Curriculum Vitae

Mahyar Karimi

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Contact Details

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Education

2023 – **Ph.D. in Computer Science**,
Institute of Science and Technology, Klosterneuburg, Austria.
Advisor: Prof. Thomas Henzinger
Research focus: runtime verification, privacy, verifiable machine learning.

2018 – 2023 **B.Sc. in Computer Engineering**,
University of Tehran, Tehran, Iran.
Graduated as one of the top 10 students in my class.
Thesis advisor: Prof. Hossein Hojjat

Notable Coursework (full mark is 20/20):

Software testing:	19.4,	Database design:	19.1,
Distributed systems:	17.8,	Cyber-physical systems:	16.3,
Software engineering:	17.8,	Internet engineering:	18.4,
Computer architecture:	20.0,	Operating systems:	19.5.

Research Experience

06.2023 – 09.2023 **Research intern,** Institute of Science and Technology Austria (ISTA)
Worked under the supervision of Prof. Thomas Henzinger.

We studied how neural networks can act as proofs. For this project, I wrote automations for network training and assembling (networks of networks) using PyTorch, translating networks to SymPy trees and SMT-LIB queries, and passing these queries to SMT solvers (Z3 as a generic and Marabou as a specialised solver). I also modified Marabou to fine-tune its abstract interpreter.

07.2022 – 09.2022 **Research intern,** Institute of Science and Technology Austria (ISTA)
Worked under the supervision of Prof. Thomas Henzinger.

We designed monitors for quantitative fairness of online decision-making agents. We modelled agent-environment interaction as a Markov chain. I wrote a Rust prototype to generate monitors and evaluate their performance. To improve space usage, I also wrote a parametrised Markov chain that generates states on-the-fly.

2021 – 2023 **Research assistant**, University of Tehran
Collaborated with Prof. Hossein Hojjat and Amir Hossein Seyhani.

We developed a model for causal reasoning over concurrent systems, with Winskel's *event structures* as our concurrency model, and the Halpern-Pearl definition of root cause. We have a Python tool for causality checking, with significant optimisations for verifying a candidate root cause.

Industry Experience

2022–3 **Software engineer,** Divar.
I worked in the *customer trust* team, where we found ways to find and stop fraudulent users by tracing their behaviour across the platform. Before that, I worked in the *jobs* team, a new direction of the company for making a job market functionality.

Related skills: Microservices architecture, Django, CI/CD, Scrum, Kanban

2021 **Infrastructure intern,** Tapsell.
Implemented a simple query caching mechanism, with Redis as the cache.
Related skills: Kubernetes, Redis, Nginx, Docker

Teaching Experience

2020 – 2022 University of Tehran
Teaching assistant in the following courses:

- *Advanced Programming* (Lecturer: Prof. Ramtin Khosravi)
  For this course, the TAs would work in teams for designing assignments. Students would receive a review of their code and oral feedback from the TA during grading.
- *Data Structures* (Lecturer: Prof. Fathiyeh Faghih)

Extracurricular Coursework

05.2023 **Functional Program Design in Scala**
Lecturer: Prof. Martin Odersky (EPFL).

03.2023 **Functional Programming Principles in Scala**
Lecturer: Prof. Martin Odersky (EPFL).

11.2023 **Supervised Machine Learning: Regression and Classification**
Lecturer: Prof. Andrew Ng (course offered by DeepLearning.AI).

Awards & Honors

2022 Research scholarship, granted by the Austrian Agency for Education and Internationalisation (OeAD-GmbH).

Presentations

09.2023 **Monitoring Markov Chains**
Presented at the 15th Alpine Verification Meeting, Prague, Czechia.

09.2024 **Monitors, Systems, and Privacy**
Presented at the 16th Alpine Verification Meeting, Freiburg, Germany.

Publications

Refereed Conference Papers

[1] Thomas Henzinger, Mahyar Karimi, Konstantin Kueffner, and Kaushik Mallik. Runtime monitoring of dynamic fairness properties. In *Proceedings of the 2023 ACM Conference on Fairness, Accountability, and Transparency*, FAccT '23, page 604–614, New York, NY, USA, 2023. Association for Computing Machinery.

[2] Thomas A. Henzinger, Mahyar Karimi, Konstantin Kueffner, and Kaushik Mallik. Monitoring algorithmic fairness. In Constantin Enea and Akash Lal, editors, *Computer Aided Verification*, pages 358–382, Cham, 2023. Springer Nature Switzerland.