University of Oxford Department of Computer Science

Job description and selection criteria

Job title	Research Assistant (Two Posts)
Division	MPLS
Department	Computer Science
Location	Wolfson Building, Parks Road, Oxford.
Grade and salary	Grade 7: £29,249 -£35,938 p.a
Hours	Full Time
Contract type	Two fixed term contracts up to 33 months
Reporting to	Professors Abramsky and Coecke

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 academic administration of the University is conducted through four divisions (Humanities, Social Sciences, Mathematical, Physical and Life Sciences, and Medical Sciences). The Mathematical, Physical and Life Sciences Division consists of ten constituent departments: the Department of Chemistry, Department of Computer Science, the Department of Earth Sciences, the Department of Engineering Science, the Department of Materials, Mathematical Institute, the Department of Physics, Department of Plant Sciences, Department of Zoology and Statistics. The division provides a framework for interdisciplinary teaching and research. There are also links with the Medical Sciences Division.

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

Department of Computer Science

The Department of Computer Science, University of Oxford has one of the longest-established Computer Science departments in the country. Formerly known as the Oxford University Computing Laboratory, it is home to a community of world-class research and teaching. Research activities encompass core Computer Science, as well as computational biology, quantum computing, computational linguistics, information systems, software verification and software engineering. The department is home to undergraduates, full-time and part-time Master's students, and has a strong doctoral programme.

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

Job description

Research topic	Categorical unification: where foundational physic, natural language and rational processes meet
Principal Investigator / supervisor	Professors Abramsky and Coecke
Funding partner	JTF

The Department of Computer Science of University of Oxford seeks two postdoctoral researchers for 33 of a JTF project:

`Categorical unification: where foundational physics, natural language and rational processes meet'

The researchers will work with Professors Abramsky and Coecke.

Executive summary:

Recent advances show that category theory can be used to capture the essential behavioural properties of many complex systems, and provides the right language to study their foundational concepts across a broad range of disciplines, including the physical world, logical and deductive systems, the way that meaning is encoded into a sentence, and closely related, cognition.

Essential mathematical components of this work include monoidal categories, sheaf theory and coalgebra.

The mathematical study of these is currently separate, but the common mathematical formalism underlying them suggests that they should be studied together, as a part of a whole. The ultimate aim is to develop a fully-integrated mathematical formalism for modelling the physical world, making deductions about it, and communicating those deductions linguistically - in short, a mathematical formalism for intelligent reasoning.

These developments would go hand-in-hand with ongoing projects which aim to automate reasoning about linguistic meaning and quantum processes, by exploiting the logical content carried by the graphical languages which describe these areas.

This project addresses both of the Big Questions of this call, by proposing a new paradigms for knowledge representation, language and reasoning, as well as for the artificial implementation of these. The models of meaning moreover model the cognitive mind in a similar manner as we model abstract mathematical reasoning.

Main Duties and Responsibilities

The main duties of the successful candidate will include

- Perform original interdisciplinary research at the interface of high level categorical constructions and applications to physics and other sciences;
- Help organizing seminars and workshops;
- Present results at international conferences and grant review meetings;
- Write publications at the standard of the internationally leading venues;
- Develop and implement new research methodologies and software tools;
- Develop research questions within a specific context, conduct individual research;
- Share responsibility for shaping the research group's plans and the writing of group-funding applications for new research projects.

Selection Criteria

Essential

- A doctoral degree (or close to finishing one) in computer science, physics or mathematics, or a closely related discipline
- Good verbal and written communication skills in English
- Experience of working with high level mathematics of category theory, in particular monoidal categories, coalgebras and sheaf theory.
- A proven background in quantum foundations and quantum information.
- Publications in leading journals and/or conferences (LiCS, ICALP, PRL, NJP etc.)
- Knowledge of categorical quantum mechanics.

Desirable:

- Experience in coding and developing software tools;
- A track record advising the research of Masters students;
- A track record of performing autonomous research;
- A track record of writing successful applications for research funding;
- Documented experience of independent lecturing.

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

These two posts are full time appointments and are available initially for 33 months (with the possibility of extension). The post has a salary on the University grade 07 scale, currently £29,249 - £35,938 p.a. This will include 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 the closing date stated in the online advertisement.

Candidates must also ask their referees to consider this job description and email their reference directly to **job29@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.