

Research Associate in Computer-Aided Design

Hybrid Additive Manufactured-Aramid Fibre Body Armour Project

(Fixed term for 9 months)

Job Ref: REQ180121

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

Project Description

Loughborough Design School is seeking to appoint a Research Associate to assist in the development of future protective equipment. Supported by the EPSRC (EP/R015155/1) and partnered by the UK Home Office Centre for Applied Science and Technology (CAST), this project aims to produce the first-generation hybrid AM-aramid fibre body armour panel capable of providing protection against stab and ballistic threats. Applicants are likely to be from a design engineering, product design, industrial design, design research, or additive manufacturing background.

Body armour is essential to protect personnel in situations where they may be exposed to puncture or penetrative threats. Whilst protection against ballistic threats can be achieved through the use of aramid-fibre armour, such armour is unsuitable at providing protection against lower velocity sharp force threats such as blades or spikes. This is due to the threat penetrating between the individual fibrous elements of the armour. Therefore, to achieve stab and ballistic resistance the use of aramid fibres coupled with a Polycarbonate (PC) chest plate is often required. By doing so, the improved manoeuvrability typically offered by fibre-based armour is substantially reduced. Whilst the protective performance of these articles have progressed since their introduction, users of such armour frequently report of ill-fitting and uncomfortable garments. This, combined with the high weight and low breathability of protective articles such as PC and aramid-based armour, at best results in impaired performance such as reduced running speeds or operational manoeuvrability, and at worst can lead to physiological effects including nerve damage and severe musculoskeletal injuries.

Additive Manufacturing (AM) or 3D Printing is the name for group of processes which can produce extremely complex geometries with little or no additional costs. The use of these for the production of clothing has already been demonstrated in the fashion arena with the development of highly articulated linkable textile-like structures. Recent work conducted by the Principle Investigator (PI) has also demonstrated that AM technologies can also be utilised to achieve stab resistance to the internationally recognised UK Home Office body armour protective standards.

This project will therefore seek to utilise the design and manufacturing opportunities offered by Additive Manufacturing (AM) technologies, coupled with the enhanced protective performance and maneuverability of existing aramid-based armour. To achieve this a range of AM material optimisation and Computer-Aided Design (CAD) activities, as well as stab and ballistic validation exercises will be performed within the research period. Development of a hybrid protection system within this project could present a significant leap in the development of the next generation of body armour in which the physical comfort of the wearer and their subsequent operational performance is as important a factor as protective performance.

Job Description

Job Grade: Specialist and Supporting Academic Grade 6

Job Purpose

A Research Associate (RA) is required by the School's Design for Digital Fabrication (D4DF) Research Group to investigate the protective performance of AM materials via stab and ballistic testing. In addition, the researcher will undertake significant CAD activities to establish a range of protective AM textiles to support the development of the first AM-aramid fibre body armour. Throughout the duration of the project the appointed RA will report to the Principle Investigator and project partner.

Job Duties

- To design, organise and undertake research for the outlined project with specific focus on undertaking AM base material optimisation via stab and ballistic testing activities;
- To design, manufacture, and test a range of stab resistant interlinking AM textiles;
- To assess the ballistic performance of the aforementioned developed AM textiles in relation to the formation of a hybrid protective panel.
- To attend meetings and other events appropriate to the project and give progress reports as required.
- To prepare reports and papers for presentation at national and international conferences where appropriate.
- To author original work for submission to peer-reviewed journals.
- To work with the other members of the research team, D4DF research group, Loughborough University, or associated project partners when appropriate.
- To liaise with suppliers of essential and auxiliary equipment deemed critical for the undertaking of the research activities outlined within the advertised project.
- To review on a continuous basis relevant developments reported in the scientific and technical literature.
- To pursue excellence and maintain high standards of safety in all activities.

General and administrative

- Be responsible for conducting the day to day running of the project.
- 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 support the project team by enhancing relationships with existing collaborators and by assisting the establishment of relationships with new collaborators.
- To write research papers suitable for publication in high quality academic journals.
- 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.

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 the Principle Investigator.

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	Current or recent work experience using 3D Computer-Aided Design (CAD)	1,3
	Prior experience of Additive Manufacturing/3D Printing processes	1,3
	Knowledge and experience in Industrial/Product/Engineering Design and the design process	1,3
	Ability to coordinate project activities, manage project tasks, prioritise and meet deadlines	1,3
Skills and abilities	Excellent written, visual, and oral communication skills	1,3
	Self-motivated with ability to meet deadlines	3
	Excellent interpersonal, and organisational skills	3
	Working knowledge of CAD software packages such as SolidWorks, Creo, Rhino 3D etc.	1,3
	Ability to write project reports and make technical presentations to industrial and academic research groups	1,3
	Excellent IT skills, including MS Office applications	1
	Knowledge of relevant Health & Safety issues	1,3
	Demonstrate evidence of having undertaken further training	1,3
Training	Demonstrate evidence of having undertaken further training	1,3
Qualifications	An outstanding educational profile up to and including first degree and / or Masters in a relevant Industrial / Product / Engineering Design discipline	1
Other	Commitment to observing the University's Equal Opportunities policy at all times.	1,3

Desirable Criteria

Area	Criteria	Stage
Experience	Prior experience in the design of protective clothing/3D textiles	1,3
	Experience of materials processing/testing/experimental design/Design of Experiments	1,3
	Working in a high quality academic research environment	1,3
	Experience of teaching and / or supervision of students in relevant areas	3
	Authoring original work for academic journal papers, conference papers or technical reports	1,3
Skills and abilities	A strong publication track record	1

Qualifications	Holds (or near to completing) a PhD in a relevant product design/design engineering/additive manufacturing discipline	1,3
Other	A willingness and ability to travel	3

Conditions of Service

The position is full-time and fixed term for 9 months. Salary will be on Specialist and Supporting Academic Grade 6, £29,799 - £33,518 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 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. 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/>

Informal Enquiries

Informal enquiries should be made to Dr. Andrew Johnson, Principle Investigator, by email at a.johnson@lboro.ac.uk or by telephone on +44 (0)1509 226963.

Applications

The closing date for receipt of applications is **13 April 2018**.