Job description and selection criteria

Job title	Senior Research Associate on the Soteria Project
Division	MPLS
Department	Department of Computer Science
Location	Wolfson Building, Parks Road, Oxford. With the opportunity to start remotely if pandemic restrictions require this.
Grade and salary	Grade 8: Salary £41,526 – £44,045 p.a.(in the range of)
Hours	Full time
Contract type	Fixed term for up to 34 months from 1 May 2021, with the possibility to start later
Reporting to	Professor Tom Melham
Vacancy reference	149983
Additional information	This role is a Grade 8 position, but 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 7 (Grade 7: £32,817 - £40,322 p.a.) with the responsibilities adjusted accordingly. This would be discussed with applicants at interview/appointment where appropriate.

The Soteria Project

This role is for a senior research associate to conduct advanced research in **applied formal verification of hardware and systems** as part of the **Soteria** project.

Soteria is a cyber-security demonstrator for the e-commerce industrial market. It is funded by UKRI as part of the Industrial Strategy Challenge Fund, [Digital Security by Design](#) (DSbD) Challenge. DSbD is a substantial programme of advanced collaborative research and development, technology prototyping, and business-led demonstrators that aims to radically update the foundation of the UK's insecure digital computing infrastructure. The cornerstone of the challenge is a technology platform prototype, called "[Morello](#)", that is more resistant to cyber-threats than conventional architectures and is being developed in a research programme at Arm.

The Soteria project is led by THG Holdings plc (THG) and involves the universities of Oxford and Manchester. THG is a global online retailer and technology business with digital security at the heart of its operations. It has world-class technical and research teams who will be applying their findings to the cutting edge of UK and global digital security through this project. Soteria's research is aimed at reducing the potential impact of security breaches and attacks, and the costs required to secure digital businesses and services.

Oxford will bring to Soteria its deep experience and expertise in automated formal hardware and software verification, both to advance research by addressing the unique challenge of the DSbD technology and to improve security assurance for the technology developed and demonstrated within Soteria.

The Role

This position, with its focus on real-world security through cutting-edge DSbD technology, is a unique opportunity to make a real impact, to advance state of the art in applied verification research, and to join a top-class team of collaborators. The role also offers an outstanding opportunity for career development that is equally well-suited to an academic or industrial research path, or to subsequent work as a senior applied verification engineer in industry.

The post holder will be a senior member of the Soteria team, working closely with Professor Melham at Oxford to research and apply novel formal verification theories, techniques, methodologies on components of innovative DSbD technology being developed in the project. The successful candidate will work in close collaboration with researchers at the university of Manchester, who are designing the central software and hardware components of the Soteria project. The post holder will also have close interactions with the research term at THG, who will execute a technically innovative and novel evaluation strategy for the technology, aimed at real-world impact.

The main responsibility of the advertised post is to contribute to the Soteria project objectives, with an emphasis on novel, automated formal verification methods applied to the technology being developed. This will involve identifying the most promising and valuable targets for formal verification, selecting appropriate tooling and algorithms – making innovative, theoretically well-grounded, extensions to these as needed – devising novel verification methodologies, and carrying out at-scale verification case studies.

Experience shows that formal verification can be most effective when done hand-in-hand with design engineering, so the role will require close collaboration with other researchers across the Soteria project.

The post holder will join the internationally leading verification research group of Professor Tom Melham, whose scientific work formal hardware modelling and verification goes back to the inception of the field. Researchers in Melham's group benefit from the scientific insights and connections that he has gained over decades of close, impact-focused collaborations with senior engineers at leading companies in the computing and semiconductor industries. Members of the group regularly present their work in leading conferences in verification, security, and testing.

The post holder will have responsibility for carrying out research as outlined above, collaborating with Professor Melham and other members of the team, and assisting with management of the project and project reporting, as required. The post holder will also have an opportunity to engage in teaching, to co-supervise students associated with Melham's group, and to provide guidance to junior members of the research group, including PhD and MSc students.

Oxford is also recruiting one or more research associates for the SCorCH project, which is also funded as part of UKRI's Digital Security by Design challenge. This is developing a new software verification toolchain to verify that the Morello platform is used correctly, as well as investigating new hardware verification technologies in this context. Research in SCorCH and Soteria will run concurrently, so the appointed researchers on both projects will benefit from a critical mass of research in DSbD technology at Oxford, alongside membership of the wider Oxford verification research group

Research topic	Formal verification of hardware and systems designs.
Principal Investigator / supervisor	Professor Tom Melham
Funding partner	UKRI

For further information about the project or for informal discussions about suitability, please contact Tom Melham (Tom.Melham@cs.ox.ac.uk).

Responsibilities

- Provide leadership in formal verification aspects of the Soteria project as a whole, develop research questions and plan the research in the context of specific case studies, and conduct individual research: analysing verification challenges, generating original ideas, and co-ordinating multiple aspects of the work to meet deadlines.

- Initiate publication of research results in leading journals and conferences. Write research articles for peer-reviewed conferences, journals, book chapters, and reviews. Present papers at international and national conferences, and lead seminars to disseminate research findings.

- Assist with management of the project and project reporting, as required.

- Help organise project meetings, workshops, and liaise with funding bodies to provide information to project stakeholders. Represent the Oxford components of the project and/or research group at project meetings and external meetings/seminars.

- Help raise research funds and shape the research group's plans by sharing responsibility for the writing of group-funding applications for new research projects.

- Carry out collaborative projects with team/group members and other research groups.

- Act as a source of information and advice to other members of the group on scientific protocols and experimental techniques.

- Assist in the supervision of postdoctoral researchers and post-graduate students working on related projects.

- The post holder may have the opportunity to teach. This may include lecturing, small-group teaching, and tutoring of undergraduates and graduate students.

Selection Criteria

Essential

- A doctorate in Computer Science or a related mathematical discipline.
- Strong publication record and familiarity with the existing literature and research in the field as witnessed by published peer-reviewed work (according to the experience of the candidate) in the area of formal verification, model checking, or related areas.
- Ability to contribute to research on the specified topics.
- A willingness to collaborate with others and work effectively as a member of a team
- Excellent communication skills, including the ability to write for publication, present research proposals and results, and represent the research group at meetings.

Desirable

- Relevant postdoctoral research experience.
- Experience of working in collaborative or interdisciplinary environments.
- Expertise in one or more of the following:
    - applied formal verification of hardware and/or software,
    - model checking, or other core formal verification technologies
    - FPGAs and/or system-on-chip and/or computer architecture and/or networks.

Pre-employment screening

All offers of employment are made subject to standard pre-employment screening, as applicable to the post.

If you are offered the post, you will be asked to provide proof of your right-to-work and your identity. And 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 so that we can discuss appropriate adjustments with you), and a declaration of any unspent criminal convictions.

We advise all applicants to read the candidate notes on the University's pre-employment screening procedures, found at: www.ox.ac.uk/about/jobs/preemploymentscreening/.

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.

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 UK 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 ten themes:

- *Algorithms & Complexity Theory* 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* focuses on theoretical foundations, multiagent systems, deep learning and computational linguistics;
- *Automated Verification* investigates theory and practice of formal verification and correct-by-construction synthesis for software and hardware systems;
- *Computational Biology & Health Informatics* is concerned with computational approaches for biomedical research and healthcare innovation;
- *Cyber-Physical Systems* is focusing on intelligent and autonomous sensor systems with applications in positioning, healthcare, environmental monitoring and smart cities;
- *Foundations, Structures and Quantum* embraces interdisciplinary research, and has a particular interest in structural foundations of quantum computation;
- *Human-Centred Computing* covers human-computer interaction, social computing and world-wide web;
- *Information Systems* covers databases, knowledge representation and reasoning;
- *Programming Languages* covers functional programming, program analysis, and programming language foundations;
- *Security* specialises in cybersecurity, protocol analysis, systems security, trusted computing, human-centred security, and networking.

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

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. The disciplines within the MPLS Division regularly appear at the highest levels in world rankings. In the results of the six-yearly UK-wide assessment of university research, REF2014, the MPLS division received the highest overall grade point average (GPA) and the highest GPA for outputs. We received the highest proportion of 4* outputs, and the highest proportion of 4* activity overall. More than 50 per cent of MPLS activity was assessed as world leading.

The MPLS Division's 10 departments and 3 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. Our research addresses major societal and technological challenges 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 (including Nobel prizes and prestigious titles such as FRS and FR.Eng) and we have a strong tradition of attracting and nurturing the very best early career researchers who regularly secure prestigious fellowships. The Division is also the proud holder of eight Athena Swan Awards (4 Silver and 4 Bronze) illustrating our commitment to ensure good practice and to encourage women in science at all levels in the division.

We have around 6,000 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 major 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 (http://www.oxfordsparks.net/) 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 endeavour to bring the potential of our scientific efforts forward for practical and beneficial application to the real world and our desire is to link our best scientific minds with industry and public policy makers.

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

How to apply

Before submitting an application, you may find it helpful to read the 'Tips on applying for a job at the University of Oxford' document, at www.ox.ac.uk/about/jobs/supportandtechnical/.

If you would like to apply, click on the **Apply Now** button on the 'Job Details' page and follow the on-screen instructions to register as a new user or log-in if you have applied previously. Please provide details of two referees and indicate whether we can contact them now.

You will also 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).

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

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

All applications must be received by **midday** 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).

Should you experience any difficulties using the online application system, please email recruitment.support@admin.ox.ac.uk. Further help and support is available from www.ox.ac.uk/about_the_university/jobs/support/. To return to the online application at any stage, please go to: www.recruit.ox.ac.uk.

Please note that you will receive an automated email from our e-recruitment system 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: www.admin.ox.ac.uk/councilsec/compliance/gdpr/privacynotices/job/. The University's Policy on Data Protection is available at: www.admin.ox.ac.uk/councilsec/compliance/gdpr/universitypolicyondataprotection/.

The University's policy on retirement

The University operates an Employer Justified Retirement Age (EJRA) for all academic posts and some academic-related posts. The University has adopted an EJRA of 30 September before the 69th birthday for all academic and academic-related staff in posts at **grade 8 and above**. The justification for this is explained at: www.admin.ox.ac.uk/personnel/end/retirement/acrelretire8+/.

For **existing** employees, any employment beyond the retirement age is subject to approval through the procedures: www.admin.ox.ac.uk/personnel/end/retirement/acrelretire8+/.

There is no normal or fixed age at which staff in posts at **grades 1–7** 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, travel discounts, and a variety of professional development opportunities. Our range of other employee benefits and discounts also includes free entry to the Botanic Gardens and University colleges, and discounts at University museums. See www.admin.ox.ac.uk/personnel/staffinfo/benefits.

University Club and sports facilities

Membership of the University Club is free for all University staff. The University Club 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 and www.sport.ox.ac.uk/oxford-university-sports-facilities.

Information for staff new to Oxford

If you are relocating to Oxfordshire from overseas or elsewhere in the UK, the University's Welcome Service website includes practical information about settling in the area, including advice on relocation, accommodation, and local schools. See www.welcome.ox.ac.uk. There is also a visa loan scheme to cover the costs of UK visa applications for staff and their dependents. See www.admin.ox.ac.uk/personnel/permits/reimburse&loanscheme/.

Family-friendly benefits

With one of the most generous family leave schemes in the Higher Education sector, and a range of flexible working options, Oxford aims to be a family-friendly employer. We also subscribe to My Family Care, a service that provides practical advice and support for employees who have caring responsibilities. The service offers a free telephone advice line, and the ability to book emergency back-up care for children, adult dependents and elderly relatives. See www.admin.ox.ac.uk/personnel/staffinfo/benefits/family/mfc/.

Childcare

The University has excellent childcare services, including five University nurseries as well as University-supported places at many other private nurseries.
For full details, including how to apply and the costs, see www.admin.ox.ac.uk/childcare/.

Disabled staff

We are committed to supporting members of staff with disabilities or long-term health conditions. For further details, including information about how to make contact, in confidence, with the University's Staff Disability Advisor, see www.admin.ox.ac.uk/eop/disab/staff.

Staff networks

The University has a number of staff networks including the Oxford Research Staff Society, BME staff network, LGBT+ staff network and a disabled staff network. You can find more information at www.admin.ox.ac.uk/eop/inpractice/networks/.

The University of Oxford Newcomers' Club

The University of Oxford Newcomers' Club is an organisation 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.