### Post Specification

<table>
<thead>
<tr>
<th><strong>Post Title:</strong></th>
<th>Research Assistant (Marie Skłodowska-Curie Actions Doctoral Networks PhD Studentship)</th>
</tr>
</thead>
</table>
| **Post Status:** | Specific Purpose Contract – Full-time  
2 Positions Open |
| **Research Group / Department / School:** | School of Computer Science and Statistics, Trinity College Dublin, the University of Dublin |
| **Location:** | O’Reilly Institute  
Trinity College Dublin, the University of Dublin  
College Green, Dublin 2, Ireland |
| **Reports to:** | Prof Andrea Patane |
| **Salary:** | Appointment will be made at a salary level in line with Marie Skłodowska-Curie Actions regulations for Doctoral Candidates which includes a basic salary of €38,000/year, a mobility allowance (€600/month) and a family allowance (if the recruited doctoral candidate has or acquires family obligations during the duration of the fellowship). The exact salary will be confirmed upon appointment and is dependent on the candidate qualifications, experience and individual circumstances. |
| **Hours of Work:** | 39 hours per week (full time) |
| **Closing Date:** | 17:00 (Irish Standard Time), 20th November 2023 |

### Post Summary

This post is for 2 PhD Researcher positions as part of the RELAX Marie Skłodowska-Curie Actions (MSCA) Doctoral Network project to work on two distinct projects led by Trinity College Dublin. RELAX includes 12 partnering institutions and a cohort of 12 PhD Researchers; the research network will investigate cutting-edge topics in data analytics systems and data-
intensive software systems to address the question of how relaxing the semantics of data analytics can enhance the capabilities of data analytics systems, both functionally and performance-wise. Successful candidate will be employed as a Researcher (for three years) and registered as a PhD student (typically a four-year duration) at Trinity College Dublin.

**Standard Duties and Responsibilities of the Post**

The first PhD project will focus on numeric accuracy and reproducibility in deep learning training and inference. Different versions of machine-learning hardware and software typically yield slightly different answers due to differences in floating point order of evaluation. The result is often poorer accuracy, or the same overall accuracy but different classifications between the two implementations, with unpredictable results. The goal of this project is to develop methods for trained models with sharper distinctions between classifications so that the model is more resilient to minor changes.

The second PhD project will focus on arithmetic and number systems for deep learning. Developing numeric types that match value distributions and operations of training better than existing default types. This project will identify number systems that make better use of limited encodings for both inference and training. It will also investigate domain-specific and application-specific number systems and encodings for improved compactness and customize the level of precision of data to the movement of the data within the parallel/distributed computing system.

Both PhD Researchers will be based in the School of Computer Science and Statistics at Trinity College Dublin, Ireland and supervised by Professor Andrea Patane. They will work closely with the other ten Doctoral Researchers hired on the RELAX project. Each PhD Researcher will also undertake a mobility secondment in industry to gain insight into the broader applications of their work on deep learning systems and to develop their industry networks. There will be opportunities for the PhD Researchers to present their work at national and international conferences.

**Funding Information**

The RELAX Doctoral Network is funded by the European Union and is part of the Marie Skłodowska-Curie Actions – Doctoral Networks (MSCA-DN) programme.
Person Specification

Note on eligibility requirements:
Applicants need to fully respect three eligibility criteria:

- Supported researchers must be Doctoral Candidates (DC), i.e., not already in possession of a doctoral degree at the date of the recruitment. Researchers who have successfully defended their doctoral thesis but who have not yet formally been awarded the doctoral degree will not be considered eligible.

- Recruited researchers can be of any nationality and must undertake trans-national mobility (i.e., move from one country to another) when taking up the appointment. In particular, at the time of selection by the host organization, researchers must not have resided or carried out their main activity (work, studies, etc.) in the country of their host organization for more than 12 months in the 3 years immediately prior to their recruitment. Short stays, such as holidays, are not taken into account.

- The candidates’ ability to understand and express themselves in both written and spoken English should be sufficiently high for them to derive the full benefit from the network training.

Qualifications
At least a 2.1 grade (or equivalent) in an undergraduate or postgraduate degree in Computer science, Applied Mathematics, Electrical Engineering or closely related discipline. An undergraduate degree is essential, and a Master’s degree is highly desirable.

Knowledge & Experience (Essential & Desirable)

- Basic programming skills in Python and C/C++ are expected, along with proficiency in at least one programming language (Essential)

- Have relevant skills and experiences, and a strong interest in both theoretical and applied science

Skills & Competencies

- Deep interest in big data analysis
• Passionate about doing research and have or be willing to develop the skills to communicate this passion with other scientists and the general public
• Welcome the opportunity to conduct research abroad and to work within an international and multidisciplinary team
• Have excellent English speaking and writing skills

The Trinity College Dublin English language requirements for non-native speakers of English are available here: https://www.tcd.ie/study/apply/admission-requirements/postgraduate/

Application Procedure
Application process Please adhere to the following guidelines to apply for this position. Each application should consist of:

• A maximum 1-page cover letter outlining your suitability for the post, with reference to relevant qualifications or experience;
• Detailed curriculum vitae, including qualifications and experience, publications (if applicable) and the name and email contacts of two academic referees;
• Transcripts of degrees;
• A maximum 1-page statement outlining your research project experience to date (this can be related to undergraduate or postgraduate research projects and/or research work experience etc).

All four items above should be compiled into a single pdf document and be sent by email to Professor Andrea Patane at apatane@tcd.ie. For the subject of your email, please use: RELAX-DN TCD application – [your surname] The deadline for applications is 20th November, 2023, 17:00 Irish Standard Time.

Do not include additional documents other than the one that has been requested. Do not include substantive information in the body of the email.

Please note that applicants that do not follow these guidelines may not be considered for shortlisting.

Informal queries can be emailed to Professor Andrea Patane apatane@tcd.ie

Additional Information
Successful candidates will receive an attractive salary following the MSCA regulations for doctoral candidates. The salary includes a basic salary of €38,000/year, a mobility allowance (€600/month) and a family allowance (if the recruited doctoral candidate has or acquires family obligations during the duration of the fellowship). The exact salary will be confirmed upon appointment and is dependent on the candidate qualifications, experience and individual circumstances. The guaranteed PhD funding is for 36 months. Financial support will be available for year 4, however, such support would be at a lower level than years 1-3. Please note that the salary attached to this PhD Research position in years 1-3 is considerably higher than what PhD students are usually paid in Ireland.

In addition to their individual scientific projects, all doctoral candidates will benefit from further training, which includes internships/secondments in relevant industry, a variety of training courses (including transferable skills), and active participation in workshops and conferences.

**RELAX Project Description**

Many companies, across all industry sectors, are increasingly becoming data companies as they collect, curate, and analyse massive amounts of data to increase productivity and cost-effectiveness, or to develop new data-driven products and services. Within each application domain, the volume and rate of producing data increases over time, which has a knock-on impact on the power consumed by the data centres, devices and communication networks that drive data analytics. Consequently, the efficiency of data analytics is increasingly important: to scale analytics to increasingly larger and more complex data sets while maintaining low response times, but also to manage the computational requirements of analytics. Data analytics, however, operate in a complex software ecosystem combining a multitude of components to handle computation, storage, resource management, etc. Efficiency cannot be isolated in a single component, nor can it be delivered as a service. On the contrary, efficiency must permeate the system design. By consequence, data analytics systems need to be built as bespoke software systems that are optimised based on a thorough understanding of the full software stack. This requires developing an understanding of the domains where these systems would be used and embedding such understandings within the design of the software systems developed. The RELAX Doctoral Network will pursue a fundamentally new approach to this problem by leveraging the semantics or
correctness conditions of applications, with the goal of enhancing scalability, response times, and availability.

The RELAX Doctoral Network is funded by the European Union and is part of the Marie Skłodowska-Curie Actions – Doctoral Networks (MSCA-DN) programme. The network brings together 5 cross-disciplinary research groups working across data science, data management, distributed computing and computing systems and 7 industry partners, spanning 8 European countries (the Netherlands, France, Sweden, Germany, Denmark, Ireland, Greece, and the UK). RELAX offers a research platform and a training program for the Fellows to study the interplay and interdependencies between data, algorithmic semantics, application domain considerations and performance characteristics of computing systems. The Network will train a new generation of industry-conscious thinkers and leaders who will influence the design and operation of future data analytics systems and data-intensive software systems.

Trinity College Dublin, the University of Dublin

Trinity College Dublin, the University of Dublin is Ireland’s leading university, one of the top ranked universities in Europe and a member of the League of European Research Universities. It is currently ranked 98th in the QS World University Rankings 2023 and 91st Worldwide and QS Subject Rankings - Computer Science and Information Systems. Located on an iconic campus in the heart of Dublin’s city centre, Trinity has 18,000 undergraduate and postgraduate students across our three faculties – Arts, Humanities, and Social Sciences; Engineering, Mathematics and Science; and Health Sciences.

The pursuit of excellence through research and scholarship is at the heart of a Trinity education, and our researchers have an outstanding publication record and strong record of grant success. Trinity has developed 19 broad-based multidisciplinary research themes that cut across disciplines and facilitate world-leading research and collaboration within the University and with colleagues around the world. Trinity is also home to 5 leading flagship research institutes:

- Trinity Biomedical Sciences Institute (TBSI)
- Trinity College Institute of Neuroscience (TCIN)
- Trinity Translational Medical Institute (TTMI)
Trinity is home to the famous Old Library and to the historic Book of Kells as well as other internationally significant holdings in manuscripts, maps and early printed material. The Trinity Library is a legal deposit library, granting the University the right to claim a copy of every book published in Ireland and the UK. At present, the Library’s holdings span approximately 6.5 million printed items, 400,000 e-books and 150,000 e-journals.

With over 120,000 alumni, Trinity’s tradition of independent intellectual inquiry has produced some of the world’s finest, most original minds including the writers Oscar Wilde and Samuel Beckett (Nobel laureates), the mathematician William Rowan Hamilton and the physicist Ernest Walton (Nobel laureate), the political thinker Edmund Burke, and the former President of Ireland Mary Robinson. This tradition finds expression today in a campus culture of scholarship, innovation, creativity, entrepreneurship and dedication to societal reform.

Rankings

Trinity College Dublin is the top ranked university in Ireland. Using the QS methodology we are ranked 98th in the world and using the Times Higher Education World University Ranking methodology we are 146th in the World.

- Trinity College Dublin is Ireland’s No.1 University (QS World University Ranking 2023, Times Higher Education Rankings 2022)
- Trinity is ranked 98th in the World (QS World University Ranking 2023)
- Trinity is ranked No.1 in Europe for Producing Entrepreneurs for the 7th year in a row Pitchbook 2021-2022

Full details are available at: www.tcd.ie/research/about/rankings.

The Selection Process in Trinity

The Selection Committee (Interview Panel) may include members of the Academic and Administrative community together with External Assessor(s) who are expert in the area. Applications will be acknowledged by email. If you do not receive confirmation of receipt within 1 day of submitting your application online, please contact the named hiring lead on the job specification immediately and prior to the closing date/time.
Given the degree of co-ordination and planning to have a Selection Committee available on the specified date, the University regrets that it may not be in a position to offer alternate selection dates. Where candidates are unavailable, reserves may be drawn from a shortlist. Outcomes of interviews are notified in writing to candidates and are issued no later than 5 working days following the selection day.

The Selection Committee may avail of telephone or video conferencing or in person interview. The University’s selection methods may consist of any or all of the following: Interviews, Presentations, Psychometric Testing, References and Situational Exercises.

It is the policy of the University to conduct pre-employment medical screening/full pre-employment medicals. Information supplied by candidates in their application (Cover Letter and CV) will be used to shortlist for interview.

Applications from non-EEA citizens are welcomed. However, eligibility is determined by the Department of Business, Enterprise and Innovation and further information on the Highly Skills Eligible Occupations List is set out in Schedule 3 of the Regulations https://dbei.gov.ie/en/What-We-Do/Workplace-and-Skills/Employment-Permits/Employment-Permit-Eligibility/Highly-Skilled-Eligible-Occupations-List/ and the Ineligible Categories of Employment are set out in Schedule 4 of the Regulations https://dbei.gov.ie/en/What-We-Do/Workplace-and-Skills/Employment-Permits/Employment-Permit-Eligibility/Ineligible-Categories-of-Employment/. Non-EEA candidates should note that the onus is on them to secure a visa to travel to Ireland prior to interview. Non-EEA candidates should also be aware that even if successful at interview, an appointment to the post is contingent on the securing of an employment permit.

**Equal Opportunities Policy**

Trinity is an equal opportunities employer and is committed to employment policies, procedures and practices which do not discriminate on grounds such as gender, civil status, family status, age, disability, race, religious belief, sexual orientation or membership of the travelling community. On that basis we encourage and welcome talented people from all backgrounds to join our staff community. Trinity’s Diversity Statement can be viewed in full at https://www.tcd.ie/diversity-inclusion/diversity-statement.

**Pension Entitlements**

This is a pensionable position and the provisions of the Public Service Superannuation (Miscellaneous Provisions) Act 2004 will apply in relation to retirement age for pension purposes. Details of the relevant Pension Scheme will be provided to the successful applicant.

Applicants should note that they will be required to complete a Pre-Employment Declaration to confirm whether or not they have previously availed of an Irish Public Service Scheme of incentivised early retirement or enhanced redundancy payment. Applicants will also be required to declare any entitlements to a Public Service pension benefit (in payment or preserved) from any other Irish Public Service employment.

Applicants formerly employed by the Irish Public Service that may previously have availed of an Irish Public Service Scheme of Incentivised early retirement or enhanced redundancy payment
should ensure that they are not precluded from re-engagement in the Irish Public Service under
the terms of such Schemes. Such queries should be directed to an applicant’s former Irish
Public Service Employer in the first instance.

Application Procedure

Applicants should submit:
- A maximum 1-page cover letter outlining your suitability for the post, with reference to
  relevant qualifications or experience
- Detailed curriculum vitae, including qualifications and experience, publications (if applicable)
  and the name and email contacts of two academic referees
- Transcripts of degrees
- A maximum 1-page statement outlining your research project experience to date (this can be
  related to undergraduate or postgraduate research projects and/or research work experience
  etc).

All four items above should be compiled into a single pdf document and be sent by email to
Prof. Andrea Patane (apatane@tcd.ie) by 17:00 (Irish Standard Time)
on Monday 20th November 2023.

Applicants whose first language is not English and who have not been educated through the
medium of English may be asked to submit evidence of English language proficiency as per
Postgraduate English Language Requirements at Trinity College Dublin
https://www.tcd.ie/study/apply/admission-requirements/postgraduate/