SENIOR RESEARCH ASSOCIATE – Networks and Systems Security, Machine Learning – D&NS

THE ALAN TURING INSTITUTE

There has never been a more significant time to work in data science and AI. There is recognition of the importance of these technologies to our economic and social future: the so-called fourth industrial revolution. The technical challenge of keeping our data secure and private has grown in its urgency and importance. At the same time, voices from academia, industry, and government are coming together to debate how these technologies should be governed and managed.

The Alan Turing Institute, as the UK's national institute for data science and artificial intelligence, plays an important part in driving forward advances in these technologies in order to change the world for the better.

The Institute is named in honour of Alan Turing, whose pioneering work in theoretical and applied mathematics, engineering and computing is considered to have laid the foundations for modern-day data science and artificial intelligence. The Institute's goals are to undertake world-class research, apply its research to real-world problems, driving economic impact and societal good, lead the training of a new generation of scientists, and shape the public conversation around data and algorithms.

After launching in 2015 with government funding from EPSRC and five founding universities, the Institute has grown an extensive network of university partners from across the UK and launched a number of major partnerships with industry, public and third sector. Today it is home to more than 500 researchers, a rapidly growing team of in house research software engineers and data scientists and a business team.

BACKGROUND

Currently, Turing is undergoing a restructuring, moving towards a challenge-led model with three Grand Challenges (Environment & Sustainability, Health, Defence & National Security). This new model focuses on world-class science and innovation and aims to generate high-quality research and translate it into real-world impact and deployment.

Building on the successes of our Defence and Security Programme and AI for Cyber Defence (AICD) Centre, the Defence & National Security Grand Challenge at the Turing is developing an ambitious programme of research to create an immune system for critical national infrastructure (CNI). The research will deliver a fundamental shift in UK's cyber-defence capability by providing AI methods and tools capable of autonomously defending CNI and other priority cyber-physical systems. Working alongside a team of other researchers and engineers at the intersection of machine-learning and cyber security, you will initially focus on either red (i.e., offensive) or blue (i.e., defensive) teaming a CNI network environment. Increasingly you will then work to automate these techniques (e.g., using GenAI and/or deep reinforcement learning), supporting both the ongoing development of an open source CNI environment for autonomous cyber research and an open competition we plan to launch in 2025.

As a team, we aim to advance the state-of-the-art and publish cutting-edge research. Day to day, we collaborate with technical and subject matter experts from our partner organisations as well as academics, software engineers, and data scientists from across the Turing's research community. We present our work to a range of audiences including research colleagues, senior decision makers and non-technical stakeholders.

We are a cross-disciplinary team and encourage applications from offensive and defensive security practitioners, software engineers, computer scientists, machine learning scientists, mathematicians, statisticians, data scientists, and data engineers. Applicants focussed predominantly on either machine learning or systems/information security are most welcome.

The team practices an agile, experiment-driven approach and values a positive, supportive and collaborative environment in which 'radical candour' and 'lifelong learning' are encouraged. We embrace failure as a learning opportunity and necessary precursor to success. We are empowered to take ownership of our work and operate with a high level of autonomy in our roles, to deliver measurable impact to our partners.

The Alan Turing Institute

ROLE PURPOSE

This role will sit within the Defence and National Security Grand Challenge and will focus on automated (i.e., enhanced using AI for control techniques) red and blue teaming a CNI network environment.

DUTIES AND AREAS OF RESPONSIBILITY

- Undertake high-quality collaborative research, contributing to the success of the research aims.
- Take the lead on writing up findings as they emerge, producing and developing reports, and publications in peer-reviewed journals, in collaboration with the research team.
- Present, disseminate and explain our work at meetings/events and contribute to both the internal and external visibility of the Institute.
- Horizon scanning across relevant fields for new advancements and methodology
- Be a point of contact, supporting PIs in engaging with stakeholders regarding projects and deputising in meetings where necessary.
- Supervise the work of research assistants and Ph.D. interns in the team and provide guidance as required.
- Line manage direct reports if required
- Contribute to the preparation of proposals and applications to external bodies, e.g., for funding and contractual purposes.
- Contribute to the life of the Institute and support a diverse and inclusive community through embracing the Turing values.
- Adhere to and promote principles of reproducible and ethical data science and ensure secure handling of data and health and safety in all aspects of work. Provide technical leadership and project management for research projects, ensuring successful outcomes
- Work with mission theme leads and other stakeholders and colleagues to define, understand and prioritise the research direction and project goals.
- Lead on the preparation of proposals and applications to external bodies, e.g., for funding and contractual purposes.
- Take responsibility for driving collaboration with academic experts and broader research partners from across the Turing, and the wider Turing / project community.
- Supervise the work of early-career researchers in the team and provide guidance as required

Specific to the project/programme/role:

- Developing and applying red and/or blue team strategies in the context of CNI network environments.
- Developing red and/or blue team tools, techniques and strategies that are enhanced or automated using modern AI for control techniques.
- The application of modern AI techniques including:
    - DRL.
    - GenAI, transformers and attention techniques.
    - Multi-agent approaches (e.g., competitive or collaborative training)
    - Sample-efficient exploration methods.
    - Meta-learning and generalisability approaches.
    - Genetic algorithms.
    - Explainable and/or interpretable AI.
- Making foundational AI contributions where it benefits the mission objective(s).
- Writing papers for submission to high quality peer review venues (e.g., S&P, USENIX, CCS, AAAI, ICML, NeurIPS, etc).

The Alan Turing Institute

Please note that job descriptions cannot be exhaustive, and the postholder may be required to undertake other duties, which are broadly in line with the above key responsibilities. This job description is written at a specific time and is subject to changes as the demands of the Institute and the role develop.

The Alan Turing Institute

PERSON SPECIFICATION		
Skills and Requirements Post holders will be expected to demonstrate the following:	**Essential (E)** **Desirable (D)**	**Tested at application (a)** **Tested at interview (i)**
Education/Qualification		
PhD (or equivalent experience and/or qualifications) in cyber/systems/network security, computer science, AI, machine learning, statistics, engineering, or a closely related discipline.	E	A
Knowledge and Experience		
A passion for networks or systems security, and an ability to demonstrate the application of offensive and/or defensive techniques.	E	A/I
A demonstrable interest in machine learning, AI, and data science.	E	A/I
Prior experience developing software in a scientific computing context, ideally in Python. Experience in frameworks such as NumPy, Tensorflow, PyTorch, Ray/RLLib, Stable Baselines. Experience in development suites, systems and versioning products (e.g., Git, IDEs, Linux).	E	A
Track record of the ability to initiate, develop and deliver high quality research aligned with research strategy any external stakeholders and to publish in peer reviewed journals and conferences.	E	A/I
Track record of outstanding research and delivering impact appropriate for a researcher with extensive postdoctoral experience	E	A/I
The ability to work in a team and interact professionally within a team of researchers and students.	E	I
Experience of working with research partners to drive collaboration	E	A/I
Experience of contributing to research proposals	D	I
Demonstrable interest in deep reinforcement learning and/or related AI for control techniques.	D	I
Experience in line management	D	A/I
Previous experience overseeing and supervising more junior colleagues' work	D	A/I
Communication		
Excellent written and verbal communication skills including the ability to present complex or technical information, and to communicate effectively with diverse audiences	E	A/I
Ability to adapt the style of communication to the audience and ensure understanding whilst negotiating and influencing where needed	E	A/I
Project Management & Project Delivery		
Proactive approach to managing stakeholders and their requirements and identifying opportunities for collaboration.	E	A/I
Adapts services and systems to meet stakeholders' needs and identifies ways of improving standards. Learns from issues and takes action to resolve them.	E	A/I

Decision Making		
Ability to advise on available options for decisions that affect operational processes, considering any risks	E	A
Work with others to make collaborative decisions that may be operational or strategic and impact immediate team or work area.	E	A/I
Analysis and Research		
Ability to plan and implement rigorous analysis plans.	E	I
Ability to carry out research independently and take the lead on writing up findings as they emerge in styles accessible to both academic and lay audiences	E	I
Teamwork and Motivation		
Ability to work effectively both as part of a team and in cross collaboration with other teams as required by the role	E	I
Other Requirements		
Commitment to EDI principles and to the Organisation values	E	I
Eligible for “UK/NATO security clearance”, e.g., by nationality or 5+ years NATO residency	E	A
Successful DSTL background check	E	I

The Alan Turing Institute

OUR VALUES

The Alan Turing Institute is committed to equality diversity and inclusion and to eliminating discrimination. All employees are expected to embrace, follow and promote our EDI Principles and Our Values.

APPLICATION PROCEDURE

If you are interested in this opportunity, please click the apply button below. You will need to register on the applicant portal and complete the application form including your CV and covering letter. The covering letter should address:

- Why you are applying for this position
- How you qualify for this position (see criteria under "Person Specification")
- Publication list (if not covered in CV)

If you have questions about the role or would like to apply using a different format, please contact us on 020 3862 3536 or email recruitment@turing.ac.uk.

CLOSING DATE FOR APPLICATIONS: Sunday 15 September 2024 at 23:59 (LONDON, UK BST)

Interviews are expected to take place from week commencing 30 September 2024.

TERMS AND CONDITIONS

This post is offered on a full time, fixed-term basis for 3 years. Part-time (0.8 FTE) applications can be considered. The annual salary is £55,184 – £63,971 plus excellent benefits, including flexible working and family friendly policies, Employee-only benefits guide | The Alan Turing Institute

The Alan Turing Institute is based at the British Library, in the heart of London's Knowledge Quarter. We expect staff to come to our office at least 4 days per month. Some roles may require more days in the office; the hiring manager will be able to confirm this during the interview.

Successful applicants will be subject to a DSTL research workers check at the offer stage.

EQUALITY, DIVERSITY AND INCLUSION

The Alan Turing Institute is committed to creating an environment where diversity is valued and everyone is treated fairly. In accordance with the Equality Act, we welcome applications from anyone who meets the specific criteria of the post regardless of age, disability, ethnicity, gender reassignment, marital or civil partnership status, pregnancy and maternity, religion or belief, sex and sexual orientation.

We are committed to building a diverse community and would like our leadership teal to reflect this. We therefore welcome applications from the broadest spectrum of backgrounds.

We are committed to making sure our recruitment process is accessible and inclusive. This includes making reasonable adjustments for candidates who have a disability or long-term condition. Please contact us at adjustments@turing.ac.uk to find out how we can assist you.

Please note all offers of employment are subject to obtaining and retaining the right to work in the UK and satisfactory pre-employment security screening which includes a DBS Check.

Full details on the pre-employment screening process can be requested from HR@turing.ac.uk***.***