Research Associate
Department of Electronic Engineering

Closing date: 29 January 2019
Interview date: To be confirmed
Vacancy reference: 7305
INTRODUCTION

An opportunity has arisen to work on an EPSRC funded project as a Research Associate on a project developing novel bio-inspired hardware control systems for application in autonomous swarm robotic systems. This post will focus on the use of a range of mobile robotic platforms with FPGA and microprocessor based control systems.
Main purpose of the role

- To conduct research under the supervision of senior colleagues and to contribute to the production of research.
- To assist in the identification and development of potential areas of research and the development of proposals for independent or collaborative research projects.
- To plan, design and perform experimental research using swarm robotic systems.
- To coordinate research activities and ensure timely delivery of the programme.

Key responsibilities

(Role holders will be required to undertake some or all of the duties below)

- To conduct individual and collaborative research projects, duties to include: analysis and interpretation of research data; use of appropriate research techniques and methods; writing up of research results and dissemination through publications, seminar and conference presentations and public engagement and outreach activities; contributing to the identification of possible new areas of research.
- To contribute to the preparation of research proposals and applications to external bodies.
- To undertake appropriate organisational and administrative activities connected to the research project, including conference organisation, and the development of promotional or educational material including website maintenance and development.
- To develop and initiate collaborative working internally and externally, duties to include: the building of internal contacts and participation in internal networks; collaboration with colleagues on joint projects as required; participation in and identification of external networks in order to share information and identify potential opportunities for collaboration and possible sources of funding; attendance at and contribution to relevant meetings.
- To provide guidance to other staff and students, as required, as well as coordinating the work of small research teams.
- To assist with undergraduate teaching in own area of expertise.

JOB DESCRIPTION

At a glance

Salary £32,236 a year

Hours of work Full time; 37 hours a week

Contract type Fixed term for 6 months

Based at Heslington Campus West
# PERSON SPECIFICATION

<table>
<thead>
<tr>
<th>Qualifications</th>
<th>Essential / Desirable</th>
</tr>
</thead>
<tbody>
<tr>
<td>First degree in Electronics or a Physical science subject</td>
<td>Essential</td>
</tr>
<tr>
<td>PhD in Electronic Engineering, Computer Science or equivalent experience</td>
<td>Essential</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Essential / Desirable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge and experience of robotic platforms and swarm robotic systems</td>
<td>Essential</td>
</tr>
<tr>
<td>Knowledge and experience of bio-inspired systems</td>
<td>Essential</td>
</tr>
<tr>
<td>Knowledge of neural networks and evolutionary algorithms.</td>
<td>Desirable</td>
</tr>
<tr>
<td>Knowledge and experience of FPGA design and digital circuit design</td>
<td>Desirable</td>
</tr>
<tr>
<td>Research expertise in an area that will complement and enhance the department’s research strategy</td>
<td>Desirable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Skills, abilities and competencies</th>
<th>Essential / Desirable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly developed communication skills to engage effectively with a wide ranging audience, both orally and in writing, using a range of media</td>
<td>Essential</td>
</tr>
<tr>
<td>Ability to write up research work for publication in high profile journals and engage in public dissemination</td>
<td>Essential</td>
</tr>
<tr>
<td>Ability to develop research objectives, projects and proposals for own and joint research, with the assistance of a mentor if required</td>
<td>Essential</td>
</tr>
<tr>
<td>Competency to conduct individual and collaborative research projects</td>
<td>Essential</td>
</tr>
<tr>
<td>Ability to identify sources of funding and contribute to the process of securing funds, with collaborators if required</td>
<td>Essential</td>
</tr>
<tr>
<td>Competency to make presentations at conferences or exhibit work in other appropriate events</td>
<td>Essential</td>
</tr>
<tr>
<td>Proven ability in working with robotic systems; Verifiable through peer-reviewed publications.</td>
<td>Essential</td>
</tr>
<tr>
<td>Proven ability to implement bio-inspired algorithms</td>
<td>Essential</td>
</tr>
<tr>
<td>Ability to develop research objectives, projects and proposals for own and joint research, with the assistance of a mentor if required.</td>
<td>Desirable</td>
</tr>
</tbody>
</table>
## PERSON SPECIFICATION

<table>
<thead>
<tr>
<th>Experience</th>
<th>Essential / Desirable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience of carrying out both independent and collaborative research</td>
<td>Essential</td>
</tr>
<tr>
<td>Experience of writing up research work for publication</td>
<td>Essential</td>
</tr>
<tr>
<td>Ability to work as part of a team and also to work independently using own initiative</td>
<td>Essential</td>
</tr>
<tr>
<td>Practical experience of swarm robotic systems</td>
<td>Essential</td>
</tr>
<tr>
<td>Experience of bio-inspired algorithms</td>
<td>Essential</td>
</tr>
<tr>
<td>Experience of FPGA design</td>
<td>Desirable</td>
</tr>
</tbody>
</table>

## Personal attributes

<table>
<thead>
<tr>
<th>Personal attributes</th>
<th>Essential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention to detail and commitment to high quality</td>
<td>Essential</td>
</tr>
<tr>
<td>Collaborative ethos</td>
<td>Essential</td>
</tr>
<tr>
<td>Interest in and enthusiasm for the subject matter of the project(s)</td>
<td>Essential</td>
</tr>
<tr>
<td>Positive attitude to colleagues and students</td>
<td>Essential</td>
</tr>
<tr>
<td>Willingness to work proactively with colleagues in other work areas/institutions</td>
<td>Essential</td>
</tr>
<tr>
<td>Ability to plan and prioritise own work in order to meet deadlines, including using initiative to plan research programmes</td>
<td>Essential</td>
</tr>
<tr>
<td>Commitment to personal development and updating of knowledge and skills</td>
<td>Essential</td>
</tr>
</tbody>
</table>
THE DEPARTMENT

The Department of Electronic Engineering at York has a long-standing reputation for high-quality degrees and successful graduates. Our MEng and BEng courses in a number of subject areas are fully accredited by the IET (Institution of Engineering and Technology) at CEng (Chartered Engineer) level. The Department is consistently highly ranked for electronic engineering in the annual National Student Survey. Our suite of taught MSc programmes covers the latest technologies and tools in important industry sectors.

In the 2014 Research Excellence Framework the majority of our submission, including 90% of our research outputs, was judged world-leading or internationally excellent. Our research groups in Communication Technologies, Intelligent Systems and Nano-science work with industry and universities across the world while providing a friendly and supportive environment for staff and students. This post will be within the Intelligent Systems and Nano-science research group in the Department.

THE INTELLIGENT SYSTEMS AND NANO-SCIENCE RESEARCH GROUP

The Intelligent Systems and Nano-science group's research is inspired from linking engineering and technology with Nature and focuses on the interactions between electronic, computational & robotic systems and biological systems. Our intellectual focus is maintained through the development of novel biologically-inspired electronic, computational & robotic systems and programs inspired by Nature, the characterisation and understanding of biological and biomedical signals and the exploitation of evolutionary mechanisms in system design and optimisation. We are interested in creating and conducting research into novel systems and architectures endowed with capabilities such as adaptation, evolution, growth, healing, replication, and learning. These technical developments are applied to a variety of real-world applications areas. These include: VLSI technology design and fabrication, autonomous intelligent vehicles, fault-tolerant systems, control systems, neural & immune system modeling and analysis of medical data for healthcare.

THE PROJECT & POST

The project

The human brain is remarkable in its ability to self-repair, for example following stroke or injury. Such self-repair results from a range of distributed and fine-grained mechanisms which act in tandem to ensure that the neurons (the basic building blocks in the brain) continue to function in as close to a normal state as possible.
In contrast, modern electronic systems design typically relies on a single controller or processor, which has very limited self-repair capabilities. There is a pressing need to progress beyond current approaches and look for inspiration from biology to inform electronic systems design. Recent studies have highlighted that interactions between astrocytes (a type of glial cell) and neurons in the brain provide a distributed cellular level repair capability where faults that impede or stop neuronal firing can be repaired by a re-adjustment of the local weights of connections between neurons in the brain.

This EPSRC funded project aims to exploit these recent findings and develop a new generation of self-repairing algorithms by taking inspiration from these results to design a new generation of “astro-centric” algorithms. To achieve this we will include components representing both neurons and astrocytes in our electronic systems and model the interactions between these in such a way as to capture the distributed repair capabilities seen in the biological system.

The project is funded by the EPSRC as part of a collaborative project between the University of York and the University of Ulster: “Self-repairing Hardware Paradigms based on Astrocyte-neuron Models”. The two areas of interest for this post are:

- Swarm robotic systems
- Application of novel bio-inspired control systems to autonomous robotics.

Practical work will involve construction of robot demonstrators using the facilities in the York robot lab.

The postholder will be work closely with Dr David Halliday, Professor Andy Tyrrell and Professor Jon Timmis in the Intelligent Systems group, and will work with the project collaborators at the University of Ulster (Professor Liam McDaid, Dr Jim Harkin). They will be responsible for the design and execution of experiments, guiding research and reporting research findings (oral and written) to an interdisciplinary audience. They will work with project collaborators at the University of Ulster. Informal enquiries may be made to Dr David Halliday (email: david.halliday@york.ac.uk or telephone: 01904 322345).

Further details:
Department of Electronic Engineering University of York: https://www.york.ac.uk/electronic-engineering/
Intelligent Systems Group, York: https://www.york.ac.uk/electronic-engineering/research/intelligent-systems-nano-science/
The York robot lab: https://www.york.ac.uk/robot-lab/
Intelligent Systems Research Centre, Ulster: [http://isrc.ulster.ac.uk/](http://isrc.ulster.ac.uk/)

Current list of research outputs from the project: [https://pure.york.ac.uk/portal/en/projects/selfrepairing-hardware-paradigms-based-on-astrocyteneuron-models(9fe6edc4-f647-4b30-8e27-8dece6058582).html](https://pure.york.ac.uk/portal/en/projects/selfrepairing-hardware-paradigms-based-on-astrocyteneuron-models(9fe6edc4-f647-4b30-8e27-8dece6058582).html)
Founded on principles of excellence, equality and opportunity for all, the University of York opened in 1963 with just 230 students. In 2018 it is the home of more than 17,000 students across more than 30 academic departments and research centres. Since opening over fifty years ago, we have become one of the world's leading universities and a member of the prestigious Russell Group.

We are consistently recognised as one of the leading Higher Education Institutes and are ranked 16th in the Times & Sunday Times league table (2017). The University of York has won six Times Higher Education (THE) Awards and five Queen’s Anniversary Prizes.

The University is proud of its association with Athena SWAN, holding 12 awards in support of gender equality, representation and success for all, with gold awards for Chemistry and Biology and a University-wide bronze award.

Of 154 universities that took part in the Research Excellence Framework (REF) in 2014, The University of York ranked 14th overall and 10th for the impact of our research. The University is consistently in the top ten UK research universities and attracts over £60m a year of funding from research alone.

Our vision is to make the University of York a world leader in the creation of knowledge through fundamental and applied research, the sharing of knowledge by teaching students from varied backgrounds and the application of knowledge for the health, prosperity and well-being of people and society.
Attractive workplace

Centred around the picturesque village of Heslington on the edge of the city of York, our colleges are set in an attractive landscaped campus. York enjoys a safe, friendly atmosphere with facilities including bars, shops, theatres and concert halls all within easy walking distance.

The University has undergone an unprecedented period of expansion and renewal since 2000. We have invested in twenty new buildings on the original campus and have completed the first and second phases of a £750m campus expansion. Our investment in new colleges, teaching and learning spaces, laboratories, research facilities and a new sports village mean there has never been a better time to join us.

During this period of change we’ve worked hard to retain our friendly, informal and collegiate atmosphere, which is important to our core values of inclusivity and interdisciplinarity.

We have a thriving international community and are committed to providing staff moving to York with as much support as possible through our Relocation Package and Welcome Officers.

The University is committed to promoting a diverse and inclusive community - a place where we can all be ourselves and succeed on merit. We offer a range of family friendly, inclusive employment policies, flexible working arrangements, staff engagement forums, campus facilities and services to support staff from different backgrounds.

For further information please visit our employee benefit pages.

THE UNIVERSITY
THE CITY AND THE REGION

The City of York

Internationally acclaimed for its rich heritage and historic architecture, York’s bustling streets are filled with visitors from all over the world. Within its medieval walls you will find the iconic gothic Minster, Clifford’s Tower and the Shambles - just a few of the many attractions.

But York isn’t just a great place to visit - it’s also a great place to live and work. While nourishing a vibrant cosmopolitan atmosphere, York still maintains the friendly sense of community unique to a small city.

Visit www.visityork.org for more information on the city of York

Shopping, culture and entertainment

York boasts specialist and unique boutiques but also all the high street stores on its busy shopping streets. Alongside them you will find cinemas, theatres, an opera house, art galleries, a vast range of restaurants, live music venues and clubs. York is particularly renowned for its multitude of pubs and bars, from the modern to the medieval.

Housing and schools

Whether you choose to live close to the city, in one of the surrounding villages or further afield, you will find a wide range of housing within comfortable distance of York and the University. For families, the area has a range of excellent schools both in the state and independent sector.

Great location

York is one of Britain’s best-connected cities. Halfway between London and Edinburgh on the East Coast mainline, on intercity trains you can reach London King’s Cross in less than two hours and Edinburgh in two and a half hours. York is also well served by road links, and it is easily accessible from the A1, M1 and the M62.

For those travelling from overseas, Manchester Airport is two hours away and Heathrow Airport just three and a half. Flights from nearby Leeds Bradford Airport provide easy access to mainland Europe. By Eurostar from London St Pancras, Paris is just over six hours away.

Yorkshire

The Lonely Planet guide recently declared Yorkshire the third best region in the world to visit. There is something to cater to every taste, whether it be the rugged landscapes of the Moors or the Dales, the picturesque seaside towns of Scarborough and Robin Hoods Bay, the gothic architecture of Whitby or the vibrancy of cosmopolitan Leeds.
Apply online

- Go to https://jobs.york.ac.uk
- Find this job using reference 7305
- Complete the online application form

You will need to submit your completed application by midnight (local UK time) on 29 January 2019

What will I need?

We will ask you for details of:
- your employment history
- relevant qualifications
- two referees

You need to be ready to show us how you meet the requirements of the job, either in a written statement and / or by answering questions.

Help and assistance

Direct any informal queries to david.halliday@york.ac.uk

If you have any questions about your application, contact the HR Services team:

recruitment@york.ac.uk
+44 (0)1904 324835