Mehrad **Haghshenas**

PhD, University of Waterloo

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Research Interests

Formal Verification | **Programming Languages** | **Logic**
Automated Theorem Proving | **Static Analysis** | **Functional Programming**

Education

University of Waterloo — *Canada*

Ph.D. in Computer Science (member of the CrySP lab) — *Expected: Jan. 2029*

- Cumulative GPA: **94.00 / 100.00**.
- Working on developing a *Rust-based transpiler that converts programs and specifications into SMT-LIB formulas, used to encode reference implementations of interpreters to support automated formal verification, equivalence checking, and enumerative testing* supervised by Dr. Meng Xu.

Utrecht University — *Netherlands*

Computing Science — *Graduation: Jan. 2024*

- Cumulative GPA: **3.94 / 4.00** *(Summa cum laude)*.
- Thesis: *Automated Verification of Hoare Triples: A Comparative Study on Static Inference of Loop Invariants* – Grade: **4.00 / 4.00**, supervised by Dr. S.W.B. Wishnu Prasetya and Prof. dr. ir. Frank van der Stappen.

Awards

2025 **International Doctoral Student Award (IDSA),** Awarded by the *University of Waterloo*. — *Canada*

2023 **Scholarship**, Awarded by *Utrecht University*. — *Netherlands*

Work Experience

ABN AMRO — *Netherlands*

Full-time Mainframe Developer — *Mar. 2024 - Dec. 2024*

- *Reviewed and refactored legacy COBOL code. Investigated automated testing frameworks (Topaz for Total Test). Updated technical documentation. Collaborated in Agile teams following Scrum methodologies.*

Hudson Dynamics B.V. — *Netherlands*

Embedded Software Engineer Intern — *Jun. 2023 - Dec. 2023*

- *Worked on the development of automated vehicles. Programmed the robotic arm of an electric loader to ensure precise vertical lift path control. Designed its control system using Parker IQAN software. Modeled the arm's search space with Denavit–Hartenberg notation and applied forward and inverse kinematic analysis.*

Volunteering Activities

Hack the North — *University of Waterloo*

Participant — *12 – 14 Sep. 2025*

- We developed *CodeMind*, a local-first, searchable timeline tool that documents AI coding sessions. The tool uses a custom Model Context Protocol (MCP) server to ingest sessions from Cursor/Claude, and an OpenAI-based LLM to extract and index key information.

Rust Z3 bindings — *GitHub*

Open-source contributor to the Z3 Rust API. — *Sep. 2025*

- Contributed feature enhancements including floating-point NaN constructors, Int–Real mixed arithmetic, 128-bit integer support, string comparison, sequence utilities, and rounding-mode APIs. Implemented correctness fixes such as improved handling of *Probe::lt* arguments and model retrieval documentation. Authored the Rust bindings guide, published on the official Z3 project website.

Stanford University Code in Place — *Online*

Volunteer Tutor — *Apr.–May 2023, 2024, & 2025*

- Volunteer tutor for Stanford's Code in Place (2023, 2024, 2025), mentoring 15 students over 6 weeks each year.

Formal Methods Europe — *Europe*

Member — *Oct. 2023 – Present*

- An organization that promotes research in formal methods to improve software and hardware systems.

Utrecht University Hackathon — *Netherlands*

Participant — *24 – 25 May 2023*

- Co-hosted by SUE Co., the event focused on the applications of AI in Software Development, GitHub Copilot, and AWS.

TEDx Organizing Committee

Netherlands

Organizing Committee Volunteer, TEDx Event. *15 Apr. 2023*

- Served on the organizing committee for a TEDx event focused on the themes Fight or Flight and Sustainability.

Teaching Assistant

Software and Systems Security

Canada

CS 453 / 698 @ University of Waterloo *May 2025 - Aug. 2025*

- Authored Assignment 2 for CS 453/698, designed to teach students fuzzing, differential testing, and reducing test cases via delta debugging.

Introduction to Computer Science 2

Canada

CS 116 @ University of Waterloo *Jan. 2025 - May 2025*

- Graded assignments on the fundamentals of programming.

Summer School

Queen Mary University of London

England

Three-week course: *Business and Society: The Changing World of Work* *Jul. 2022–Aug. 2022*

- 15 UK credits (7.5 ECTS); grade: **A** (75.6/100).

Utrecht University

Netherlands

One-week course on *Advanced Functional Programming in Haskell* (Dr. Wouter Swierstra) *Jul. 2022*

- No exam was administered.

Miscellaneous

Languages English (**IELTS 8.5**, taken on Nov. 3, 2023), Persian (native), French (A1).

Programming Rust, Coq, C, Python, Haskell, Java, COBOL, MATLAB, JavaScript, R, SQL, C#.

Relevant Courses Software & Systems Security, Languages & Compilers, Functional Programming, Software Testing & Verification, Logic for Computer Science, Operating Systems, Software Verification Using Proof Assistants.