present outcomes to all Investigators and Collaborators (incl. those located at other Institutions), making recommendations for next steps.
- To support the project team by enhancing relationships with existing collaborators and by assisting the establishment of relationships with new collaborators.
- Travel to external partners and collaborators to undertake experimental trials, attend meetings and make presentations, when required.
- To attend and contribute to conferences, seminars, webinars and other events of interest to the team.
- To contribute to project promotion and public engagement events.
- To contribute ideas for new research and impact directions.
- To always maintain confidentiality and ensure that intellectual property (IPR) generation is safeguarded, and agreements are not violated.
- When appropriate, to deliver teaching, tutorials and laboratory sessions to students, in support of the Teaching & Learning environment in the School.
- To engage in training programmes in the University (or elsewhere) that are consistent with the needs and aspirations of the project and those of the Lab.
- To 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. Training will be provided as necessary and in support of the Researchers' professional development, and an attitude for learning will be an essential criterion in the selection of a successful candidate.

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 Equity & Diversity policy and procedures at all times. Duties must be carried out in accordance with relevant Equity & 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 Prof Paul P. Conway and Prof Carmen Torres-Sanchez, Principal Investigators on the Programme Grant.

Person Specification

Your application will be reviewed with respect to meeting 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, giving examples of recent experience. You may use the **STAR** approach: explain what the **S**ituation was, which **T**ask you had to do or were allocated, what **A**ction you took, what you did and a justification, and what was the **R**esult. It is highly recommended that the candidates express in their Cover Letter how they fit to the Job Purpose and Job Duties described above. Stages of assessment are as follows:

1 – Application

2 – Test/Presentation

3 – Interview

Essential Criteria

	Criteria	**Stage**
Experience	Significant experience within a high-quality research or development environment	1, 3
	Proven experience in the operation of Additive Manufacturing equipment and post-processing tasks	1, 2, 3
	Evidenced experience in materials selection and their manufacturing processes	1, 2, 3
	Knowledge of material properties, esp metals and alloys, bio-compatible polymers and ceramic composites.	1, 2, 3
	Experience writing technical reports with an R&D purpose, e.g. journal or trade articles, conference papers or industrial technical reports	1
Skills and abilities	Working knowledge of CAD/CAM software e.g. NX, Solidworks, Magics, etc	1, 3
	Excellent written and oral communication skills in English	1, 2, 3
	A good understanding of the basics of materials processing techniques in particular using Additive Manufacturing	1, 3
	Ability to organise resources to support and further own research activities within the scope of their work	1, 3
	Ability to plan own workload in accordance with the overall project objectives and work independently and self-propelled to meet deadlines	2, 3
	Working knowledge of characterisation tools and techniques (some of those could be any of the following: SEM, TEM, DSC, XPS, micro-CT, mechanical testing, AFM, XRD, etc) and a willingness to deepen understanding and use of these techniques	1, 2, 3
	Self-motivated with an ability to work independently and in teams to meet the project(s) deadlines	1, 3
	Excellent interpersonal and organisational skills	1, 3
	Working knowledge of data analysis software packages (e.g., MatLab, Origin, Excel, SPSS, MiniTab, Tableau, etc)	1, 3
	Ability to write weekly project reports and make technical presentations to industrial and academic research groups	1, 3
	Knowledge of relevant Health & Safety issues	1, 3
Training	Evidence of having undertaken further training and a willingness to be trained if necessary to fulfil the requirements of the job	1, 3

Qualifications	A Bachelors or a Master's level Degree in Manufacturing Engineering, Mechanical Engineering, Materials Science, Physical Sciences, Computer Science, Maths or related discipline	1
	PhD (or near completion) in Manufacturing Engineering, Mechanical Engineering, Materials Science, Physical Sciences, Computer Science, Maths or related discipline. Alternatively, equivalent industrial experience in an R&D environment	1
Other	Commitment to observing the University's Equal Opportunities policy at all times.	3

Desirable Criteria

Area	Criteria	Stage
Experience	Involvement in or having worked across different projects, demonstrating an ability to manage own time and competing priorities	1, 3
	Experience of creating multi-physics simulations, esp. physical, chemical or mechanical processes and phenomena	1, 3
	Experience in Image Processing techniques to conduct and interrogate volumetric (re-)constructions	1, 2, 3
	Experience of macro scale modelling techniques, e.g. FEA, COMSOL or similar	1, 3
	Dealing with problems which may affect the achievement of research objectives and deadlines	3
Skills and abilities	Understanding of Design Methodologies as a framework to inform product and system development, esp DfAM	1, 3
	A self-starter who can operate effectively with minimal supervision, liaising with members of the team on own initiative	3
	Presentation skills of technical and non-technical aspects of the project to various audiences (i.e. academic and industrial collaborators, and general public dissemination of results and impact)	1,3
Other	Able to travel to academic and industrial collaborators' sites	1, 3

Conditions of Service

The position available is FULL TIME or PART TIME and FIXED TERM for 12 months. Salary will be on Specialist and Supporting Academic Grade 6 (£33,966 to £42,978 per annum) at a starting salary to be confirmed on offer of appointment according to the successful candidate's knowledge and experience.

The appointment will be subject to the University's normal Terms and Conditions of Employment for Academic and Related staff/Operational and Administrative 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 are available at http://www.lboro.ac.uk/services/hr/a-z/family-leave-policy-and-procedure---page.html.

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 and dynamic working when the tasks and assignments of the project can permit it.

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/