Lead Research Data Scientist, Defence AI Research (DARe) Centre

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

The Defence & Security (D&S) programme at the Turing is looking to expand a newly formed team of research engineers working on real-world problems aligned with defending and securing the UK. Following in the footsteps of the institute's namesake, Alan Turing, the team operates at the intersection of mathematics, engineering and computing and works in close collaboration with the Turing's National Security partners.

As a team, we bring together cutting-edge research and motivating mission challenges, using our data science, software engineering and stakeholder management skills to create next generation capabilities for our partners. 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 work with state-of-the-art cluster and cloud platforms to realise our collaborators' data science and artificial intelligence research at scale.

Your role will be to work both independently and collaboratively with the Principal Investigators (PIs) and other researchers in the centre working in domains as diverse as: space situational awareness and space systems, future sensing, cyber, generative AI and disinformation, communications and networks, human-machine teaming, and digital twins. The ideal candidate is inquisitive, enjoys solving complex, challenging problems, and thinks creatively to find non-obvious solutions. We are a cross-disciplinary team and encourage applications from both generalists and specialists including those who self-identify as software engineers, computer scientists, machine learning practitioners, physicists, mathematicians, statisticians or more widely as data scientists or data engineers.

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.

ROLE PURPOSE

The role will sit within the Defence AI Research (DARe) Centre focussed on performing horizontal (underpinning) research. DARe is aiming to become a world-class centre focused on delivering the science needed to advance UK capabilities in AI and Data science in the defence and security domain. This involves both the application of existing AI algorithms and techniques and building of hardware prototypes as well as fundamentally advancing the state of the art of AI.

Research engineers and data scientists perform investigations based on tasking from D&S partners to derisk new technologies and create proof-of-concept work to inform future research. Investigations often involve understanding whether a new algorithm, or piece of hardware is suitable for a particular problem, how academic technology performs when applied in real- world situations, and what the potential drawbacks of adopting a new technology are.

DARe projects usually last 1-2 years, are exploratory, have a high risk of failure, and generally output proof of concept code, embedded hardware and software prototypes, and technical write-ups or academic papers. Work is done in collaboration with other DARe group members. Research engineers and data scientists are expected to provide support to other scientists in the group, and to develop working prototypes. The technical scope of the work includes:

- The application of modern AI algorithms (e.g. physics informed neural nets, transformers, autoencoders, reinforcement learning, graph neural networks) for automated real time analysis and exploitation of multiple data sources.
- Processing of a range of datasets including satellite imaging, time series telescope data, radar data, cyber defence data.
- Development of novel approaches for multimodal sensor fusion and 3D classifiers.
- AI security and understanding vulnerabilities at the intersection of cyber and frontier AI models.
- Investigate assurable and adversarial AI including the determination as to the scope and limits of a model when being applied to a different area to its training.
- Understanding pattern of life and automated detection of anomalies, outliers, and edge cases.
- Approaches for handling sparsity, irregular sampling and missing data, uncertainty quantification, visualisation, and communication.
- Embedded hardware and software for multi-purpose, multi-sensor autonomous systems.
- Distributed computing approaches to optimise resource allocation and computation for increased efficiency and improved resiliency.
- Perform technical AI assessments and data collection trials involving hardware equipment.
- Human Machine teaming relationships including explainability, interpretability (e.g. saliency maps, LIME), transparency and trust.

These are subject to change and will be co-developed by Defence partners and the Centre Lead at the Turing.

DUTIES AND AREAS OF RESPONSIBILITY

Successful candidates will:

- Provide technical leadership and project management on multi-person projects (2 to 4 people), guiding the project directions synergistically with other related efforts and align with the strategic research goals of the institute. Able to liaise with the PI and oversee the contribution to a larger project, delegate work packages and other tasks to team members, and take responsibility for their completion over the lifetime of the project.
- Be the primary person responsible for delivery of a service area of strategic importance to the Institute. The team member is expected to shape the effort to align with the strategic goals of the institute, coordinate team activities, manage delivery of several independent areas, solicit feedback, and tweak services in response to the changing operational needs of the Institute.
- Provide leadership for the team involvement in external projects within one or more domain challenge areas:
  - Work closely with the center PI to ensure projects align with the strategic research directions of the D&S challenge and draw upon the skills and experience of team members.
  - Mentors a Senior member of staff in this process, delegating work as is appropriate.

- o   When necessary, author or contribute to research proposals to support these efforts.
- Line manage a team including their performance and supporting their career development aspirations.
- Understand the problems of the Turing's partners and develop appropriate approaches to solving these problems.
- Perform experiments and develop capabilities, which might include building and deploying machine learning models; applying data science, statistical and algorithmic techniques to data; building microservices, data processing/engineering systems and platforms or developing user interfaces and/or visualisations.
- Develop, implement, and adapt state-of-the-art and novel data science and artificial intelligence, and future sensing techniques emerging from the Institute and elsewhere to problems faced by the Turing's partners.
- Present, disseminate and explain our work to external stakeholders and research collaborators including Documenting capabilities, processes, and systems for effective and efficient reuse across multiple domains; Presentation at Defence and Security programme events including monthly meetups and wider Turing events; Presentation at Partner reading groups, conferences and to Partner stakeholders; Publication, support and maintenance of research/prototype software.
- Contribute to the life of the Institute and support its community:
  - o   Deliver teaching and training to colleagues and students, including within the team in our regular skills sessions.
  - o   Support research colleagues to make the most of the Institute's secure high performance computing environments for advanced research.
  - o   Contribution to and involvement in the DARE team running of special interest groups.
- Ensure compliance with the secure handling of data and health and safety with all aspects of their work.
- Perform technical assessments and data collection trials.

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.

If not already held, successful candidates will need to be willing to undertake the SC clearance process once in-post. Eligibility criteria and further information on the process can be found on the UK Government security vetting [website](). Successful candidates will be subject to a Dstl research workers form check at the offer stage.

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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		
A PhD degree or equivalent professional experience in a field with significant use of both computer programming and advanced algorithmic, statistical, physics or numerical techniques.	E	A
Undergraduate-level degree or higher in computer science, engineering, data science, mathematics, statistics or a related discipline.	E	A
Must be eligible to hold a UK SC clearance and secure SC clearance within 6 months of the commencement of their employment, or in such longer period as the Institute may in its absolute discretion consider reasonable to obtain such clearance.	E	A
Knowledge and Experience		
Strong background in one or more of the following areas: Space situational awareness and space systems, remote sensing, satellite imaging, modelling of physical systems, machine learning, reinforcement learning, adversarial AI, AI security, sensor systems, radar, cyber defence.	E	A/I
Professional experience in a field or sector with significant use of both computer programming and advanced algorithmic, statistical or numerical techniques.	E	A/I
Experience developing software in a scientific computing context, ideally in Python, including the use of established libraries such as NumPy, Tensorflow, PyTorch, scikit-learn, pandas, numpy, scipy, matplotlib and RL specific frameworks such as Ray/RLLib, Stable Baselines. Experience in development suites, systems and versioning products (e.g., Git, IDEs, Linux).	E	A/I
An understanding of the importance of good practices for producing reliable software and reproducible analyses (e.g. version control, issue tracking, automated testing, package management, literate analysis tools such as Jupyter).	E	A/I
Experience managing, structuring, and analysing research data as well as experience managing and organising the parameters and results of computational experiments.	D	A/I
Direct experience developing and deploying technologies in support of UK Defence and National Security organisations.	D	A/I
Machine learning, including experience with one or more established software libraries (e.g. Tensorflow, Keras, PyTorch, scikit-learn).	D	A/I
Working with (relational and non-relational) databases and APIs to access data programmatically using query languages (e.g. SQL, Elastic Query DSL, GraphQL).	D	A/I
Experience of developing analytics suited to large-scale data processing (e.g. Spark).	D	A/I
Experience of deploying and maintaining developed capabilities operationally.	D	A/I
User interface design and development with web technologies, especially for data visualisation and knowledge representation.	D	A/I
Experience with public cloud platforms and related technologies.	D	A/I
Experience conducting and publishing research to the standard required by top-tier reviewed journals.	D	A/I

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Communication		
Excellent written and verbal communication skills, including experience in the authoring of research papers or technical reports, and giving presentations or classes on technical subjects.	E	I
Ability to negotiate and influence others.	E	I
Project Management and Project Delivery		
Ability to work effectively as part of a remote team, with collaborators and clients.	E	A/I
Ability to shape the direction of projects, deliver project outputs and manage relationships with key external stakeholders.	E	A/I
Ability to provide technical leadership of projects that support significant research programmes in the institute.	E	A/I
Decision Making		
Independently makes decisions which are low risk and that mainly affect themselves or a small number of people and are guided by regulation and practice.	E	A/I
Initiative and Problem Solving		
Demonstrated enthusiasm and ability to rapidly assimilate new computational and algorithmic ideas and techniques, at a more than superficial level, and apply them successfully.	E	A/I
Ability to use own judgement to analyse and solve problems.	E	A/I
Ability to lead one's own work independently, including planning and execution.	E	A/I
Analysis and Research		
Experience managing, structuring, analysing and visualising research data and the results of computational experiments.	E	A/I
Ability to lead research within formal or informal teams and work collaboratively within a team of researchers.	E	A/I
Ability to adopt appropriate data analysis methods for the purpose and produce simple reports to present the findings.	E	I
Team Development		
Ability to support and mentor junior staff and demonstrate routine procedures to new team members.	E	A/I
Other Requirements		
Commitment to EDI principles and to the Organisation values.	E	A/I
A willingness to undergo the Security Check (SC) clearance process once in post, if not already held.	E	A/I

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

CLOSING DATE FOR APPLICATIONS: SUNDAY 21 APRIL AT 23:59 (LONDON, UK BST)
We reserve the right to close this vacancy early or to interview suitable candidates before the closing date if enough applications are received.

TERMS AND CONDITIONS

This full-time post is offered on a fixed-term basis for three years. The annual salary is £62,666 to £67,200 plus excellent benefits, including flexible working and family friendly policies, https://www.turing.ac.uk/work-turing/why-work-turing/employee-benefits.

Must be eligible to hold a UK SC clearance and secure SC clearance within 6 months of the commencement of their employment, or in such longer period as the Institute may in its absolute discretion consider reasonable to obtain such clearance.

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 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***.***