

Research Associate:

Developing and analysing distributed algorithms for Compact Self-Healing Routing (COSHER)

Job Ref: REQ17382

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

School/Department summary

The Department of Computer Science is part of the School of Science at Loughborough. The Department has attracted staff and students from all over the world, making it a diverse and stimulating environment in which to research and study. The department has strong research in various themes including networks, Internet/cloud computing, cybersecurity, vision, machine learning, theory of formal systems, algorithms and theoretical computer science organised around the Vision (VAHC), Networks (ISNS) and Theory (TAFS) research groups.

Further information about the Department can be found here: www.lboro.ac.uk/departments/compsci, and about the School here: <http://www.lboro.ac.uk/science/>.

Job Description

Job Grade: Specialist and Supporting Academic 6

Project Description

This is a one-year Research Associate (RA) position as part of a 15 month EPSRC funded research project. The project aims to initiate research into development of fault-tolerant routing for next generation large scale networks of devices with low memory. It plans to achieve this by developing mathematically rigorous novel *compact self-healing (COSHER) algorithms* leveraging the intense research done in previous years in compact routing and in self-healing distributed algorithms.

The main idea behind the project is the development of self-healing routing solutions over networks of nodes with low memory. This has implications for networks such as *the Internet of Things (IOT)*. Compact routing is an important area of research that seeks to reduce the resources (particularly, routing tables and header sizes) in network routing. Self-healing is a responsive distributed approach to failures such as node crashes and/or insertions where local responses are used to maintain global properties. This project seeks to combine both approaches to develop resilient compact routing. The research planned in this project falls within the domain of distributed algorithms, distributed computing and theoretical (mathematical) algorithm development using graphs (and graph theory) as a model for networks. The work builds on recent collaborations of the PI with researchers in Israel and Mexico and will seek to continue and build further collaborations. This is a challenging project and earlier postdoc experience and familiarity with the research challenges covered are highly desirable.

The project will also include an opportunity for the RA to attend the *Royal Society's Communication and Media skills residential course*. The RA will be based at Loughborough University and is expected to work closely with the Principal Investigator Dr. Amitabh Trehan.

Job Purpose

The purpose of the position is to develop and analyse COSHER algorithms, as planned in the EPSRC project. Beginning with understanding present work, the research associate is expected to work in the development of COSHER algorithms in two related stages. The first stage is to develop fully compact deletion-only COSHER algorithms for general graph topologies, the present COSHER algorithms having 'non-compact' components and limited to tree topology. In the second stage, the algorithms will be extended to make them fully dynamic incorporating node insertions along with deletions. The research associate will also be expected to collaborate, publish, and disseminate results related to this research in conferences and online platforms (such as a project website) and develop a small simulation illustrating the working of the algorithms.

Job Duties

- To work on all aspects of the above project as required by the research plan.
- To study relevant background literature
- To develop understanding of mathematical and research tools as needed.
- To use computing tools as required e.g. to develop a simple simulation.
- To communicate and interact effectively with the collaborators in the project.
- To discuss the results and progress at regular meetings.
- To produce 3-monthly written summary reports.
- To disseminate results both at conferences and in the scientific literature.
- To organise meetings and workshop as part of the project.
- To maintain the web and online presence of the project (via a project website and social media).
- To liaise with staff members and research students to ensure objectives and milestones within the project are met.
- To undertake tasks assigned by the Principal Investigator commensurate with the nature and grade of the position.
- To undertake trainings as required by the project.

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 Principal Investigator.

Person Specification

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	Experience of conducting research in the area of distributed algorithms	1, 3
	Developing and mathematically analysing algorithms using graph theory and other mathematical tools	1,3
	Proficiency in using computers for academic work	1,3
	Experience of publishing research outcomes	1, 3
Skills and abilities	Ability to publish in international conferences and journals	1, 3
	Oral communication skills sufficient to present material at international meetings	1, 3
	Ability to work as part of a team and to collaborate with others	1, 3
Training	Willingness to undertake further training as appropriate and to adopt new procedures as and when required	3
Qualifications	A PhD degree in Computer Science or a related subject	1, 3
Other	Evidence of a good working knowledge of equal opportunities and understanding of diversity in the workplace	1, 3

Desirable Criteria

Area	Criteria	Stage
Experience	Knowledge of compact routing and self-* algorithms	1, 3
	Programming expertise to create simple software simulations	1, 3
Skills and abilities	Ability to organise and coordinate small workshops and meetings	1,3
Qualifications	Earlier Postdoctoral research experience	1, 3

Conditions of Service

The position is Full-time and Fixed-term for 12 months. Salary will be on specialist and supporting academic 6, £29,301 - £31,076 per annum, 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. Amitabh Trehan by email at a.trehan@lboro.ac.uk or by telephone on +44 (0)1509 222564

Application

The closing date for receipt of applications is **1 June 2017**