

Research Associate in Bio-engineering (Bioengineered Human Neural Networks for Neuromorphic Interfaces)

Job Ref: REQ250438

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.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

This project forms part of the **UK Multidisciplinary Centre for Neuromorphic Computing**, a national EPSRC-funded initiative bringing together world-leading expertise in AI, neuroscience, photonics, materials science and bioengineering. The Loughborough University team focuses on developing human stem cell-derived neural networks and engineering microfabricated platforms to support and interrogate these networks *in vitro*. The project will create advanced bioengineered neural systems by differentiating human induced pluripotent stem cells (hiPSCs) into neurons and integrating them within custom-designed microdevices. These platforms will allow precise spatial arrangement and functional assessment of living neural networks using electrophysiological and optogenetic techniques. The work will directly contribute to the Centre's overarching goal of developing neuromorphic computing systems inspired by the architecture and dynamics of biological brains. Researchers will also work closely with collaborators in neuromorphic engineering, computational neuroscience and advanced fabrication to support the development of next-generation hybrid bio-digital platforms.

This post is based within the **Department of Chemistry, School of Science at Loughborough University**, working with **Professor Paul Roach** and **Dr Eric Hill** in collaboration with the wider UK Centre for Neuromorphic Computing, led by Aston University. As such, the successful applicant will need to be proactive and dynamic to work in response to many other elements within the overall project. The ideal candidate will be enthusiastic about multidisciplinary collaboration and have a proactive approach to working within a dynamic research environment.

Expertise in microfabrication, lithography, 3D printing, or other relevant microengineering techniques would be highly advantageous. The post holder will lead the design and fabrication of culture platforms and the optimisation of protocols for generating functional hiPSC-derived neuronal networks. Training will be provided where appropriate on specialist instrumentation and for specific methodologies.

Job Description

Job Grade: Specialist and Supporting Academic Grade 6

Job Purpose

The project focuses on developing bioengineered human neural networks from stem cell-derived neurons and integrating them with advanced microfabricated platforms to explore their potential for neuromorphic computing. These systems will provide new insights into human neuronal network behaviour and how it can be harnessed for next-generation computing technologies. The researcher will work within a dynamic, multidisciplinary team and be proactive in engaging with multiple partners and external collaborators across the UK Centre for Neuromorphic

Computing. The post would suit someone with a PhD or strong background in stem cell biology, neural engineering, or biofabrication, with an interest in applying biological systems to address technological challenges.

Job Duties

- Generate and develop concepts for bioengineered devices in line with the project's remit, translating ideas into practical microfabricated systems.
- Support the development and refinement of stem cell culture protocols for seeding and maintaining human iPSC-derived neural networks within microdevices.
- Evaluate, optimise, and implement fabrication methods, including but not limited to photolithography, soft lithography, and advanced 3D printing techniques.
- Characterise and optimise device designs and surface modifications to enhance neural cell adhesion, viability, and function within engineered platforms.
- Investigate and integrate state-of-the-art technologies, including tools for neuromodulation and functional assessment, in collaboration with external project partners.
- Work proactively within a multidisciplinary team to drive forward the implementation of biohybrid neural networks for neuromorphic computing applications.
- Take responsibility for the day-to-day running of the research project, including experimental planning, data collection, and troubleshooting.
- Formulate detailed project plans in consultation with the wider project team, contributing creatively to the evolution of project aims.
- Communicate research progress to the project team, collaborators, and Centre partners, making recommendations on future directions.
- Prepare regular internal reports and present findings at project meetings, national and international conferences, and external stakeholder events.
- Actively engage with project partners and the wider Centre for Neuromorphic Computing community to strengthen collaborative links and explore new research opportunities.
- Contribute to high-quality research outputs suitable for publication in leading peer-reviewed journals.
- Support public engagement and outreach activities to promote the project and Centre's research to non-specialist audiences.
- Assist in the supervision and mentoring of undergraduate, UG, MSc, and PhD students and other researchers working within the project team.
- Participate in training and professional development opportunities aligned with the needs of the role and the Department.
- Maintain confidentiality and uphold intellectual property agreements at all times.
- Undertake other duties as reasonably requested by the project team, commensurate with the grade and nature 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 Professor Paul Roach/Dr Eric Hill as appropriate.

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	<i>In vitro</i> stem cell culture, differentiation and characterisation	1, 3
	Human induced pluripotent neural cells	1, 3
	Establishing new methodologies for <i>in vitro</i> stem cell culture, organoids	1, 3
	Authoring original work for academic journal papers, conference papers or technical reports	1, 3
	Working in a high-quality, multidisciplinary research environment	1, 3
Skills and abilities		1, 3
	Working knowledge of biological assays including microscopy, immunofluorescence, electrophysiological investigation	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
	Working knowledge of data presentation and analysis software packages (e.g. Microsoft 365, Origin)	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	Willingness to learn and develop	3
	Ability to share responsibility for the supervision and training of undergraduate and post-graduate research students	1, 3
Qualifications	PhD in a relevant subject such as biomaterials, regenerative medicine, engineering (materials, mechanical or electronic), biophysics	1
Other	Commitment to observing the University's Equity, Diversity and Inclusion policy at all times.	3

Desirable Criteria

Area	Criteria	Stage
Experience	Optogenetics	1, 3
	Experience/ training in instrumentation development	1, 3
	Background in biomaterials/ micro-fabrication	1, 3
	(Bio)materials fabrication, characterisation and testing	1, 3

	Materials characterisation methods (e.g. wettability, microscopy, SEM, FTIR, AFM)	1, 3
	Multielectrode array technology and neuronal cell interfaces	1, 3
	Micro-fabrication (including but not limited to lithographic techniques and 3D printing)	1, 3
	Developing proposals for funding from external agencies	1, 3
	Light-based 3D printing techniques e.g., 2-Photon polymerisation, Digital light processor.	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
	CAD software, additive manufacturing techniques	1, 3
	Programming languages such as Matlab, python	1, 3
Qualifications	PhD (or relevant other qualification/experience) in an area of bio-engineering, stem cell culture, biomaterials for the development of cell culture devices	1, 3

Conditions of Service

The position is FULL TIME and FIXED TERM for 2 years starting on or around 1 August 2025 with the possibility of extension. Salary will be on Specialist and Supporting Academic Grade 6 (£35,116 – £45,143 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](#). Recruitment will directly follow UKRI requirements with offer made on receipt of funding.

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/>