Mehrad **Haghshenas**

PHD, UNIVERSITY OF WATERLOO

Canada

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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 — *Exp Graduation: Jan. 2029*

- Currently working on developing a *Rust-based transpiler and DSL that converts Rust programs and specifications into SMT-LIB formulas for automated formal verification of program semantics* 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**.
- **Supervisors:** Dr. S.W.B. Wishnu Prasetya, Prof. dr. ir. Frank van der Stappen.

Awards

2025	**International Doctoral Student Award (IDSA),** From *University of Waterloo*.	*Canada*
2023	**Granted Scholarship,** From *Utrecht University*.	*Netherlands*

Work Experience

ABN AMRO
Netherlands

MAINFRAME DEVELOPER — *Mar. 2024 - Dec. 2024*

- As a full-time mainframe developer, I had the following responsibilities:
  - Reviewed and refactored legacy COBOL code to align with modern standards.
  - Investigated automated testing frameworks for mainframe applications.
  - Worked in Agile teams, following Scrum methodologies.
  - Wrote and maintained technical documentation.

Hudson Dynamics B.V.
Netherlands

EMBEDDED SOFTWARE ENGINEER INTERN — *Jun. 2023 - Dec. 2023*

- This company works in the field of automated vehicles. I had the following responsibilities:
  - Programming the robotic arm of an electric loader to ensure precise vertical lift path control.
  - Modeling the search space of the arm using the Denavit-Hartenberg Notation and employing forward and inverse kinematic analysis.
  - Designing the control system using Parker IQAN Software for optimal performance.

Volunteering Activities

Rust bindings for the Z3 SMT solver
GitHub

OPEN-SOURCE CONTRIBUTOR — *2025*

- Contributed pull requests to the Z3 Rust API (Rust bindings for the Z3 solver), including:
  - *Feature enhancement* like Floating-point NaN constructors, Int–Real mixed arithmetic, 128-bit integer support, string comparison, sequence utilities, and rounding modes APIs.
  - Fixes improving correctness e.g., *Probe::lt* argument handling and *model* retrieval docs.
- Authored the Rust binding guide, published on the Z3 project website.

Stanford University
Online

A VOLUNTEER TUTOR IN STANFORD UNIVERSITY CODE IN PLACE — *Apr. – May 2023, 2024, & 2025*

- Organized by Stanford, I served as a volunteer tutor in 2023, 2024, & 2025, mentoring 15 students over a 6-week online period.

Formal Methods Europe (FME)
Europe

MEMBER — *6 Oct. 2023 - Present*

- An organization encouraging the research of formal methods for the improvement of software and hardware systems.

Utrecht University
Netherlands

HACKATHON — *24, 25 May 2023*

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

TEDx Organizing committee   *Netherlands*

A Volunteer for organizing a TEDx event   *15 Apr. 2023*

- I volunteered at a TEDx event centered around the theme *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 automated bug detection, 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*

- Grading assignments on the fundamentals of programming.

Summer School

Queen Mary University of London   *England*

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

- *15 UK Credits (7.5 ECTS), **A** (75.6 / 100.00).*
- Final Project on *Artificial Intelligence in Business and Society*.

Utrecht University   *Netherlands*

1 week course by Dr. Wouter Swierstra on Advanced Functional Programming in Haskell.   *Jul. 2022*

- No exam was administered.

Miscellaneous

Languages	English (**IELTS**: *8.5*, taken on 3rd of Nov. 2023), Persian (Native).
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.