Job description and selection criteria

Job title	Research Assistant on Mobile Robotics
Division	MPLS
Department	Computer Science
Location	Wolfson Building, Parks Road, Oxford.
Grade and salary	Grade 7: Salary £30,434 – £37,394 p.a.
Hours	Full Time
Contract type	Fixed term for up to 2.5 years from 1 March 2015
Reporting to	Prof. Niki Trigoni
Vacancy reference	117255

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 22,000.

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 over 6,500 'academic-related' staff (postgraduate research, computing, senior library, and administrative staff) and over 2,700 '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 2012/13 was £1,086.9m. Oxford is one of Europe's most innovative and entrepreneurial universities: income from external research contracts exceeds £436.8m p.a., and more than 80 spin-off companies have been created.

For more information please visit www.ox.ac.uk/staff/about_the_university.html

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 was established in 1957, making it one of the longest-established Computer Science departments in the country. It is one of the UK's leading Computer Science Departments (ranked first in a number of international rankings). The Research Excellence Framework (REF) in December 2014 resulted in 74 members of the Department having 53% of their research activity ranked in the top category of 4* (world-leading). Overall, we received an average of 3.34 across the department (3* being internationally excellent). A significant majority of the Department are active in externally sponsored research, with both government and industrial funding. At present there are 69 members of academic staff and almost 100 research staff.

The Department 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. The Department is housed across multiple sites within the University's South Parks Road Science area, facilitating strong collaborative links with research groups and institutes in closely allied areas (including the Oxford Internet Institute and the Oxford e-Research Centre). This is an essentially inter-disciplinary activity which is at present attracting major funding from a number of sources. At present the Department holds over £50m in external research contracts.

Research in the Department is currently managed in seven themes:

- *Programming Languages and Software Engineering* (led by Professor Jeremy Gibbons, and including Professor Jim Davies) works on a wide variety of areas including model-driven development, functional programming, and static analysis;
- *Security* (led by Professor Bill Roscoe) specialises in cybersecurity (Professor Sadie Creese leads a new Cybersecurity Centre), protocol analysis, trusted computing, networking, and human-centred computing;

- *Automated Verification* (led by Professor Marta Kwiatkowska) covers probabilistic and software model checking (Professor Daniel Kroening), time and concurrency (Professor Joel Ouaknine, Professor James Worrell, and Professors Roscoe and Lowe), and hardware (Professor Tom Melham);
- *Computational Biology* (led by Professor David Gavaghan, and including Professors Kevin Burrage, Helen Byrne, and Blanca Rodriguez) 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;
- *Foundations, Logic and Structures*, (leader Professor Samson Abramsky) which includes groups working on quantum information and computation (Professors Samson Abramsky and Bob Coecke), game semantics and verification (Professor Luke Ong), and constraints (Professor Peter Jeavons);
- *Information Systems* (led by Professor Ian Horrocks, and including Professors Michael Benedikt, Nando de Freitas, Boris Motik, Georg Gottlob, and Michael Wooldridge) has groups working on databases, knowledge representation and reasoning, multi-agent systems, and computational linguistics (Professor Stephen Pulman);
- *Algorithms* (led by Professor Leslie Ann Goldberg, and including Professors Paul Goldberg and Elias Koutsoupias) covering computational complexity, algorithmic game theory, and constraint satisfaction.

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

Summary of the University's Equal Opportunities Policy

The policy and practice of the University of Oxford require that all staff are afforded equal opportunities within employment. Entry into employment with the University and progression within employment will be determined only by personal merit and the application of criteria which are related to the duties of each particular post and the relevant salary structure. In all cases, ability to perform the job will be the primary consideration. Subject to statutory provisions, no applicant or member of staff will be treated less favourably than another because of age, disability, gender reassignment, marriage or civil partnership, pregnancy or maternity, race, religion or belief, sex, or sexual orientation.

Job description

Research topic	Mobile Robotics: Enabling a Pervasive Technology of the Future
Principal Investigator / supervisor	Professor Niki Trigoni
Funding partner	EPSRC

Overview of the role

A Grade 7 postdoctoral research assistant post is available to work on the Programme Grant project "Mobile Robotics: Enabling a Pervasive Technology of the Future", in the area of robotic and human positioning and navigation systems in GPS-denied environments. The post will be under the supervision of Prof. Niki Trigoni, head of the Sensor Networks Group, in collaboration with Profs. Paul Newman and Ingmar Posner (Oxford Engineering Science Dept.) and Prof. Marta Kwiatkowska (Oxford Dept. of Computer Science).

The key objective of the Programme Grant project on Mobile Robotics is to endow machines with the fundamental capability of working synergistically with people in large, complex and time-changing environments, and for long periods of time. This programme grant has a vast industrial footprint, and impinges on, at a minimum, personal transport, security and defence, inspection, warehouse and factory automation, space exploration, built infrastructure monitoring, construction, logistics and agriculture. This cross-disciplinary project combines aspects of sensing, mapping, localisation, perception for action, learning from interaction and cooperation and verification.

The focus of the advertised post is on developing novel approaches for long-term localisation and navigation of robots and people in GPS denied environments, such as warehouses. Areas of interest include: 1) fusion of visual and non-visual (radio / magnetic) opportunistic signals for robot and human localisation; 2) using robot navigation experiences to assist in human localisation and navigation, and vice versa; 3) cross-modality training in the context of localisation and navigation.

More information about the sensor networks group can be found here:
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 role 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.

- Provide leadership in relevant research aspects of the project (developing research questions, generating original ideas, and small-scale project
- Initiate publication of research results in top-ranking journals and present research results at leading conferences
- Contribute to software development for human-held and robot-embedded mobile devices
- Assist in the supervision of post-graduate students working on related projects
- Adapt existing and develop new scientific techniques and experimental protocols
- Test hypotheses and analyse scientific data from a variety of sources, reviewing and refining working hypotheses as appropriate
- Contribute ideas for new research projects

- Develop ideas for generating research income, presenting detailed research proposals to senior researchers
- Collaborate in the preparation of scientific reports and journal articles and occasionally present papers and posters
- Use specialist scientific equipment in a laboratory environment
- Act as a source of information and advice to other members of the group on scientific procedures and experimental techniques
- Represent the research group at external meetings/seminars, either with members of the group or alone
- Help with the organisation of seminars and workshops
- The researcher will have the opportunity to teach. This may include lecturing, small-group teaching, and tutoring of undergraduates and graduate students
- The researcher 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

Selection Criteria

Essential:

- A doctoral degree (or very close to completion) in Electrical Engineering, Computer Science, or a related discipline
- Specialist knowledge of and demonstrable experience in one or more positioning and navigation algorithms for humans / robots, such as pedestrian dead reckoning, radio-based localization, visual odometry for human/robotic navigation, and so on
- Background in Bayesian State Estimation techniques (Particle/Kalman/HMM filters and simultaneous localization and mapping)
- Proven track record of relevant publications
- Ability to manage own academic research and associated activities
- Ability to contribute ideas for new research projects and research income generation
- Excellent communication skills, including the ability to write for publication, present research proposals and results, and represent the research group at meetings.

Desirable:
- Experience in programming embedded systems
- Expertise in digital signal processing and communication
- Knowledge of sensor network approaches and algorithms
- Experience of independently managing a discrete area of a research project
- Experience of actively collaborating in the development of research articles for publication

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 funded by EPSRC, is available from 1 March 2015 for up to 2.5 years and has a salary on the University grade 07S scale (currently £30,434 - £37,394 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 three 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 the closing date stated in the online advertisement.

Interviews are planned for 25-26th March 2015.

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.