

The Alan Turing Institute

RESEARCH ASSOCIATE –TOKEN ECONOMY

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 the 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.

Dr Andrea Baronchelli leads the Token Economy Theme at the Alan Turing Institute, which aims to bring together researchers and industrial partners interested in understanding the socio-economic implications of the blockchain revolution and the emerging Token Economy. The overarching goal is to investigate the current blockchain ecosystem to improve the design of future tokens, minimise potential risks for users and maximise potential societal benefits.

This research project will explore the interplay between centralisation and decentralisation in the Token Economy, starting from the Bitcoin blockchain. It will initially focus on dark web marketplaces (DWMs) as both central actors of trade and source of new decentralised avenues for the exchange of wealth and goods. It will then broaden the analysis to investigate how DWM users engage with the rest of the network and, more broadly, how decentralisation and centralisation co-evolve in the network.

We are hiring a Research Associate to support and enable the delivery of this project under the direction of Dr. Andrea Baronchelli.

ROLE PURPOSE

Dark web marketplaces (DWMs) are major actors of illicit online trade, with millions of users producing an aggregated revenue of billions of US dollars. Recent research by the Dr Andrea Baronchelli, the Principal Investigator (PI), and his team¹, revealed a rich user dynamic around DMWs.

The successful candidate will investigate the network dynamics of transactions occurring between DWM users. While the market acts as a fundamental meeting point for users, preliminary research by the PI and his team has revealed that it also favours the emergence of direct transactions between users (for simplicity, P2P network). Thus, the star-like network representation in which a central marketplace is connected with otherwise isolated peers does not capture the real dynamics of DWM ecosystems.

The successful candidate will have the opportunity to contribute to the project with their current expertise while deepening their knowledge of methods required to deal with large time-evolving networks. They will interact with scientists from other disciplines in order to embed the project results into a genuinely interdisciplinary setting. With time, the postdoc will have the opportunity to assume a leading role in the project implementation and dissemination (including publications), as well as in designing new research.

The research is sponsored partly through a generous gift from PayPal and it is anticipated that there will be frequent interactions with the PayPal Team working on topics of common interest. In London, the postdoc will be based primarily at The Alan Turing Institute and secondarily at City University of London. They will work directly with the PI and will be fully embedded in his research team, which in October 2021 is formed by 2 PhD students and 3 Postdocs (excluding the one to be hired for this project). The postdoc will also have opportunities to engage with other cutting-edge projects and world-class experts hosted by the Turing.

It is expected that the research will result in at least two scientific publications in interdisciplinary journals and results will also be presented at international conferences such as NetSci, Conference on Complex Systems (CCS) etc. or at more specialised venues.

DUTIES AND AREAS OF RESPONSIBILITY

Successful candidates will:

- Apply state-of-the-art and novel data science, network science, and artificial intelligence techniques emerging from the Institute and elsewhere to the research challenges of the Turing partnerships:
 - Apply and develop methods for analysing large time-varying networks.
 - Apply and develop metrics to characterise both microscopic and macroscopic behaviour of large time-varying networks.
 - Contribute to the development of time-varying network models.
 - Enable data sharing between organisations and different departments within an organisation.
- Scope, pilot and deliver high quality research activity in partnership with partner stakeholders, and under the Direction of the Principal Investigator and Programme Director:
 - Understand which data are, or might be, available; and collect and manage this data.
 - Perform analyses, which might include: building statistical models; applying machine learning techniques; building models and simulations.
 - Drive the development of mathematical and statistical techniques for the inference of large networks.
 - Document processes for effective and efficient reuse across multiple domains.

¹ ElBahrawy, Abeer, et al. "Collective dynamics of dark web marketplaces." *Scientific Reports* 10.1 (2020): 1-8.

- Drive collaboration with academic experts and broader research partners from across the Turing and the wider Turing community
- Publish and disseminate high-quality research papers and publications detailing research output and project case-studies.
- Become part of the broader partnership team and be expected to engage on a regular basis with the partner.

Other duties:

- 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.

PERSON SPECIFICATION

<p align="center">Skills and Requirements</p> <p>We are seeking candidates with a broad range of experience and who can be flexible in some areas.</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 Computer Science, Physics, Statistics, Mathematics, Economics, Operations Research, 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 solid background in one or more of the following: Network Science, Data Science, 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 outstanding research and in delivering impact appropriate to career stage	E	A
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.	D	A&I
Hands-on experience with Machine Learning methods	D	A/I
Demonstrated enthusiasm and ability to rapidly assimilate new computational and mathematical ideas and techniques on the job, at a more than superficial level, and apply them successfully.	D	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
Liaison 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: 10 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 £34,510 per annum

This role is located at The Alan Turing Institute, 96 Euston Road, London, NW1 2DB.

From 4th January 2022, The Alan Turing Institute will trial a Hybrid Working Model for an initial six-month trial period. The Initial expectation is that staff will be based at the above location for at least 2-4 days per month.

Remote working days will be subject to the operational and role requirements and are to be agreed with the Line Manager

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.