

The Alan Turing Institute

Research Associate in Homomorphic Encryption (Project FAIR) (x2)

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 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 several 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 ['Finance and Economics' programme](#) brings together leading experts in data science, machine learning, finance and the social sciences, from both academia and industry to tackle the most challenging questions by producing world-leading research with significant impact. The programme works closely with government and industry to exploit the potential of new technologies in the financial sector and economic research, and to position the UK as the leader in these areas. The programme is led by the Programme Director, Lukasz Szpruch.

The programme has recently received a significant investment from the [Engineering and Physical Sciences Research Council](#) (EPSRC) to deliver one of eight business-led "Prosperity Partnerships". This will see the Turing, HSBC, and other organisations in the financial sector developing a Framework for responsible adoption of Artificial Intelligence in the financial services industry (FAIR). FAIR brings together academia and industry to advance research and develop practical and scalable solutions needed to fully realise the transformational benefits of responsible adoption of AI across the financial services industry.

We are driven by our vision to enable the finance sector to leverage transformational benefits through the responsible adoption of AI by:

- Developing an actionable framework for safe and trustworthy deployment of AI in Financial Services, underpinned by foundational research methodologies formulated by cross-disciplinary and cross-sectoral teams.
- Developing digital sandbox environments to enable validation and testing and co evaluation of emerging technologies in a transparent manner.
- Identifying industry-wide standards and processes to address trade-offs between regulatory and ethical dimensions facing industry and regulators across a range of contexts and use-cases.

[FAIR](#) has five main research themes:

1. Robustness and Resilience
2. Privacy and Security
3. Fairness and Transparency
4. Verification and Accountability
5. Integration Environment

Find out more: [Project FAIR: Framework for responsible adoption of artificial intelligence in the financial services industry](#).

The Turing are hiring a team of Research Associates to support and enable the delivery of the five main research themes under the direction of the Turing Programme Director, and the project PIs. The team will collectively have a broad range of expertise, and we will be hiring based on varied skills required for each specific challenge.

We are looking for two Research Associates to support and enable the delivery of this project under the direction of Professor Carsten Maple.

ROLE PURPOSE

The successful candidate will work in partnership with our industry partner HSBC on a project that is aligned to the Privacy and Security research theme within FAIR. The successful candidate will engage with companies and regulators globally to build a picture of activity in homomorphic encryption. The work will take the form of both desk research and qualitative information gathering including surveys and interviews. Through collecting examples and building understanding of where homomorphic encryption has been put into production at scale, a clear business-case with a tangible evidence-base can be produced to secure buy-in and investment in homomorphic encryption at a senior level within HSBC.

The initial project phase is designed to have near-term impact, however there is potential for the Turing to support HSBC's roadmap in this space in the long-term, and HSBC anticipates the longer-term impact and roll-out of this work to be global. There is also opportunity for project learnings regarding the stance of regulators to inform the development of homomorphic encryption methods at an academic level.

Dedicated to our new partnership, the Research Associate will also act as a linchpin and key interface between our two organisations and will play a key role in both delivering and bringing to life our research across the partner and amongst the Turing community.

The candidate will join a vibrant team of researchers working in privacy and security and will have opportunities to engage with cutting-edge projects and experts at leading universities. These will include Sam Cohen, Gesine Reinert and Marta Kwiatkowska (Oxford), Carsten Maple and Graham Cormode (Warwick), Adrian Weller (Cambridge), Philip Treleaven (UCL) and Lukasz Szpruch (Edinburgh), as well as project teams funded by other strategic partnerships.

DUTIES AND AREAS OF RESPONSIBILITY

Successful candidates will:

- Contribute to an understanding of the current application of homomorphic encryption (HE) in practice through secondary research including:
 - Identifying commercial solutions for HE in the finance sector and adjacent sectors
 - Identifying the engagement of regulatory bodies in the deployment of HE , in finance and adjacent sectors
 - Identifying and analysing the technical challenges and benefits in deploying HE in finance and adjacent sectors
 - Identifying and analysing the technical challenges and benefits in deploying HE in finance and adjacent sectors

- Contribute to an understanding of the current application of homomorphic encryption (HE) in practice through primary, qualitative research including:
 - Understanding the technical challenges faced in, and benefits derived from, the deployment of HE in finance and adjacent sectors
 - Understanding the regulatory challenges faced in the deployment of HE in finance and adjacent sectors, and lessons learned
 - Critically analysing the qualitative information gained through surveying relevant stakeholders
 - Document processes for effective and efficient reuse across multiple domains.
- Support collaboration with academic experts and broader research partners from across the Turing and the wider Turing community
- Produce a high-quality output that provides a business case on the deployment of HE in finance.
- Become part of the broader partnership team and be expected to engage on a regular basis with the partner.

Other duties:

The successful candidate may be expected to:

- Present, disseminate and explain our work at internal and external events hosted by Turing and/or the partner.
- Contribute to the life of the Institute and support its community.

Please note that job descriptions cannot be exhaustive, and the post-holder 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.

PERSON SPECIFICATION

<p align="center">Skills and Requirements</p> <p align="center">Post holders will be expected to demonstrate the following:</p>	<p align="center">Essential (E)</p> <p align="center">Desirable (D)</p>	<p align="center">Tested at application(A)</p> <p align="center">Tested at interview(I)</p>
Education		
Research Associate level: PhD in Mathematics, Statistics, Economics, Operations Research, Computer Science or closely related discipline.	E	A
Research Assistant level: Near completion of a PhD or equivalent level of professional qualification in Mathematics, Statistics, Economics, Operations Research, Computer Science or closely related discipline.	E	A
Knowledge and Experience		
A background in one or more of the following: Probability Theory, Stochastic Analysis and Control, Bayesian Inference and Probabilistic Machine Learning, mathematical Modelling of collective behaviour of interacting systems and rigorous agent-based modelling.	E	A
Experience in design, development and implementation of research software libraries, ideally using one of the following: Python, R, Julia and their associated frameworks.	E	A&I
Track record of the ability to initiate, develop and deliver high quality research aligned with the research strategy indicated by the PI and any industrial stakeholders and to publish in peer reviewed journals and conferences.	E	A&I
Hands-on experience with Machine Learning methods	E	A/I
Track record of outstanding research and in delivering impact appropriate to career stage	E	A
Experience in publishing research papers, code libraries or technical reports and giving presentations or classes on technical subjects.	E	A/I
Ability to create and promote a collegial and collaborative approach to interdisciplinary research activities.	D	A/I
Communication		
Excellent writing skills and proven ability to communicate complex, specialist or conceptual information/research findings clearly and persuasively to diverse audiences. Including the ability to explain technical concepts to technical and non-technical audiences.	E	I
Ability to write research reports and papers in styles accessible to both academic and lay audiences.	D	I
Analysis and Research		
Ability to organise working time, take the initiative, and carry out research independently, under the guidance of the PI	E	I

Ability to use own judgement to analyse and solve problems	E	I
Liasion and Networking		
Participates in networks within the organisation or externally to share knowledge and information in order develop practice or help others learn	E	A/I
Decision Making Processes and Outcomes		
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
Other Requirements		
Commitment to meeting deadlines	E	I
Commitment to EDI principles and to the Organisation values	E	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.

Our values

- Trust**
We create an environment where we have trust and can be trusted
- Inclusivity**
We expect our Turing community to contribute to a culture that is inclusive and free of barriers
- Respect**
We all have different roles, priorities and challenges but our shared purpose is the same
- Leadership**
Leadership is everyone's business; Turing leaders set the right tone and lead by example
- Transparency**
Everyone should understand the how and the why of our decisions and actions
- Integrity**
We are all ambassadors for the Turing's mission of changing the world for the better

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 on 020 3970 2148 or 0203 862 3340, or email recruitment@turing.ac.uk.

CLOSING DATE FOR APPLICATIONS: 03 January 2022 at 23:59

TERMS AND CONDITIONS

This full-time post is offered on a 2-year fixed-term basis. The annual salary is £37,000-£42,000 (depending on experience) plus excellent benefits, including flexible working and family friendly policies, <https://www.turing.ac.uk/work-turing/why-work-turing/employee-benefits>

Candidates who have not yet been officially awarded their PhD will be appointed as Research Assistant at a salary of £34,500 per annum

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 team to reflect this. We therefore welcome applications from the broadest spectrum of backgrounds.

Reasonable adjustments to the interview process will be made for any candidates with a disability.

Please note all offers of employment are subject to continuous eligibility 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.