Harun Yılmaz

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Research Objective

I aim to advance formal methods for computer systems by developing program logics and verification tools that make software correctness provable and reliable at scale. My current work on automata-based and relational verification motivates me to pursue a PhD focused on the formal verification of real-world systems.

Education

Sabancı University *Sept 2021 - Current*
BSc in Computer Science and Engineering *Istanbul, Turkey*

- **CGPA**: 3.84/4.0
- **Relevant Coursework:** Formal Languages and Automata Theory *(Ranked 1st)*, Programming Languages, Operating Systems, Distributed Systems, Computer Architecture, Parallel Computing, Cryptography

Vrije Universiteit Amsterdam *February 2024 - July 2024*
Exchange semester *Amsterdam, Netherlands*

- **Term GPA**: 9.1/10
- **Relevant Coursework:** Computer Organization (*Ranked 1st*), Computer Networks (8.5/10), Applied Programming for AI (9.5/10)

Experience

Research Intern *Klosterneuburg, Austria*
Institute of Science and Technology Austria (ISTA) *June - September 2025*
Supervised by Thomas A. Henzinger and N. Ege Saraç

- Extended **QuAK** (Quantitative Analysis Kit) C++ framework to support the analysis of **Nested Quantitative Automata** (NQA). **QuAK is the first tool to provide automated analysis for this automata model**.
- Designed and implemented algorithms for non-emptiness and universality decision problems of NQA.
- Studied the expressiveness of NQA and the analysis of richer quantitative specifications expressible by NQAs such as average response time.

Undergraduate Assistant *Istanbul, Turkey*
Sabancı University *February 2025 - Current*

- Delivered weekly recitation lectures for the ***Operating Systems*** course on topics including scheduling, concurrency, and memory management.
- Supported over 150 students through office hours and programming assignments in C.
- Prepared recitation, quiz, and exam materials to help students understand and practice course content.

Publications

(Tentative Title) Automating the Analysis of Nested Quantitative Automata with QuAK

Thomas A. Henzinger, Nicolas Mazzocchi, N. Ege Saraç, ***Harun Yılmaz***

- Under preparation for submission to *Computer Aided Verification (CAV 2026)*.

Projects

Relational Verification of Concurrent Programs using Refinement Proofs *2025–Current*
Supervisor: Süha Orhun Mutluergil

- Developing a program logic that composes existing functional verification logics such as Hoare Logic to reason about program relations using forward and backward simulations.
- Implementing the logic and verify concurrent data structures by proving theorems within ***VEIL***, a state-of-the-art verification framework built on the ***Lean*** proof assistant.

Compiler Frontend with Static Analysis *2024* [GitHub]

- Developed Flex/Bison-based compiler frontend with symbol tables and semantic checks for a small language

Concurrent Queue with Work Stealing *2024* [GitHub]

- Implemented a concurrent queue algorithm inspired by Michael & Scott's with work-stealing for multi-core scheduling

LC-3 Virtual Memory System *2023* [GitHub]

- Extended LC-3 VM with paged memory management, address translation and process control blocks

Wearable Health Analytics *2023* [GitHub]

- Analyzed Garmin data to correlate sleep, activity, and stress metrics. Performed statistical analysis and hypothesis testing.

Honors and Awards

OeAD Scholarship for ISTernship Summer Program *June - September 2025*
OeAD, Austria's Agency for Education and Internationalisation

- Awarded a scholarship to participate in the highly competitive ISTernship Summer Program at the Institute of Science and Technology Austria (ISTA), conducting research for 3 months within a leading research group.

Dean's List: High Honor *2022–2025*
Sabancı University Faculty of Engineering and Natural Sciences

- Consistently recognized on the Dean's List for High Honors every semester throughout my university education (2022 - 2025), achieved by maintaining a term GPA of 3.5 or higher.

Sakıp Sabancı Outstanding Achievement Scholarship *September 2021*
Sabancı University

- Awarded a comprehensive scholarship covering full annual tuition, a monthly stipend, and dormitory fees. This scholarship is granted to top-ranking students admitted through the Full Scholarship quota.

Technical Skills

Programming Languages: C, C++, Lean, Rocq, Python, Assembly, Scheme, Verilog HDL, Prolog, MySQL

Development Tools: Git, Github, LaTeX, Flex/Bison, OpenMP

Volunteering and Leadership

SUDOSK (Sabancı University Outdoor Sports Club) *2023–2025*
President & Board Member

- Led as President and Board Member, organizing outdoor sports events and managing club administration to promote a healthy and active outdoor sports community.

Civic Involvement Project (CIP), Sabancı University *2022*

- Volunteered in coastal cleanups and animal shelter work to support environmental conservation and animal welfare.

Hobbies and Interests

Outdoor sports (mountaineering, rock climbing, bouldering), Drumming, Debating

References

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