School of Aeronautical and Automotive,
Chemical and Materials Engineering

Loughborough University

Research Associate in Autonomous Systems Autonomous Search for Chemical Release with a pocket-sized Drone [SceneSearch] – Part Time (20 hours per week) Fixed-term until 1 October 2018

Job Ref: REQ171003

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

Job Description

To support the Defence and Security Accelerator (DASA) funded project on Autonomous Search for Chemical Release with a pocket-sized Drone [SceneSearch], a Research Associate is required to carry out the planned research on Bayesian search algorithm design and the deployment of the algorithm on a small-size quadrotor. In particular, this includes developing a novel particle filter to estimate the source term of the hazardous release using a chemical sensor mounted on a quadrotor, designing required flight tests to verify the developed algorithm and writing scientific papers and project reports. Working knowledge of at least one of the following areas: Bayesian estimation, unmanned aerial vehicles and POMDP would be advantageous. The candidate is expected to possess a PhD or have research experience towards a PhD level.

This project is funded by DASA with two industrial partners, Swarm Systems Ltd and Createc. The successful candidate will be expected to work alongside the partners and also communicate with DASA and potential end-users.

The Research Associate will be based in the Autonomous Systems Laboratory at the Department of Aeronautical and Automotive Engineering.

Job Grade: Specialist and Supporting Academic Grade 6

Job Purpose:
To be responsible for conducting research into airborne Bayesian search algorithm for chemical release, delivering expertise in system integration and prototyping the developed algorithms with industrial partners.

Job Duties

Research
The work entails, primarily, the following activities under the direction and supervision of Dr Cunjia Liu and Professor Wen-Hua Chen:

- To conduct scientific and technological research independently into Bayesian search algorithm for chemical release in atmosphere.
- To develop a novel particle filter to estimate the source term of the hazardous release using a chemical sensor mounted on a quadrotor.
- To design required flight tests to verify the developed algorithm.
- To conduct experimental tests of the developed algorithm in real world environment.
- To plan, manage and conduct the work to agreed dead-lines.
- To set and monitor budgets with respect to expenditure on equipment, consumables and travel.

- To guide and train postgraduate research students associated with the project.
- To manage the research activity in every aspect of the project.
- To develop and implement new lines of research and the writing of research proposals.
- To liaise with research sponsors and make technical presentations.
- To maintain confidentiality where appropriate and to ensure that intellectual property (IP) agreements are met.
- To identify and report new opportunities for IP generation.
- To carry out literature reviews, to write up technical reports and technical papers for publication of the results obtained and the generation of research posters and other publicity media.
- Where necessary, to spend short periods of time travelling in the UK and overseas.
- Travel to equipment suppliers and other organisations on an ad-hoc basis.

Teaching

Teaching is not the primary purpose of this post and teaching load will be small relative to the typical load of a member of academic staff in the School, but the Research Associates may be expected to contribute to taught programmes and student projects, at any level, if appropriate and if requested to do so.

Other Related Activities and Functions

- To engage in training programmes in the University (e.g. through Professional Development) and elsewhere as required.
- 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.
- To undertake such 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 project PI.

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	Specific detailed experience of developing autonomous Bayesian search algorithms for chemical release	1,3
	Experience with the experimental procedure of testing algorithms for Bayesian estimation of chemical release	1,3
	Computer or programming skills on Matlab/Simulink and embedded hardware e.g. Arduino.	1,3
	The conducting of original research that can be, or has been published in high quality journals	1,3
	Experience of conducting flight tests of small quadrotors	1,3
	Experience of working in industry or collaboration with industry on research projects	1,3
	Experience of unmanned aerial vehicles	1,3
	Analysis of quantitative experimental data	1,3
Skills and abilities	Demonstration of excellent technical ability	1,3
	Knowledge of Bayesian estimation technology and autonomous decision marking techniques	
	Leadership and research management skills with a focused drive for results.	1,3
	Excellent inter-personal and communication skills - both written and oral	1,3
	Excellent team-working skills	1,3
	Excellent research paper or report writing skills	1,3
	Highly-motivated with the ability to set and meet deadlines appropriate to the progress of the project	1,3
Training	Willingness to undertake appropriate further training and to adopt new procedures as and when required	1,3
Qualifications	A good honours degree in aerospace engineering, or other relevant subjects.	1,3
	Relevant postgraduate research experience or industrial experience in Bayesian estimation.	1,3
Other	Commitment to observing the University's Equal Opportunities policy at all times	1
	Willingness to travel	1,3

Desirable Criteria

Area	Criteria	Stage
Experience	Experimental test of source term estimation algorithms	1,3
	Project planning / management / leadership experience	1,3
Skills and Abilities	Track record in originating and developing new ideas	1,3
	Relevant experience in collaborating with industrial partners	1
	Interest in autonomous systems	1
	Ability to develop a programme of original research, persuade others of its importance and thus secure funding from external sources	1
Other	Licensed for driving in the UK	1,3

Conditions of Service

The position is part-time (20 hours per week) and fixed term until 1 October 2018. Salary will be on Specialist and Supporting Academic Grade 6, £29,799 - £34,520 pro rata 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, 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 Cunjia Liu by email at C.Liu5@lboro.ac.uk.

Applications

The closing date for receipt of applications is **29 October 2017**.