

The Alan Turing Institute

Research Associate, Computational Statistics in Engineering

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

We invite applications for a Postdoctoral Research Associate to join the new Computational Statistical Inference for Engineering and Security (CoSInES) project. This is a timely project developing new theory and methodology within Statistical Science and Scalable Computational Statistics, with particular focus on applications within the exciting new areas of Data-Centric Engineering and Defence and Security.

This £3M programme led by Gareth Roberts at Warwick is funded by the EPSRC, and brings together research groups from the Universities of Lancaster, Bristol, Oxford and Warwick. A major project partner will be the Alan Turing Institute <https://www.turing.ac.uk>, in particular its programmes on Data-Centric Engineering (DCE) and Defence and Security (D&S). More details of the CoSInES project can be found at <http://www.cosines.org/>.

There are tremendous demands for advanced statistical methodology to make scientific sense of the recent deluge of emerging data. Huge challenges in modelling, computation, and statistical algorithms have been created by diverse and important questions in virtually every area of human activity. This project aims to create a step change in the use of statistical methodology, motivated by challenges in modelling, computation, and statistical algorithms, for use in engineering and security.

The problems this project will tackle will be characterised by complex large datasets indexed in space and often continuously in time. New models will require not only spatial components, but also large network and time-series structure often requiring the solutions to stochastic (randomly distributed) differential equations.

Inference - drawing conclusions from data - will require a completely new generation of algorithms. Such algorithms will need to be tailored for particular computer architecture, and will require underpinning theory to show they scale. New theory developed on the computational and statistical robustness of approaches will be required to ensure the usefulness of the procedures developed.

The main focus of the research will be in developing and studying generic statistical methods which have applicability in a wide-range of applications.

The work will cover a range of different approaches:

- Studying high-dimensional statistical algorithms whose performance scales well to high-dimensions and to big data sets.

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- Developing statistical theory to understand new complex models.
- Producing methodology tailored to specific computational hardware.
- Studying the statistical and algorithmic effects of mis-match between data and models.
- Building methodology for statistical inference where privacy constraints mean that the data cannot be directly accessed.

The research will focus on the major application domain which aligns with the Turing research programme: [Data-Centric Engineering](#). Partnership between the researchers and the Turing's programmes will maximise the impact and speed of translation of the research being conducted. For Data-Centric Engineering, an example is the project '[A digital twin of the world's first 3D printed steel bridge](#)'. The project is presenting enormous challenges to existing applied mathematical and statistical modelling of complex structures where even the bulk material properties are unknown and randomly distributed. A new generation of numerical inferential methods are therefore needed to support this progress.

ROLE PURPOSE

We are seeking to recruit a postdoctoral Research Associate to join a team of investigators and other research associates which includes the contacts listed below as well as Paul Fearnhead (Lancaster), Christophe Andrieu (Bristol), Arnaud Doucet (Oxford), Mark Girolami (Cambridge and Turing) and Mark Briers (Turing), Anthony Lee (Bristol and Turing), Chris Holmes (Oxford and Turing) and Alex Mijatovic (Warwick and Turing).

We are seeking applications specifically in the areas of the methodology and applications of Computational Statistics to Data Centric Engineering <https://www.turing.ac.uk/research/research-programmes/data-centric-engineering>. The successful applicant will be based at the Alan Turing Institute and be a member of the Data Centric Engineering Programme led by Mark Girolami.

You should have, or be close to completing, a PhD in Statistics or a related discipline. You will work directly with the investigators to undertake and support the research necessary to achieve the specific aims within this grant. This will include, for example, publishing in leading statistical/application journals, presentation of research at workshops and conferences, developing code implementing new statistical methods, and active involvement in project meetings. You will be experienced in one or more of the following areas: Statistics, Computational Statistics, Theory and methodology of Stochastic Algorithms, High-Performance Computing. You will have demonstrated the ability to develop new statistical methodology. We are particularly keen to encourage applicants with strong computational skills, and are looking to put together a team of researchers with skills that cover theoretical, methodological and applied statistics. A demonstrable ability to produce academic writing of the highest publishable quality is essential.

This full-time post is offered on a fixed-term contract for a period of 30 months starting in January 2021.

Informal enquiries may be addressed to Professor Mark Girolami (mgirolami@turing.ac.uk) . Please note that applications sent directly to this email address will not be accepted.

DUTIES AND AREAS OF RESPONSIBILITY

The Research Associate will work closely with the project investigators based at The Alan Turing Institute with the aim:

- To take initiatives in the planning and execution of research;
- To identify and develop suitable techniques, and apparatus, for the development and implementation of the existing programmes;
- To conduct data analysis;
- To ensure the validity and reliability of data at all times;
- To maintain accurate and complete records of all findings;
- To undertake any training and or professional development;
- To prepare material for presentation in oral and poster formats;
- To draft publications and prepare them for submission to refereed journals;
- To write and publish articles in peer-reviewed journals/digests that highlight findings from research ensuring consistency with the highest standards of academic publication and showcasing the Institute's research leadership;

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- To contribute to writing bids for research grants;
- To provide guidance to staff and students;
- To supervise practical work and advise students on techniques;
- To take responsibility for organising resources and effective decision making in support of research;
- To attend relevant workshops and conferences as necessary;
- To develop contacts and research collaborations within the Institute and the wider community;
- Teaching and related activities may be required as part of collaboration work.

Other duties:

- To work in close co-operation with the principal investigator and collaborators on the project;
- To provide regular updates on progress to the team;
- To undertake appropriate administration tasks;
- Support the Principal Investigator and research group in the design and development of the research programme;
- To ensure compliance with secure handling of data and health and safety in all aspects of work;
- To participate in and develop internal and external partnerships, for example to identify sources of funding, generate income, obtain projects, or build relationships for future activities.

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PERSON SPECIFICATION

<p style="text-align: center;">Skills and Requirements</p> <p style="text-align: center;">Post holders will be expected to demonstrate the following</p>	<p style="text-align: center;">Essential (E)</p> <p style="text-align: center;">Desirable (D)</p>	<p style="text-align: center;">Tested at application(a)</p> <p style="text-align: center;">Tested at interview (i)</p>
Education		
Research Associate level: Holds a PhD or equivalent level of professional qualification in Statistics or closely related discipline.	E	a
Research Assistant level: Near completion of a PhD or equivalent level of professional qualification in Statistics or closely related discipline.	E	a
Knowledge and Experience		
A solid background in one or more of the following: Statistics, Computational Statistics, Theory and methodology of Stochastic Algorithms, High-Performance Computing.	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
Communication		
Excellent written communication skills, including the ability to write for publications, present research proposals and results, and represent the research group at meetings.	E	i
Teamwork and Motivation		
The ability to work in a team and interact professionally within a team of researchers and PhD students.	D	i
Planning and Organising		
The ability to initiate, plan, organise, implement and deliver programmes of work to tight deadlines	E	i
Ability to organise and prioritise own work with minimal supervision	E	i
Initiative and Problem Solving		
Creative approach to problem solving	D	i
Analysis and Research		
Ability to carry out original research and to produce published research papers	E	a & i

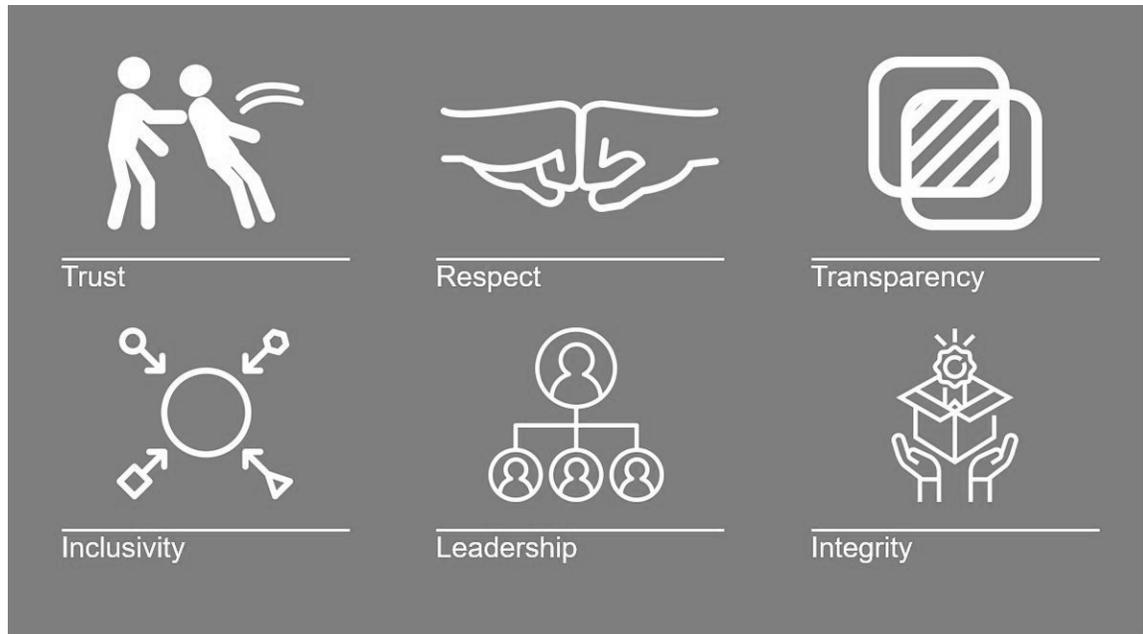
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A developing track record in producing high quality academic publications	E	a & i
Ability to write research reports and papers in styles accessible to both academic and lay audiences	E	a & i
Previous experience of conducting studies of related literature and research to support the design and implementation of projects	E	a & i
Previous experience and ability of developing reports, ensuring conceptual relevance, comprehensiveness, and currency of information	E	a & i
Ability to identify, develop and apply new concepts, techniques and methods	E	I
Liaison and Networking		
Ability to network with others with shared interests, collaborating on projects and ability to build relationships	E	i
Teaching and Learning		
Teaching and related activities may be required as part of collaboration work	E	a & i
Other Requirements		
Commitment to meeting deadlines	E	I
Flexible attitude towards work	E	I
Commitment to EDI principles and to the Organisation values	E	i

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.

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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 [Rules of the Game](#)



Respect – We treat everyone with respect, dignity and kindness and acknowledge the experiences, skills and contributions of others.

Trust - We communicate openly and honestly to support an environment where we have trust in each other.

Transparency – We seek to ensure that everyone understands the how and the why of our decisions and actions. We take on board to feedback when those decisions are challenged.

Inclusivity – We are committed to continuously learning how to be more inclusive by listening to those facing barriers.

Leadership – We recognise creating an inclusive, diverse and equitable institute requires leadership from all. We stand up and speak out when change is needed.

Integrity – We recognise that how we work is as important as our outputs and seek to exemplify best practice in all our decisions.

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, covering letter and contact details for your referees. If you have questions about the role or would like to apply using a different format, please contact them on 0203 862 3575, or email recruitment@turing.ac.uk.

CLOSING DATE FOR APPLICATIONS: 15 November 2020

TERMS AND CONDITIONS

This full-time post is offered on a fixed-term basis for 30 months starting in January 2021. The annual salary is £35,000-£41,000 (dependent on skills and 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 within the salary range £32,000-£34,000 per annum.

This job description is written at a specific time and is subject to change as the demands of the Institute and the role develop. The role requires flexibility and adaptability and the post holder needs to be aware that they may be asked to perform tasks and be given responsibilities not detailed in this job description.

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.

Reasonable adjustments to the interview process can also 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.