University of Oxford Department of Computer Science

Job description and selection criteria

Job title	Research Assistant
Division	MPLS
Department	Computer Science
Location	Wolfson Building, Parks Road, Oxford.
Grade and salary	Grade 7: Salary £29,541 – £36,298 p.a.
Hours	Full Time
Contract type	Fixed term for up to 3 years

Introduction

The University

The University of Oxford is a complex and stimulating organisation, which enjoys an international reputation as a world-class centre of excellence in research and teaching. It employs over 10,000 staff and has a student population of over 21,000.

Most staff are directly appointed and managed by one of the University's 130 departments or other units within a highly devolved operational structure - this includes 5,900 'academic-related' staff (postgraduate research, computing, senior library, and administrative staff) and 2,820 'support' staff (including clerical, library, technical, and manual staff). There are also over 1,600 academic staff (professors, readers, lecturers), whose appointments are in the main overseen by a combination of broader divisional and local faculty board/departmental structures. Academics are generally all also employed by one of the 38 constituent colleges of the University as well as by the central University itself.

Our annual income in 2009/10 was £879.8m. Oxford is one of Europe's most innovative and entrepreneurial universities: income from external research contracts exceeds £367m p.a., and more than 60 spin-off companies have been created.

For more information please visit www.ox.ac.uk

MPLS Division

The Mathematical, Physical, and Life Sciences Division (MPLS) is one of the four academic divisions of the University.

Oxford is widely recognised as one of the world's leading science universities. In the 2008 UK Research Assessment Exercise over 70% of research activity in MPLS was judged to be world-leading (4*) or internationally excellent (3*), and Oxford was ranked first in the UK across the mathematical sciences as a whole.

The MPLS division's ten departments and three interdisciplinary units span the full spectrum of the mathematical, computational, physical, engineering and life sciences, and undertake both fundamental research and cutting-edge applied work. We have over 6,000 students and research staff, and generate over half of our funding from external research grants. Our research addresses major societal and technological challenges and is increasingly interdisciplinary in nature. We collaborate closely with colleagues in Oxford across the medical sciences, social sciences and humanities, as well as with researchers from around the world.

For more information, please visit:

http://www.mpls.ox.ac.uk/

Department of Computer Science

The Department of Computer Science (DoCS) was established in 1957. It is one of the UK's leading Computer Science Departments (ranked first in a number of newspaper rankings, and third in terms of research power). In the RAE in 2008, 80% of the submitted research was found to be in the top two tiers, either 4* (world-leading) or 3* (internationally excellent). Many members of the Department are active in externally sponsored research, with both government and industrial funding. At present there are 52 members of academic staff and over 80 research staff.

DoCS has close links with government, industry, and other departments within the University. Among the latter are Mathematics, Engineering, Physics, Statistics and a number of life sciences departments. It has a major role in the rapidly-developing field of e-Science alongside the Oxford e-Research Centre, an independent unit with which we share a building. This is an essentially inter-disciplinary activity which is at present attracting major funding from a number of sources. At present DoCS holds £37m in external research contracts.

Research in DoCS is currently managed in seven themes. *Software Engineering* (led by Professor Jim Davies), works on a wide variety of areas including e-Science and model-driven development; *Programming Languages* (led by Professor Jeremy Gibbons and including Dr Ralf Hinze and Professor Oege de Moor); Security (leader Professor Bill Roscoe, with Professor Sadie Creese leading a new Cyber Security Centre, and Professor Gavin Lowe); *Verification* (leader Professor Marta Kwiatkowska) covering probabilistic and software model checking (Professor Daniel Kroening) with time and concurrency (Professor Joel Ouaknine, Professor James Worrell, and Professors Roscoe and Lowe), and automated verification of hardware (Professor Tom Melham); *Computational Biology* (led by Professor David Gavaghan and including Professors Kevin Burrage and Helen Byrne) is one of the

world's leading groups building computational models of biological systems and is particularly well known for its work on the heart; and *Foundations, Logic and Structures*, (leader, Professor Samson Abramsky) which includes groups working on quantum information and computation (Abramsky and Professor Bob Coecke), game semantics and verification (Professor Luke Ong) and constraints (Professor Peter Jeavons); *Information Systems* (jointly led by Professors Georg Gottlob and Ian Horrocks and including Professor Stephen Pulman, who works on Computational Linguistics, and Professor Michael Benedikt). In addition the department has recently recruited Professors Mike Wooldridge (Agent Based Systems) and Elias Koutsoupias (Algorithms). A realignment of the themes is expected shortly.

For more information please visit: http://www.cs.ox.ac.uk/

Job description

Autonomous and Intelligent Sensing Systems	Autonomous and Intelligent Sensing Systems
Principal Investigator / supervisor	Dr Niki Trigoni
Project Team	**Team:** Niki Trigoni @ Sensor Networks Group (Computer Science Dept.) Paul Newman and Ingmar Posner @ Mobile Robotics Group (Engineering Science Dept.) **Project title:** Intelligent Workspace Acquisition, Comprehension and Exploitation for Mobile Autonomy in Infrastructure Denied Environments
Funding partner	EPSRC

Overview of the role

A Grade 7 postdoctoral research assistant post is available to work in the area of autonomous and intelligent sensing systems under the direction of Dr Niki Trigoni in the Department of Computer Science, University of Oxford. The post is in association with the EPSRC Grant "Intelligent Workspace Acquisition, Comprehension and Exploitation for Mobile Autonomy in Infrastructure Denied Environments", and is in collaboration with Prof. Paul Newman and Dr Ingmar Posner at the Oxford Department of Engineering Science.

The Oxford Sensor Networks team, where the successful candidate will be based, is led by Dr Niki Trigoni and Dr Andrew Markham, and currently has five PhD students, in addition to two postdoctoral researchers expected to start in autumn 2013. The high level goal of this project is to extend the reach, applicability and reliability of mobile autonomy. At the heart of successful autonomy in the real world lies a capacity to interpret and navigate unstructured, unmodified workspaces, alone or in concert with other agents, often using only restricted communications. In this project, ground vehicles will be used to significantly speed up the process of creating workspace representations by sharing the sensor data that they acquire, instead of relying only on their onboard sensors. In infrastructure-deprived environments, the lack of a fixed communication infrastructure poses a significant challenge in disseminating workspace data. The question that arises is how ground vehicles should plan their trajectories to form a wireless ad hoc network that allows for data transfer within application-specific delay bounds. The key challenge here is that ground vehicles are not only tasked to bridge comms, but also to sense the environment. The goals of sensing and connectivity

may often come in conflict. The joint optimization of the two tasks of sensing and bridging connectivity is key to efficiently building representations of the environment. The proposed optimization algorithms will be tested using real ground vehicle platforms.

Applicants must have (or shortly be expecting to obtain) a PhD in Computer Science, Electrical Engineering, or a closely related field. Candidates who can demonstrate strong background in relevant aspects of decision making and planning under uncertainty in robotic networks, or robust control algorithms for connectivity maintenance are encouraged to apply. The application should include a supporting statement, which summarises how they would contribute to the project. Priority will be given to candidates who can strengthen and/or broaden existing activities of the Sensor Networks Group.

The successful candidates will be expected to work with Dr Niki Trigoni and the Sensor Networks team to contribute to achieving the goals of the project. More information about the team can be found at:

http://www.cs.ox.ac.uk/activities/sensors/index.html

The main duties are described below. The exact scope of the research will depend on the skills of the candidate appointed who will be expected to fulfil the selection criteria defined below.

Responsibilities/duties

The roles will require the postholder to undertake innovative research as defined by the project proposal and to work with colleagues to progress the objectives of the project.

The duties and responsibilities are as follows:

- To provide leadership in the relevant research aspects of the project, developing research questions, generating original ideas and conducting individual research.
- To initiate publication of research results in top ranking journals and present research results at leading conferences.
- To contribute to embedded software development and deployment of sensor/robotic systems.
- To collaborate with members of the project team, which is based in both CS and Engineering Science departments at Oxford.
- To collaborate with members of the Oxford Sensor Networks group (in the CS department) and support the research of junior researchers by providing technical assistance and advice on methodology, as required.
- To assist with project reports and contribute to new research funding applications, as necessary.
- To contribute to software demos, and other activities described in the project proposal.
- The postholder will carry out any other duties as are within the scope, spirit and purpose of the job as requested by their line manager or the Principal Investigators.
- Assistance in the supervision of post-graduate students working on related projects.
- The postholder will have the opportunity to teach. This may include lecturing, small-group teaching, and tutoring of undergraduates and graduate students.

Selection Criteria

Essential:

Applicants should have

- a doctoral degree in electrical engineering, computer science, or related discipline;
- excellent knowledge of some of the following topics in the area of autonomous intelligent systems:
    - decision making and planning under uncertainty in robotic networks
    - robust control algorithms for mobile robot network connectivity
    - balancing connectivity and sensing coverage in robotic networks
- strong programming skills and experience in real sensor/robotic system development
- willingness to develop software for real ground vehicle platforms and perform tests with multiple vehicles
- strong track record of relevant publications;
- excellent scientific writing ability;
- excellent communication skills in English;
- ability and willingness to participate in the development of prototype systems and in deploying/testing autonomous systems;
- ability and willingness to mentor or supervise doctoral students.

Desirable:

- familiarity with radio propagation models
- experience of embedded software development
- strong background in communication protocols for ad hoc networks (esp. at the routing layer)
- experience in autonomous ground vehicle platforms

Working at the University of Oxford

For further information about working at Oxford, please see:

http://www.ox.ac.uk/about_the_university/jobs/research/

Salary and Benefits

The post, which is a full time appointment, is funded by EPSRC is available for up to 3 years, has a salary on the University grade 07S scale (currently £29,541 - £36,298 p.a.). This includes membership of the University Superannuation Scheme (USS) and has an annual leave entitlement of 38 days per year (inclusive of all public holidays and university closed periods).

How to apply

If you consider that you meet the selection criteria, click on the **Apply Now** button on the 'Job Details' page and follow the on-screen instructions to register as a user. You will then be required to complete a number of screens with your application details, relating to your skills and experience. When prompted, please provide details of two referees and indicate whether we can contact them at this stage. You will also be required to upload a CV and supporting statement. The supporting statement should describe what you have been doing over at least the last 10 years. This may have been employment, education, or you may

have taken time away from these activities in order to raise a family, care for a dependant, or travel for example. Your application will be judged solely on the basis of how you demonstrate that that you meet the selection criteria outlined above and we are happy to consider evidence of transferable skills or experience which you may have gained outside the context of paid employment or education.

Please save all uploaded documents to show your name and the document type.

All applications must be received by **midday** on 3rd July 2013

Candidates must also ask their referees to consider this job description and email their reference directly to **job07@cs.ox.ac.uk** or, alternatively, post or fax it to: The Administrator, Department of Computer Science, Wolfson Building, Parks Road, Oxford OX1 3QD, such that the reference arrives by, or shortly after, the advertised closing date. You will also be asked to provide reference details as part of the online application process and will be asked to indicate whether you are happy for us to contact your referees directly should they not provide a reference by the stated closing date.

Should you experience any difficulties using the online application system, please email recruitment.support@admin.ox.ac.uk

To return to the online application at any stage, please click on the following link www.recruit.ox.ac.uk

Please note that you will be notified of the progress of your application by automatic e-mails from our e-recruitment system. **Please check your spam/junk mail** regularly to ensure that you receive all e-mails.