

Daragh King

PhD Researcher in Computer Science

- Location: Vienna, Austria
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Research interests

My research interests lie broadly in the intersection of formal methods, program verification, and A.I. My most recent work devises a neurosymbolic approach to loop invariant generation; essentially, a language model is orchestrated to utilise the weakest precondition calculus and Hoare logic to derive loop invariants for program verification. I am also interested in the application of A.I and machine learning to interactive and automated theorem proving (e.g. to Lean and Vampire).

Education

- 2022–2026** **PhD Computer Science, Trinity College Dublin (Ireland)**
- Supervisor: Prof. Vasileios Koutavas.
- 2019–2020** **Postgraduate Certificate in Artificial Intelligence, Dublin City University (Ireland)**
- Result: First Class Honours.
- 2013–2017** **BSc (Honours) Theoretical Physics and Applied Mathematics, Maynooth University (Ireland)**
- Result: First Class Honours.

Academic Positions & Affiliations

- 2022–Present** **PhD Researcher, Trinity College Dublin (Ireland)**
- Supervised by Prof. Vasileios Koutavas. Funded by D-Real.
- 2024–Present** **Visiting PhD / Intern, APRe Group, TU Wien (Austria)**
- Advised by Prof. Laura Kovács.

Papers

- *A Neurosymbolic Approach to Loop Invariant Generation via Weakest Precondition Reasoning.*
- Under Submission.
- **Daragh King**, Vasileios Koutavas, Laura Kovács.
- *LLMs and Fuzzing in Tandem: A New Approach to Automatically Generating Weakest Preconditions.*
- STTT Special Issue on Challenges of Software Verification (CSV) 2025, published 2026.
- **Daragh King**, Vasileios Koutavas, Laura Kovács.
- *LLM-Based Generation of Weakest Preconditions and Precise Array Invariants.*
- 2025 IEEE/ACM 13th International Conference on Formal Methods in Software Engineering (FormalISE), 2025.
- **Daragh King**, Vasileios Koutavas, Laura Kovács.
- *Using the Polyak Step Size in training Convolutional Neural Networks.*
- The Second Tiny Papers Track at ICLR 2024, 2024.
- **Daragh King**.

Talks & Presentations

- *LLM-based Generation of Weakest Preconditions.*
- Challenges of Software Verification (CSV) 2025, Venice, Italy.

- *LLM-Based Generation of Weakest Preconditions and Precise Array Invariants*.
- FormaliSE 2025, Ontario, Canada.
- *Using the Polyak Step Size in training Convolutional Neural Networks (Poster)*.
- ICLR 2024, Vienna, Austria.

Teaching & Supervision

- **Teaching Assistant, Undergraduate Programming Centre** — Trinity College Dublin, *Academic Year 2023–2024*.
- **Teaching Assistant, Programming Project (CSU11013)** — Trinity College Dublin, *Academic Year 2023–2024*.
- **Teaching Assistant, Data Structures and Algorithms (CSU33D05)** — Trinity College Dublin, *Academic Year 2022–2023*.

Industry Experience

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| 2021–2022 | Java Consultant (via 8 West Consulting) — Anthem
Backend software development for US dental insurance markets using Java and the Spring ecosystem. |
| 2019–2021 | .NET Engineer — Flutter (Sports & Trading, “Trading Tribe”)
Developed applications in C# using .NET/.NET Core to support sports trading workflows. |
| 2017–2019 | Software Engineer — Allied Irish Bank (AIB)
Backend software engineering in several domains, e.g. payments processing and internal tool development. |

References

Available upon request.