

Ph.D. Studentships in Reinforcement Learning and Swarm Intelligence for Coordination of Autonomous Vehicles

Applications are invited for four funded four-year Ph.D. studentships investigating the use of deep reinforcement learning (RL) and Swarm Intelligence techniques to optimize travel-time reliability 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 travel-time reliability.

Extending the state of the art in deep RL and swarm intelligence, these studentships 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 algorithms that allow traffic controllers to cooperate towards system-wide optimal solutions. PhD students are 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.

Each studentship carries a Ph.D. stipend of €18,500 per year as well as relevant tuition fees, for up to four years subject to satisfactory progress, and is tenable from September 2022.

Interested students should have a B.Sc. and/or M.Sc. in Computer Science, Computer Engineering or a closely-related discipline as well as exceptional software development skills. Significant experience in machine learning including relevant project work is highly desirable. Experience of RL and/or intelligent transportation systems is also desirable as are strong mathematical skills.

The position will be based in the School of Computer Science and Statistics at Trinity College Dublin, Ireland. The successful candidates will be supervised by Prof. Vinny Cahill and Prof. Ivana Dusparic and will join a Clearway team consisting of 4 PhD students and 2 postdoctoral researchers, as well as a wider team of ~10 PhD students working with Profs Cahill and Dusparic in the areas of RL and intelligent mobility. Furthermore, PhD students will have an opportunity to engage in ClearWay industry collaborations and intelligent mobility hackatons.

Please send applications by email to vinny.cahill@tcd.ie and Ivana.Dusparic@tcd.ie quoting "ClearWay Studentship" in the subject line and containing two PDF files as follows:

1. a curriculum vitae (giving full details of qualifications and experience, including transcripts of degrees, a description of your contribution to relevant project work, and the names and contact details of two referees), and
2. 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.

Details of degree and English language requirements for PhD TCD admissions can be found at <https://www.tcd.ie/study/apply/admission-requirements/postgraduate/>.

The extended closing date for applications is May 31st 2022.

Trinity College is an equal opportunities employer.