Research Associate, Cardiac Digital Twins

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

Turing Research and Innovation Cluster – Digital Twins

Together, The Alan Turing institute and its partners have invested more than £26M in digital twin (DT) research and innovation across a wide portfolio of projects including developing foundational theory and applications in the engineering, environmental and social sciences. This represents one of the largest portfolios of academic DT research in the UK. To build on this wealth of activity we have recently established a Turing Research and Innovation Cluster in Digital Twins (TRIC DT), which forms a central part of the Turing's foundational research capability and the science and innovation strand of the Institute's wider strategy. The overarching objective for the TRIC-DT is to democratise access to Digital Twin technology by providing open and reproducible computational and social tools freely accessible to the UK research and innovation communities.

While DT technology has proven to be extremely powerful in a range of areas, current DTs are highly bespoke, and their development and deployment to address real-world problems requires specialised expertise and computational infrastructure. This has created a barrier that fundamentally limits their use. As has been true with other powerful computational technologies realizing the potential of DTs requires a robust, user-friendly, open-source toolkit for implementation.

The TRIC-DT has three interlinked thematic research topics: infrastructure, health & environment. The infrastructure theme is led by Profs. David Wagg & Keith Worden (job share), the health theme is led by Prof. Steven Niederer, and the environment theme is led by Drs Kirstine Dale & Scott Hosking (job share).

ROLE PURPOSE

We are seeking a Research Associate to work as part of TRIC DT Healthcare Theme. The project will focus on the rapid and robust creation of cardiac digital twins from UK biobank data at scale. This role will involve utilizing expertise in applied probabilistic and generative deep learning, as well as machine learning algorithms, to contribute to the advancement of digital twin technology in the healthcare sector.

As a Research Associate, you will have the opportunity to customize deep learning and machine learning models using PyTorch and Scikit-learn libraries. Proficiency in object-oriented programming with Python, including functions, classes, dictionaries, and working with multiple data frames, is essential for this role.

A key responsibility will be handling and analyzing the UK Biobank dataset, to convert them into suitable formats for deep learning and medical image analysis. Knowledge of tools such as pandas data frame, scikit-image, SciPy, SimpleITK, NiBabel, OpenCV, and NumPy will be used. Additionally, expertise in handling temporal medical imaging and longitudinal data formats, specifically those found in the UK Biobank dataset, is required.

The successful candidate will be proficient in customizing different visualization tools to effectively visualize multi-dimensional healthcare data. Integration of multiple datasets, including imaging, clinical, and demographic information, will be an essential aspect of the role.

Furthermore, the Research Associate will possess the necessary knowledge to run deep learning models on high-performance computing (HPC) servers or cloud-based systems. Experience in deploying deep learning models using Docker technology in virtual environments is also expected.

If you have a strong background in applied probabilistic, generative deep learning, and machine learning algorithms, along with the ability to handle and analyze healthcare datasets, we encourage you to apply. Join our team in the Health Theme at the Alan Turing Institute and contribute to ground breaking research in the field of digital twins for healthcare applications.

Links to the DT Innovation and Impact Hub: In addition to the scientific research described above, the work will be strongly connected to the activities happening in the TRIC-DT Innovation and Impact Hub. In particular we intend to contribute to developing an open-source library of code for digital twin implementation and operation.

DUTIES AND AREAS OF RESPONSIBILITY

- To undertake research related opensource software for the rapid creation of cardiac digital twins
- To produce high-quality research publications documenting the results of the research, to publish these papers in relevant peer-reviewed scientific journals of international standing, and to present these results at conferences and workshops.
- To hold regular meetings with designated members of staff and with other collaborators.
- To collaborate with and support colleagues in the development of research links between the Turing and their partners, and the wider community as appropriate.
- To travel as necessary to present work and meet with external collaborators.
- To take the initiative and make original contributions to the research programme wherever possible, and to contribute freely to the team research environment in an inclusive manner conducive to the success of the research project as a whole.
- Collaborate with the TRIC-DT Network and engage with the Innovation and Impact Hub team and activities to support the goals of democratising access to digital twin technology by providing open, reproducible and trustworthy computational and social tools.

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 qualification/experience in Computer Science, Artificial Intelligence, Mathematics or Engineering or a related field of study.	E	A
Knowledge and Experience		
Possess sufficient specialist knowledge relating to AI for medical image analysis AI, and related ML methods.	E	A
Experience of defining the research direction in collaboration with Principal Investigators as appropriate to career stage.	E	I
The ability to initiate, develop and deliver high quality research aligned with the research strategy as indicated by the PI and any industrial stakeholders, and to publish in peer reviewed journals and conferences.	E	A/I
Advanced coding skills in relevant programming languages, particularly python.	E	A
Knowledge and interest in digital twins and AI.	E	A
Communication		
Excellent communication skills with the ability to present complex information and conceptual ideas to a range of audiences.	E	A/I
The ability to write research reports and papers in styles accessible to both academic and lay audiences.	E	I
Project Delivery		
Able to identify sources of funding, generate income, obtain consultancy projects and develop external networks for future activities.	D	A/I
Demonstrated ability to collaborate actively within the Institution and externally to complete research projects and advance thinking.	E	A/I
Able to balance the pressures of research, administrative demands and competing deadlines to meet objectives.	E	I
Decision Making		
Work with others to make collaborative decisions that may be operational or strategic and impact immediate team or work area.	E	I
Ability to make independent decisions which are low risk and that mainly affect themselves or a small number of people and are guided by regulation and practice	E	I
Initiative and Problem Solving		
Uses judgement to analyse and solve problems and take action to prevent recurrence of problems.	E	I
Consider possible solutions to identify those which offer wider benefits and obtain evidence to support thinking	E	I
Analysis and Research		

Ability to plan and implement rigorous analysis plans.	E	I
Identify and use a range of standard sources to gather and analyse routine data and produce reports that can be interpreted by others.	E	I
Understand when additional data is required and identifies appropriate sources. Produces reports that identify key issues and findings.	E	I
Other Requirements		
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 20 3862 3536, or email recruitment@turing.ac.uk.

CLOSING DATE FOR APPLICATIONS: Sunday, 24 September 2023 at 23:59

TERMS AND CONDITIONS

This full time post is offered on a fixed term basis for two years. The annual salary is £42,893 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 £40,148 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 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*.*