



University of Oxford Department of Computer Science

## Job description and selection criteria

<b>Job title</b>	Research Associate on UKRI AI Hub Project
<b>Division</b>	Mathematical, Physical and Life Sciences (MPLS)
<b>Department</b>	Computer Science
<b>Location</b>	Wolfson Building, Parks Road, Oxford.
<b>Grade and salary</b>	Grade 7: Salary £36,024 – £42,978 p.a.
<b>Hours</b>	Full Time (part time can be considered)
<b>Contract type</b>	Fixed term contract for 3 years
<b>Reporting to</b>	Prof Michael Bronstein and Prof Alessandro Abate
<b>Vacancy Reference</b>	173346
<b>Additional information</b>	Whilst the two roles are Grade 7 positions, we would be willing to consider candidates with potential but less experience who are seeking a development opportunity, for which an initial appointment would be at Grade 6 (Grade 6: £32,332 - £38,205 p.a.) with the responsibilities adjusted accordingly. This would be discussed with applicants at interview/appointment where appropriate.

<b>Research topic</b>	Mathematical and Computational Foundations of AI - Understanding Decision Making (Theme D)
<b>Principal Investigator / supervisor</b>	Prof Michael Bronstein and Prof Alessandro Abate
<b>Project team</b>	Abate/De Giacomo/Kwiatkowska/Parker/and Associates
<b>Funding partner</b>	The funds supporting this research project are provided by UKRI



## Overview of the role

We are seeking a highly motivated Postdoctoral Research Associate to work within the framework of the recently-launched EPSRC-funded national AI Hub to establish the Mathematical and Computational Foundations of AI.

The post holder will be key member of the UKRI AI Hub project, and particularly of its Theme D (Understanding Decision Making), which includes senior academics within the core team (Abate, De Giacomo, Kwiatkowska, and Parker), in the department of Computer Science and in the Mathematical institute at Oxford, as well as associate members at other institutions (hubs of the project) across the UK. The successful candidate is expected to play a central role in shaping the research on the Mathematical and Computational Foundations of AI, and research will in particular concentrate on Theme D, which focuses on “Understanding Decision Making”.

We are interested in investigating novel architectures for models aimed at sequential decision making, particularly in a data-driven, adaptive learning context, with fine-grained attention on reactive and deliberative sequential decision making and distinguishing between aleatoric and epistemic forms of uncertainty.

We are interested in several technical competencies falling under Theme D and beyond, and in particular on work coupling data-driven and model-driven approaches, including (but are not limited to): advanced Bayesian techniques to calibrate and update models in an adaptive setup, where decisions ought to balance active learning with exploitative goals; data-driven model learning for strategic reasoning and planning; formal methods techniques for reactive synthesis in presence of unreliable input/output signals.

The post holder will be a member of research groups within the project, with responsibility for carrying out research, to provide guidance to junior members of the research groups including research assistants, PhD students, and students on projects. The post holder will also have an opportunity to engage in teaching.

## Responsibilities/duties

- Manage own research and administrative activities, within guidelines provided by senior colleagues
- Contribute to the formulation of theories, models and algorithms
- Develop software, also building on existing ones
- Contribute to wider project planning, including ideas for new research projects
- Determine the most appropriate methodologies to test hypotheses, and identify suitable alternatives if technical problems arise
- Gather, analyse, and present scientific data from a variety of sources and related models/theories
- Collaborate in the preparation of scientific reports and journal/conference articles and present papers and posters at conferences
- Act as a source of information and advice to other members of research groups on scientific and technical issues
- Represent the research groups at external meetings/seminars, either with other members of the group or alone
- Contribute to discussions and share research findings with colleagues in partner institutions, and research groups

- Teach or undertake ad-hoc paid teaching (this includes lecturing, demonstrating, small group teaching, tutoring of undergraduates and graduate students and supervision of Masters project)
- 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

## **Selection criteria**

### **Essential**

- Hold a relevant PhD/DPhil (or be close to completion\*) in computer science, mathematics or related disciplines, together with relevant research experience
- Ability to manage own academic research and associated activities
- Possess sufficient specialist knowledge across relevant areas of the project
- Ability to manage own academic research and associated activities
- Previous experience of contributing to publications/presentations
- 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**

- Proven experience of software development
- Experience of independently managing a research project
- Experience of actively collaborating in the development of research articles for publication

\*Evidence required:

EITHER a copy of your PhD/ DPhil award certificate;

OR an academic reference confirming the qualification has been awarded;

OR an academic reference confirming that you have submitted your thesis, if you have not yet completed

## **Pre-employment screening**

### **Standard checks**

If you are offered the post, the offer will be subject to standard pre-employment checks. You will be asked to provide: proof of your right-to-work in the UK; proof of your identity; and (if we haven't done so already) we will contact the referees you have nominated. You will also be asked to complete a health declaration so that you can tell us about any health conditions or disabilities for which you may need us to make appropriate adjustments.

Please read the candidate notes on the University's pre-employment screening procedures at:

<https://www.jobs.ox.ac.uk/pre-employment-checks>

## **The EPSRC Hub in Mathematical Foundations of AI**

Led by Professor Michael Bronstein (DeepMind Chair in Artificial Intelligence, Department of Computer Science), the Hub will focus on the mathematics and computational research which is foundational to AI, and which could unlock new, more efficient AI systems. In particular, the hub will seek new AI breakthroughs by employing theoretical tools from currently underexplored mathematical fields.

The research programme will bring together almost 40 researchers at Oxford, Southampton, Durham, Imperial, QMUL and Aberdeen from across Computer Science, Mathematics and Statistics. They will focus on developing rigorous mathematical answers to four fundamental questions that underlie modern AI and machine learning systems.

## **About the University of Oxford**

Welcome to the University of Oxford. We aim to lead the world in research and education for the benefit of society both in the UK and globally. Oxford's researchers engage with academic, commercial and cultural partners across the world to stimulate high-quality research and enable innovation through a broad range of social, policy and economic impacts.

We believe our strengths lie both in empowering individuals and teams to address fundamental questions of global significance, while providing all our staff with a welcoming and inclusive workplace that enables everyone to develop and do their best work. Recognising that diversity is our strength, vital for innovation and creativity, we aspire to build a truly diverse community which values and respects every individual's unique contribution.

While we have long traditions of scholarship, we are also forward-looking, creative and cutting-edge. Oxford is one of Europe's most entrepreneurial universities and we rank first in the UK for university spin-outs, and in recent years we have spun out 15-20 new companies every year. We are also recognised as leaders in support for social enterprise.

Join us and you will find a unique, democratic and international community, a great range of staff benefits and access to a vibrant array of cultural activities in the beautiful city of Oxford.

For more information, please visit [www.ox.ac.uk/about/organisation](http://www.ox.ac.uk/about/organisation).

## **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). Our Computer Science and Informatics submission to the UK Research Excellence Framework (REF) in December 2021 resulted in 81% of research activity ranked as 4\* (world-leading) and the rest ranked as 3\* (internationally excellent). A significant majority of the Department are active in externally sponsored research, with both government and industrial funding. At present, there are 74 members of academic staff and 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 life sciences. 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). At present, the Department holds over £75m in external funding of which £58m is research.

Research in the Department is currently managed in ten themes:

- *Algorithms & Complexity Theory*, led by Professor Leslie Ann Goldberg, focusses on determining the inherent difficulty of computational problems, classifying problems according to this inherent difficulty, and designing and analysing algorithms that use computational resources as efficiently as possible;
- *Artificial Intelligence & Machine Learning*, led by Professor Michael Wooldridge, focuses on theoretical foundations of AI, multiagent systems, deep learning, reinforcement learning, and computational linguistics;
- *Automated Verification*, led by Professor Marta Kwiatkowska, investigates theory and practice of formal verification and correct-by-construction synthesis for software and hardware systems;
- *Computational Biology & Health Informatics*, led by Professor Blanca Rodriguez, is concerned with computational approaches for biomedical research and healthcare innovation;
- *Human-Centred Computing*, led by Professor Nigel Shadbolt, includes human-computer interaction, social computing, and the worldwide web;
- *Data, Knowledge and Action*, led by Professor Ian Horrocks, includes databases, knowledge representation and reasoning;
- *Programming Languages*, led by Professor Sam Staton, includes functional programming, program analysis, and programming language foundations;
- *Quantum*, led by Professor Jonathan Barrett, focusses on quantum computing including quantum software, causality in quantum theory, quantum cryptography and foundations of quantum computing;
- *Security*, led by Professor Ivan Martinovic, specialises in cybersecurity, protocol analysis, systems security, trusted computing, and networking.
- *Systems*, led by Professor Niki Trigoni, focusses especially on cyber physical systems. We plan to substantially broaden our research in systems to complement our existing research areas.

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

The Department of Computer Science holds a bronze Athena Swan award to recognise advancement of gender equality: representation, progression and success for all.

### **The Mathematical, Physical, and Life Sciences Division (MPLS)**

The Mathematical, Physical, and Life Sciences (MPLS) Division is one of the four academic divisions of the University. Oxford is widely recognised as one of the world's leading science universities and the MPLS Division is home to our non-medical sciences, with 9 academic departments that span the full spectrum of the mathematical, computational, physical, engineering and life sciences, and undertake both fundamental research and cutting-edge applied work. Our research tackles major societal and technological challenges – whether developing new energy solutions or improved cancer treatments, understanding climate change processes, or helping to preserve biodiversity, and is increasingly focused on key interdisciplinary issues. We collaborate closely with colleagues in Oxford across the medical sciences, social sciences and humanities, and with other universities, research organisations and industrial partners across the globe in pursuit of innovative research geared to address critical and fundamental scientific questions.

MPLS is proud to be the home of some of the most creative and innovative scientific thinkers and leaders working in academe. Our senior researchers have been awarded some of the most significant scientific honours and we have a strong tradition of attracting and nurturing the very best early career researchers who regularly secure prestigious fellowships and faculty positions. MPLS continues in its work to support diversity in its staffing, seeing that it will bring benefits to all, and we are pleased to note that all academic departments in the Division hold Athena Swan Awards.

We have around 7,000 full and part-time students (including approximately 3,500 graduate students) and play a major role in training the next generation of leading scientists. Oxford's international reputation for excellence in teaching is reflected in its position at the top of the major league tables and subject assessments. MPLS academics educate students of high academic merit and potential from all over the world. Through a mixture of lectures, practical work and the distinctive college tutorial system, students develop their ability to solve diverse mathematical, scientific and engineering problems.

MPLS is dedicated to bringing the wonder and potential of science to the attention of audiences far beyond the world of academia. We have a strong commitment to supporting public engagement in science through initiatives including the Oxford Sparks portal ([www.oxfordsparks.ox.ac.uk](http://www.oxfordsparks.ox.ac.uk)) and a large variety of outreach activities; these are crucial activities given so many societal and technological issues demand an understanding of the science that underpins them. We also bring the potential of our scientific efforts forward for practical and beneficial application to the real world and our desire, aided by the work of Oxford University Innovation and Oxford Sciences Innovation, is to link our best scientific minds with industry and public policy makers.

For more information about the MPLS division, please visit: [www.mpls.ox.ac.uk](http://www.mpls.ox.ac.uk)

### **How to apply**

Applications are made through our online recruitment portal. Information about how to apply is available on our Jobs website <https://www.jobs.ox.ac.uk/how-to-apply>.

Your application will be judged solely on the basis of how you demonstrate that you meet the selection criteria stated in the job description.

As part of your application you will be asked to provide details of two referees and indicate whether we can contact them now.

You will be asked to upload a CV and a supporting statement. The supporting statement must explain how you meet each of the selection criteria for the post using examples of your skills and experience. This may include experience gained in employment, education, or during career breaks (such as time out to care for dependants)

Please upload all documents **as PDF files** with your name and the document type in the filename.

All applications must be received by **midday** UK time on the closing date stated in the online advertisement.

### **Information for priority candidates**

A priority candidate is a University employee who is seeking redeployment because they have been advised that they are at risk of redundancy, or on grounds of ill-health/disability. Priority candidates are issued with a redeployment letter by their employing department(s).

If you are a priority candidate, please ensure that you attach your redeployment letter to your application (or email it to the contact address on the advert if the application form used for the vacancy does not allow attachments).

### **If you need help**

Application FAQs, including technical troubleshooting advice is available at: <https://staff.web.ox.ac.uk/recruitment-support-faqs>

Non-technical questions about this job should be addressed to the recruiting department directly ([hr@cs.ox.ac.uk](mailto:hr@cs.ox.ac.uk))

To return to the online application at any stage, please go to: [www.recruit.ox.ac.uk](http://www.recruit.ox.ac.uk).

Please note that you will receive an automated email from our online recruitment portal to confirm receipt of your application. **Please check your spam/junk mail** if you do not receive this email.

### **Important information for candidates**

#### **Data Privacy**

Please note that any personal data submitted to the University as part of the job application process will be processed in accordance with the GDPR and related UK data protection legislation. For further information, please see the University's Privacy Notice for Job Applicants at: <https://compliance.admin.ox.ac.uk/job-applicant-privacy-policy>. The University's Policy on Data Protection is available at: <https://compliance.admin.ox.ac.uk/data-protection-policy>.

#### **The University's policy on retirement**

The University operates an Employer Justified Retirement Age (EJRA) for very senior research posts at **grade RSIV/D35 and clinical equivalents E62 and E82** of 30 September before the 70<sup>th</sup> birthday. The justification for this is explained at: <https://hr.admin.ox.ac.uk/the-ejra>. For **existing** employees on these grades, any employment beyond the retirement age is subject to approval through the procedures: <https://hr.admin.ox.ac.uk/the-ejra>.

There is no normal or fixed age at which staff in posts at other grades have to retire. Staff at these grades may elect to retire in accordance with the rules of the applicable pension scheme, as may be amended from time to time.

#### **Equality of opportunity**

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. No applicant or member of staff shall be discriminated against because of age, disability, gender reassignment, marriage or civil partnership, pregnancy or maternity, race, religion or belief, sex, or sexual orientation.

### **Benefits of working at the University**

#### **Employee benefits**

University employees enjoy 38 days' paid holiday, generous pension schemes, flexible working options, travel discounts including salary sacrifice schemes for bicycles and electric cars and other discounts. Staff can access a huge range of personal and professional development opportunities. See <https://hr.admin.ox.ac.uk/staff-benefits>

#### **Employee Assistance Programme**

As part of our wellbeing offering staff get free access to Health Assured, a confidential employee assistance programme, available 24/7 for 365 days a year. Find out more <https://staff.admin.ox.ac.uk/health-assured-eap>

#### **University Club and sports facilities**

Membership of the University Club is free for University staff. It offers social, sporting, and hospitality facilities. Staff can also use the University Sports Centre on Iffley Road at discounted

rates, including a fitness centre, powerlifting room, and swimming pool. See [www.club.ox.ac.uk](http://www.club.ox.ac.uk) and <https://www.sport.ox.ac.uk/>.

### Information for staff new to Oxford

If you are relocating to Oxfordshire from overseas or elsewhere in the UK, the University's Welcome Service includes practical information about settling in the area, including advice on relocation, accommodation, and local schools. See <https://welcome.ox.ac.uk/>

There is also a visa loan scheme to cover the costs of UK visa applications for staff and their dependants. See <https://staffimmigration.admin.ox.ac.uk/visa-loan-scheme>

### Family-friendly benefits

We are a family-friendly employer with one of the most generous family leave schemes in the Higher Education sector. Our Childcare Services team provides guidance and support on childcare provision, and offers a range of high quality childcare options at affordable prices for staff. In addition to 5 University nurseries, we partner with a number of local providers to offer in excess of 450 full time nursery places to our staff. Eligible parents are able to pay for childcare through salary sacrifice, further reducing costs.

See <https://childcare.admin.ox.ac.uk/>. We also subscribe to the Work+Family Space, a service that provides practical advice and support for employees who have caring responsibilities for dependants of all types. See <https://hr.admin.ox.ac.uk/my-family-care>

### Supporting disability and health-related issues (inc menopause)

We are committed to supporting members of staff with disabilities or long-term health conditions, including those experiencing negative effects of menopause. Information about the University's Staff Disability Advisor, is at <https://edu.admin.ox.ac.uk/disability-support>. For information about how we support those going through menopause see <https://hr.admin.ox.ac.uk/menopause-guidance>

### Staff networks

The University has a number of staff networks including for research staff, BME staff, LGBT+ staff, disabled staff network and those going through menopause. Find out more at <https://edu.admin.ox.ac.uk/networks>

### The University of Oxford Newcomers' Club

The University of Oxford Newcomers' Club is run by volunteers that aims to assist the partners of new staff settle into Oxford, and provides them with an opportunity to meet people and make connections in the local area. See [www.newcomers.ox.ac.uk](http://www.newcomers.ox.ac.uk).

### Research staff

The Researcher Hub supports all researchers on fixed-term contracts. They aim to help you settle in comfortably, make connections, grow as a person, extend your research expertise and approach your next career step with confidence. Find out more <https://www.ox.ac.uk/research/support-researchers/researcher-hub>

Oxford's Research Staff Society is a collective voice for our researchers. They also organise social and professional networking activities for researchers. Find out more <https://www.ox.ac.uk/research/support-researchers/connecting-other-researchers/oxford-research-staff-society>