

The Alan Turing Institute

Research Associate – EDoN: Early Detection of Neurodegenerative Disease

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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 Alan Turing Institute has been awarded a grant by Alzheimer's Research UK (ARUK) to lead the Analytics Hub for the EDoN initiative.

Early Detection of Neurodegenerative diseases (EDoN) is the largest initiative in the world that will collect, share and analyse clinical and digital health data to detect diseases like Alzheimer's. Ultimately, this approach would be used by doctors to give an earlier and much more accurate diagnosis of dementia diseases.

The Alan Turing Institute is leading on the EDoN Analytics Hub which is tasked with designing and performing the analyses that will allow EDoN to make sense of the data collected in the project. The Analytics Hub is composed of data scientists and is responsible for developing, validating and refining machine learning 'fingerprint' models that can detect the diseases that cause dementia at their earliest stage.

The [Health and Medical Sciences](#) programme at the Turing delivers research into the theory and methods of AI, statistics, and data analytics underpinning medical and health applications that will enable scientists to do better science, without compromising respect for privacy and patient trust. The Analytics Hub is led by Professors Richard Everson (Alan Turing Institute and Exeter University) and Chris Holmes (Alan Turing Institute and Oxford University), and is recruiting two Senior Research Associate/Research Associates to support the data analytics and modelling. There may be opportunities for a joint appointment or visiting positions at the universities of Oxford or Exeter.

ROLE PURPOSE

The Research Associate will work closely with Professors Richard Everson and Chris Holmes and the Analytics Hub to deliver the data analytics and modelling aspects of the Analytics Hub. The post-holder will explore existing and develop novel machine learning methods to model and analyse retrospective and prospective data collected by the EDoN project and held in the Turing Secure Research Environment.

This role represents an outstanding opportunity to influence the direction of data intensive research to improve millions of people's lives. You will develop novel methods to, for example, reduce misclassification of individuals due to co-morbidities, accurately predict particular disease subtypes, detect and model cognitive decline, combine multi-modal datasets. Initial work will be on retrospective data, but we will rapidly move to novel forms of data collected on low-burden digital platforms, such as smart phones and wearable technologies. Particular attention will be paid to issues around interpretability and

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reproducible research. You will produce breakthrough research in machine learning and data science for the early detection of neurodegenerative disease, publishing in top-rated journals and conferences.

Successful candidates should have a strong quantitative background and preferably a strong machine learning and statistics background and be eager to do research at the interface of AI and neuroscience. There is significant scope for the postholder to develop new skills and grow in the role. We are excited to work with applicants who bring a fresh perspective on a paradigm shifting and ambitious research goal.

As a leader in your field and area of expertise you will collaborate with and coordinate the work of other post-doctoral researchers the Analytics Hub and will design and coordinate analytics work with the Digital and Clinical Hubs. Your colleagues in the Analytics Hub include data wranglers mentored by Dr Ann-Marie Mallon and a reproducibility lead mentored by Dr Kirstie Whitaker at The Alan Turing Institute. The EDoN Clinical Hub is led by Professor Zuzana Walker at University College London and the EDoN Digital Hub is led by Dr Chris Hinds at the Big Data Institute at the University of Oxford. Professor Zoe Kourtzi at the University of Cambridge is the Scientific Director of EDoN and the Chair of the EDoN Steering Group. More information about members of the EDoN collaboration can be found at <https://edon-initiative.org/organisation>. We expect that success in the role will also require close collaboration with other communities such as the Brain Imaging Data Structure (BIDS), UK Dementia Research Institute, and Deep Dementia Phenotyping Network, among others.

This programme of work sits under the Health and Medical Sciences Programme at the Alan Turing Institute and as such the Health Programme delivery team will enable extensive opportunities for you to collaborate with and learn from experts from across all programmes at The Alan Turing Institute. There may be opportunities for a joint appointment or visiting positions at the universities of Oxford or Exeter. Informal enquiries can be directed to healthprogramme@turing.ac.uk

DUTIES AND AREAS OF RESPONSIBILITY

- Design and implement cutting edge statistical and machine learning methods to detect cognitive decline and dementia-causing diseases. Demonstrate internally across the EDoN consortia and the broader health data science communities, how data science and AI methods can provide predictive modelling to help clinicians in the detection of dementia.
- Compare the power of cognitive, neuroimaging and digital markers in retrospective and prospective cohorts to accurately detect dementia.
- Determine the integrity of digital markers and estimating the scale of data collection that will be necessary for the EDoN project's overarching vision of detecting diseases like Alzheimer's years before the symptoms of dementia start.
- Analyse initial prospective data from the Predictors of COgnitive DEcline in attenders of memory clinic (CODEC) study based at the Essex Neurocognitive Clinic along with other pilot data to determine the integrity of digital markers and estimating the scale of data collection that will be necessary.
- In collaboration with the EDoN Reproducibility Lead, deliver robust and transparent algorithms and models that can be reproducibly deployed at scale for future analysis work.
- Catalyse connections and collaboration between EDoN team members across a distributed team. This could come in the form of synchronous regular meetings or it could occur asynchronously, for example through active engagement on distributed channels such as Slack and private GitHub repositories.
- Communicate technical topics to colleagues and external partners by preparing and presenting reports, blog posts, organising and delivering presentations, and taking an active role in meetings and discussions. Communications may be synchronous or asynchronous, remote or in-person, and must be prepared at the appropriate granularity of detail for the audience.
- Publish – as lead or co-author – peer-reviewed research articles and, if interested, perspective, opinion and commentary articles
- Contribute to the research aims and challenges of the EDoN Initiative, The Alan Turing Institute's Health and Medical Sciences Programme, and those of The Alan Turing Institute more broadly. This may be through active participation at in-person and online workshops or in conversation with experts across these overlapping communities.

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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.

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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 (or equivalent experience and/or qualifications) in a relevant area, which will include Statistics, Mathematics, Engineering, Computer Science, or related discipline.	E	A
Knowledge and Experience		
Strong background in one or more of the following areas: Bayesian inference, ensemble models, multivariate time-series analysis, medical image analysis.	E	AI
Strong quantitative background, and preferably a strong machine learning and statistics background	E	AI
Experience managing, structuring and analysing research data.	E	AI
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 and Rmarkdown).	E	AI
Interest and/or knowledge of neurodegenerative and cognitive datasets	D	AI
Developing for high-performance computing hardware (CUDA, MPI, OpenMP)	D	AI
Experience contributing to, maintaining and/or leading open source research software projects	D	AI
Communication		
Excellent written and verbal communication skills, including experience in the visual representation of quantitative data, the ability to write for publication, present research proposals and results, and represent the research group at meetings.	E	AI
Ability to communicate research and advocacy clearly and persuasively to diverse audiences.	E	AI
Liaison and Networking		
Ability to collaborate successfully in a multidisciplinary environment across different levels of seniority.	E	AI
Project Management & Project Delivery		
Ability to work flexibly, prioritising tasks to meet deadlines and maintaining a high standard and attention to detail	E	A
Ability to manage the delivery of projects and events.	E	A
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	I
Analysis and Research		
Ability to carry out original research and to produce published research papers	E	A

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Experience of conducting studies of related literature and research to support the design and implementation of projects	E	A
Experience and ability of developing reports, ensuring conceptual relevance, comprehensiveness, and currency of information	E	A
Ability to identify, develop and apply new concepts, techniques and methods	E	A
Other Requirements		
Commitment to EDI principles and to the Organisation values	E	I

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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.

TERMS AND CONDITIONS

This full time post is offered on a fixed term basis for 2 years. The annual salary is £38,850 - £46,200 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 £36,236 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.

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

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.