

THE UNIVERSITY OF MANCHESTER
PARTICULARS OF APPOINTMENT
FACULTY OF SCIENCE & ENGINEERING
SCHOOL OF COMPUTER SCIENCE

**PROFESSOR/READER/SENIOR LECTURER AND ONE LECTURER IN PROGRAM
ANALYSIS AND CYBER SECURITY**

VACANCY REF: S&E-10470

Salary:	Salary will be offered according to skills and relevant experience: Lecturer: Grade 7 £39,324 - £48,327 per annum Senior Lecturer/Reader: Grade 8 £49,772 - £59,400 per annum (with progression to £64,894 for Reader). Professor: Negotiable and competitive for a world-leading academic in Program Analysis and Cyber Security
Hours:	Full time
Duration:	Permanent
Location:	Oxford Road, Manchester

Enquiries about the vacancy, shortlisting and interviews:

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BACKGROUND INFORMATION

The University of Manchester

The University of Manchester is the largest single-site university in the UK, with the biggest student community. In total, 25 Nobel Prize winners have worked or studied here. Students benefit from unrivalled facilities, such as our Careers Service and the John Rylands Library, with over a million manuscripts and archival items, while staff benefit from an environment that is fast emerging as an epicentre for research excellence. The campus, at the heart of the city, is alive with student activity day and night. We are ranked 35th in the world, seventh in Europe and fifth

in the UK in the 2016 Shanghai Jiao Tong World Ranking. We are well underway with the biggest investment in facilities undertaken by any UK university, with £750m spent so far and a further £1bn by 2022.

Faculty of Science and Engineering

The Faculty of Science and Engineering is large and comprehensive, with nine component schools: Chemical Engineering and Analytical Sciences; Chemistry; Computer Science; Earth and Environmental Sciences; Electrical and Electronic Engineering; Materials; Mathematics; Mechanical, Aerospace and Civil Engineering; and Physics and Astronomy. Together with eight research institutes (Manchester Institute of Biotechnology, the Photon Science Institute, Dalton Nuclear Institute, National Graphene Institute, Manchester Energy, the International Centre for Advanced Materials, the Manchester Institute for Mathematical Sciences and the University of Manchester Aerospace Research Institute) the Faculty has a diverse portfolio of research, at the highest quality. Many major advances of the 20th century began here, including the work by Rutherford leading to the splitting of the atom and the development of the world's first stored-program computer. Today, research activities remain at the cutting-edge and the Faculty now generates in excess of £130M in research funding per year.

The School of Computer Science

Manchester has a long and distinguished track record in the research and teaching of core Computer Science, and across interfaces to adjacent disciplines. Founded upon the pioneering work of Williams, Kilburn and Turing, the School was the first academic Department of Computer Science in the UK and one of the first to run an undergraduate programme. The research strength of the school is reflected in consistently strong returns in UK research assessment exercises (5* in RAE 2000, 2nd in Research Power in RAE 2008, 4th in overall GPA in REF 2014 and ranked equal 1st for research environment). The School is among the largest in the country, and thus has been able to develop research and teaching profiles that are both broad and deep, reflecting critical mass both in core areas of the discipline (e.g. computer architecture, computer engineering, information management, logic and automated reasoning, machine learning and optimisation, and text mining) and in several interdisciplinary fields (e.g. nanotechnology, bioinformatics, and health informatics, neuro-morphic computing and HPC systems).

Formal Methods Group

The *Formal Methods Group* (FMG) has a broad span of interests, ranging from developing the new mathematics of computational behaviour, through the study and development of system design and verification methods, to all aspects of logic. The group has a particular strength in the automation of logic with members of the FMG having world-leading competence in computational logic, and especially in automated theorem proving in first-order logic (FOL).

FMG develops two award-winning theorem provers Vampire (Andrei Voronkov, Giles Reger) and iProver (Konstantin Korovin), which have consistently won international theorem proving competitions for over 15 years. Recently Vampire has been extended to reasoning with theories, successfully competing against SMT solvers in their annual competition. There is also active research in developing tools for description logics (Renate Schmidt) complemented by expertise in Semantic Web technology elsewhere in the school (Bijan Parsia, Uli Sattler). The group has made major contributions to all aspects of automated reasoning: theory, implementation techniques and applications and 2015 Andrei Voronkov was awarded the Herbrand Award for contributions to automated deduction. The FMG also has strong links to industry including past collaborations with Intel and Microsoft.

An Opportunity For Growth In Program Analysis and Cyber Security

This is an exceptional opportunity to join the University of Manchester's novel and world leading activities in automated reasoning based program analysis and cyber security.

The national need for advanced research in cyber security has never been clearer. Computers, smart phones, IoT, and other cyber-physical devices [etc.](#) are now used in all areas of everyday life, from business to education to entertainment and critical infrastructure. From the individual to the national level, we have become reliant on software systems and risk substantial loss if these systems fail or have their security compromised. One important strand of cyber security research is the development of fundamental techniques to produce [strong assurance](#) about the resilience of systems containing computational devices.

We are looking to fill two roles in the broad area of employing reasoning-based techniques directly to program analysis for security properties, or to the verification of security-related protocols or algorithms. Relevant research areas may include, but are not limited to, model checking, abstract interpretation, symbolic computation, program synthesis, static and dynamic analysis, deductive verification etc. with a focus on cyber security-related applications such as, e.g., code and data integrity, malware analysis, intrusion detection, integrity, trustworthiness, privacy and anonymity. The two positions reflect our desire to establish a new research area. Ideally the senior position would have a strong track-record of relevant research with industrial connections.

The focus on reasoning-based methods is targeted to complement our world-leading status in automated reasoning. The automated reasoning group at Manchester, consisting of Andrei Voronkov, Konstantin Korovin, Renate Schmidt, and Giles Reger, have a long track-record in pragmatic automated reasoning research as described above. Such techniques are needed for the success of research in reasoning-based Cyber Security. A need evidenced by our group's role in the National Cyber Security Centre's second Research Institute in Automated Program Analysis and Verification. As well as potential to collaborate with the automated reasoning group to further research at the intersection of these areas, there is potential for wider collaboration within the school, for example potential applications exist within the advanced processor technologies group.

Cyber Security is clearly a cross-cutting concern touching all areas of research from the design of secure power systems for critical systems (IEEE) to the mathematical modelling of cyber activity (Maths). You will join a growing pan-university community interested in world-leading Cyber Security research.

The School of Computer Science is a leading research institution, and as such, we value exceptional researchers. You will publish to the highest standards, secure external research funding, pursue real-world impact, and contribute to the world-class PhD training programmes within the School.

The School values exceptional teachers. You will play a key role in maintaining our reputation as an institute of learning – designing and delivering innovative UG/PG topics, both in Cyber Security and across the spectrum of Computer Science. Exceptional teachers are encouraged to demonstrate this in their application.

We wish the appointees to contribute to a dynamic research activity in automated reasoning based Program Analysis for Cyber Security leading to new work, within and across research groups in the school, and with complementary centres of excellence across the university and beyond.

Overall Purpose of the Job:

Professor

As a Professor in the School of Computer Science you will be required to contribute to the leadership of the School – in research, teaching and management. Initially you will be expected to develop and lead research activity that has an exceptional degree of novelty with the potential for major impact. As such you will be required to: Develop a cross-group and cross-disciplinary research activity; secure substantial research funding in order to develop a group; manage any funded projects that you lead and ensure that they succeed in their objectives; and ensure that their outcomes are seen and understood by the widest possible audience, in particular by disseminating the results of your research at conferences and in suitable high-impact journals. You will also contribute more broadly to the research by leadership and by developing collaborations with a broad range of researchers in the School and University. In due course you will also contribute to the School's teaching activities and contribute to the leadership and management of the School more generally.

The responsibilities listed below describe the range of activities expected of a Professor in the School, with specific teaching and management duties to be determined by the Head of School. In the first instance you would be expected to provide academic leadership and to develop new activity in Program Analysis and Cyber Security.

Key Responsibilities, Accountabilities or Duties:

Research

- Lead research of exceptional novelty that has the potential for major impact.
- Develop and lead an internationally leading research activity by establishing new areas of research in the School and University and by supporting existing projects.
- Identify and secure substantial external funding for your research.
- Disseminate the results of your research in the highest impact international outlets, presenting at internationally leading conferences and publishing in high-impact journals.
- Identify any potentially valuable IP developed by your research, ensure that it is suitably protected by the University and encourage its exploitation.
- Attract highly able graduate students and postdoctoral research assistants.
- Manage graduate students and junior staff in such a manner as to ensure the success of their projects and to maximise their career development.

Teaching

- Teach on the School's undergraduate and postgraduate programmes.

- Undertake administration including assessment, examination, and curriculum design.
- Maintain awareness of developments in teaching and learning and employ innovative teaching methods that inspire students, maximise learning, develop their employability and ensure student satisfaction.
- Supervise undergraduate and taught postgraduate student projects and tutorials.
- Participate in the School's student recruitment activities.

Other

- Engage fully in the School, Faculty and University as communities, seeking and creating potential for collaboration and collective success without regard for subject or organisational boundaries.
- Support the University's broader agendas on matters such as sustainability, equality and diversity and community engagement.
- Take a leading role in aspects of the School's organisation and management.
- Act to raise the external visibility and reputation of the School, the Faculty and the University by engagement with appropriate professional bodies.
- Broadly disseminate understanding of and excitement in the discipline by means of public engagement.
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Essential

- PhD in Computer Science or a closely related area (or equivalent)
- Substantial postdoctoral research experience
- Excellent interpersonal and communication skills
- Proven success in leading a research team
- Expertise in research in any relevant area of Program Analysis with Applications in Cyber Security, plus:
- A sustained record of internationally leading publications
- A sustained record of presenting at international conferences with invited/keynote talks
- Evidence of significant recognition within the relevant international research community
- Evidence of sustained commitment to internationally leading research and publishing
- Evidence of sustained, substantial research funding and of managing significant research projects
- Evidence of extensive collaboration within and outside your current organisation, nationally and internationally
- Successful experience of teaching, including the ability to use a range of teaching and learning strategies to engage students

- Experience of planning and developing teaching materials and of the introduction of novel teaching methods
- Sustained success in supervision of postgraduate students
- Willingness to travel nationally and internationally

Desirable

- Experience of engaging with or working in industry.

Overall Purpose of the Job:

Reader

You will join an internationally leading School of Computer Science. You will therefore be required to lead and conduct high quality research, to disseminate it in suitable high-impact outlets, to secure substantial research funding and to contribute to the School's teaching activities. You should already have a significant international presence in Program Analysis and Cyber Security and be working towards a Chair in the same area. The specific responsibilities of the person appointed will be agreed with the Head of the School of Computer Science. Your research will advance the vision for Program Analysis and Cyber Security, both at its core and in its application.

Key Responsibilities, Accountabilities or Duties:

Research

- Leadership of world -leading original research.
- Developing major research collaborations in the School, nationally and internationally.
- Leading major bids for substantial research income to fund a growing research effort.
- Disseminating the results of research to achieve the highest impact: publishing in high-quality journals, presenting at internationally leading conferences, and seeking to transfer the results outside academia through technology transfer, public engagement and other routes.
- Attracting and supervising postgraduate research students.
- Managing graduate students and research staff in such a manner as to ensure the success of their projects and to maximise their career development.

Teaching

- Actively contributing to and enhancing the teaching programmes of the School of Computer Science at both undergraduate and postgraduate levels.
- Contribute to teaching related administration, examination, and to curriculum design
- Supervise undergraduate and taught postgraduate student projects and tutorials

Other

- Contributing to the management and administration of the School's activities and the broader objectives of the School.

PERSON SPECIFICATION

Reader

Essential

The School is looking for an enthusiastic and self-motivated researcher and teacher to join a dynamic group of scientists. The appointee will be expected to have an established or emerging international presence in Program Analysis and Cyber Security research, strong evidence of an independent research program, to supervise research students and staff and to actively develop teaching. The appointee is expected to have the following:

- A PhD or equivalent in a relevant discipline.
- Evidence of independent research experience.
- A sustained excellent, relevant publication record with cited publications in high quality journals and/or conferences with evidence of significant impact.
- Established internationally outstanding expertise in an area of Program Analysis and Cyber Security.
- Evidence of securing sustained, substantial research funding and managing major research projects.
- Evidence of successfully leading cross-disciplinary research teams including excellent interpersonal and communication skills.
- Evidence of successful supervision of postgraduate research students.
- Evidence of enthusiastic and successful teaching of aspects of undergraduate and taught postgraduate programmes in Computer Science, including at its core, and the development of successful innovative teaching using a range of methods.
- Willingness to contribute to outreach and public engagement activities relating to the research area and the broader School/University.
- Excellent organisational skills and the ability to deliver to deadlines.
- **Desirable**
- Experience of working in or with industry

Overall Purpose of the Job:

Senior Lecturer

You will join an internationally leading School of Computer Science. You will therefore be required to lead and conduct high quality research, to disseminate it in suitable high-impact outlets, to secure substantial research funding and to contribute to the School's teaching activities. The specific responsibilities of the person appointed will be agreed with the Head of School. Your research will advance our vision for Program Analysis and Cyber Security.

Key Responsibilities, Accountabilities or Duties:

Research

- Contributing to the leadership of internationally-leading original research.

- Developing major research collaborations in the School, nationally and internationally.
- Leading bids for substantial research income to fund a growing research effort.
- Disseminating the results of research to achieve the highest impact: publishing in high-quality journals, presenting at internationally leading conferences, and seeking to transfer the results outside academia through technology transfer, public engagement and other routes.
- Attracting and supervising postgraduate research students.
- Managing graduate students and research staff in such a manner as to ensure the success of their projects and to maximise their career development.

Teaching

- Actively contributing to and enhancing the teaching programmes of the School of Computer Science at both undergraduate and postgraduate levels.
- Contribute to teaching related administration, examination, and to curriculum design
- Supervise undergraduate and taught postgraduate student projects and tutorials

Other

- Contributing to the management and administration of the School's activities and the broader objectives of the School.

Overall Purpose of the Job:

Senior Lecturer

The School is looking for an enthusiastic and self-motivated researcher and teacher to join a dynamic group of scientists. The appointee will be expected to have developed an independent research program, to supervise research students and staff and to actively develop teaching. The appointee is expected to have the following:

Key Responsibilities, Accountabilities or Duties:

Research

- Contributing to the leadership of internationally-leading original research.
- Developing major research collaborations in the School, nationally and internationally.
- Leading bids for substantial research income to fund a growing research effort.
- Disseminating the results of research to achieve the highest impact: publishing in high-quality journals, presenting at internationally leading conferences, and seeking to transfer the results outside academia through technology transfer, public engagement and other routes.
- Attracting and supervising postgraduate research students.
- Managing graduate students and research staff in such a manner as to ensure the success of their projects and to maximise their career development.

Teaching

- Actively contributing to and enhancing the teaching programmes of the School of Computer Science at both undergraduate and postgraduate levels.
- Contribute to teaching related administration, examination, and to curriculum design

- Supervise undergraduate and taught postgraduate student projects and tutorials

Other

- Contributing to the management and administration of the School's activities and the broader objectives of the School.

PERSON SPECIFICATION (Senior Lecturer)

Essential

The School is looking for an enthusiastic and self-motivated researcher and teacher to join a dynamic group of scientists. The appointee will be expected to have developed an independent research program, to supervise research students and staff and to actively develop teaching. The appointee is expected to have the following:

- A PhD or equivalent in a relevant discipline.
- Evidence of independent research experience.
- A sustained excellent, relevant publication record with cited publications in high quality journals and/or conferences.
- Established expertise in Program Analysis and Cyber Security.
- Evidence of successfully securing substantial research funding and managing research projects.
- Proven ability to lead a cross-disciplinary team, with excellent interpersonal and communication skills.
- Evidence of successful supervision of postgraduate research students.
- Evidence of enthusiastic and successful teaching of aspects of undergraduate and taught postgraduate programmes in Computer Science, including its core topics, and the development of successful innovative teaching using a range of methods.
- Willingness to contribute to outreach and public engagement activities relating to the research area and the broader School/University.
- Excellent organisational skills and the ability to deliver to deadlines.

Desirable

- Experience of working in or with industry

JOB DESCRIPTION (Lecturer)

You will join an internationally leading School of Computer Science. You will therefore be required to carry out high quality research, to disseminate it in suitable high-impact outlets, to secure significant research funding and to contribute to the School's teaching activities. The specific responsibilities of the person appointed will be agreed with the Head of School of Computer Science.

Key Responsibilities, Accountabilities or Duties

Research

- Undertaking and directing original research of the highest international standard.

- Developing national and international research collaborations.
- Obtaining substantial grant and other research income to fund a growing research effort.
- Disseminating the results of research to achieve the highest impact: publishing in high-quality journals, presenting at internationally leading conferences, and seeking to transfer the results outside academia through technology transfer, public engagement and other routes.
- Attracting and supervising postgraduate research students.
- Managing graduate students and research staff in such a manner as to ensure the success of their projects and to maximise their career development.

Teaching

- Actively contributing to and enhancing the teaching programmes of the School of Computer Science at both undergraduate and postgraduate levels.
- Contribute to teaching related administration, examination, and to curriculum design
- Supervise undergraduate and taught postgraduate student projects and tutorials

Other

- Contributing to the management and administration of the School's activities and the broader objectives of the School.

PERSON SPECIFICATION (Lecturer)

The School is looking for an enthusiastic and self-motivated researcher and teacher to join a dynamic group of scientists. The appointee will be expected to develop an independent research program, to supervise research students and staff and to actively develop teaching. The appointee is expected to have the following:

Essential

- A PhD in a relevant discipline.
- Postdoctoral research experience.
- An excellent, relevant publication record with cited publications in high quality journals and conferences.
- Expertise in an area of Program Analysis with applications in Cyber Security
- The ability to work collaboratively as part of a cross-disciplinary team including excellent interpersonal and communication skills.
- The ability to obtain research funding to manage research projects.
- The ability to supervise postgraduate students successfully.
- The ability to enthusiastically teach aspects of undergraduate and taught postgraduate programmes in Computer Science and to develop innovative teaching.

Desirable

- Experience of a range of teaching methods.
- Experience of planning and developing teaching materials.
- Successful experience of supervising postgraduate students.
- Experience of working in, or with, industry.