



## Post Specification

<b>Post Title:</b>	Postdoctoral Research Fellow
<b>Post Status:</b>	Specific Purpose Contract – Full Time Tenable immediately
<b>Research Group / Department / School:</b>	Distributed Systems Group, Discipline of Networks and Distributed Systems, School of Computer Science and Statistics
<b>Location:</b>	Trinity College Dublin, The University of Dublin, College Green, Dublin 2, Ireland
<b>Salary:</b>	Commensurate with experience and achievement (in the range €42,782-€53,439)
<b>Reports to:</b>	Prof. Vinny Cahill & Prof. Ivana Dusparic
<b>Hours of Work:</b>	39 hours per week
<b>Closing Date:</b>	The closing date for applications is June 16 <sup>th</sup> 2023. Late applications will be considered if the post remains unfilled.

## Post Summary

We are seeking to recruit a Postdoctoral Research Fellow to investigate the use of deep reinforcement learning (RL) and swarm intelligence techniques to optimize urban and highway traffic in the presence of autonomous and conventional vehicles within the ClearWay project funded by Science Foundation Ireland from 2022-2026.

The increasing availability of sensor data, including from connected and autonomous vehicles, will make it possible to capture the detailed state of a road network in real time. Along with the ability to exercise an increasing level of control over individual vehicles either indirectly, e.g., via urban traffic control or driver guidance systems, or directly, in the case of (semi-)autonomous vehicles, this offers the opportunity to deploy new approaches to traffic management with the explicit goal of optimizing end-to-end travel-time reliability.

Extending the state of the art in deep RL and swarm intelligence, ClearWay will design algorithms for optimization of urban and highway traffic as a function of the increasing levels of sensor data and increasing levels of control over individual vehicles available. Such algorithms will need to take account of the scale, complexity, and inherent non-stationarity of traffic systems, while adapting to the many transient perturbations that effect traffic flow. The focus is on decentralized and multi-agent algorithms that allow traffic controllers to cooperate towards system-wide optimal solutions. The successful candidate is expected to make contributions to the state of the art in deep RL applied to cyber-physical systems in areas such as multi-agent cooperation, lifelong learning, transfer learning, and explainability.

The position will be based in the School of Computer Science and Statistics at Trinity College Dublin, Ireland under the direction of Prof. Vinny Cahill and Prof. Ivana Dusparic. For informal

inquiries please contact {vinny.cahill, ivana.dusparic}@tcd.ie.

### **Required Qualifications**

The successful candidate must have a PhD in Computer Science, Computer Engineering, Electronic Engineering, or a related field. The post is applicable to both new and experienced PhD holders, and salary will be commensurate with experience and achievement. The successful candidate will join an inter-disciplinary team of highly-skilled and innovative researchers in the areas of RL and intelligent mobility.

### **Essential Knowledge & Experience**

- Expertise in machine learning, in particular deep and/or reinforcement learning
- Established track record of publication in leading journals/conferences, on relevant topics
- Excellent software engineering and programming skills
- Excellent written and oral communication skills
- Experience of project proposal writing
- The ability to work well in a group
- Strong self-motivation and willingness to learn

### **Desirable Knowledge & Experience**

Experience in one or more of the following areas, is considered is preferable:

- Intelligent transport systems/intelligent mobility
- Distributed computing
- Optimisation
- MSc and PhD student supervision
- Industry collaboration and public engagement

### **Post Funding**

The post is funded by Science Foundation Ireland (SFI) as part of the ClearWay project from 2022-2026.

### **Post Location**

The post will be hosted by the School of Computer Science and Statistics at Trinity College Dublin, a collegiate, friendly, and research-intensive centre for academic study and research excellence. For further information about the School, see <https://www.scss.tcd.ie/>.

### **Application Procedure**

Please send applications by email to vinny.cahill@tcd.ie and ivana.dusparic@tcd.ie quoting "ClearWay Fellowship" in the subject line and containing three PDF files as follows:

(1) a cover letter,

(2) a curriculum vitae (giving full details of qualifications and experience, including transcripts of degrees, a description of your contribution to relevant project work, identification of your three most-significant publications relevant to the ClearWay project, and the names and contact details of two referees), and

(3) a 1-2 page research proposal.

Please do not provide other documents, documents in other formats, or include any substantive information in the body of your email.

### **Trinity College Dublin, the University of Dublin**

Trinity is Ireland's leading university and is ranked 98th in the world (QS World University Rankings 2023). Founded in 1592, the University is steeped in history with a reputation for excellence in education, research and innovation.

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.

Trinity is ranked as the 17th most international university in the world (Times Higher Education Rankings 2020) and has students and staff from over 120 countries.

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 five leading flagship research institutes:

- Trinity Biomedical Sciences Institute (TBSI)
- Trinity College Institute of Neuroscience (TCIN)
- Trinity Translational Medical Institute (TTMI)
- Trinity Long Room Hub Arts and Humanities Research Institute (TLRH)
- Centre for Research on Adaptive Nanostructures and Nanodevices (CRANN)

Trinity is the top-ranked European university for producing entrepreneurs for the past five successive years and Europe's only representative in the world's top-50 universities (Pitchbook Universities Report).

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 is the top ranked university in Ireland and ranked 98th in the world (QS World University Rankings 2023). Full details are available at: [www.tcd.ie/research/about/rankings](http://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 prior to the closing date/time, please contact us.

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.

In some instances the Selection Committee may avail of telephone or video conferencing. The University's selection methods may consist of any or all of the following: Interviews, Presentations, Psychometric Testing, References and Situational Exercises.

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 if required. 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.

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