

Mahdi Haji

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EDUCATION

B.Sc. in Computer Science Eng., University of Tehran 2021–Present

GPA: 18.40/20 Ranked top 5 in CE at University of Tehran

PUBLICATIONS

- **Chess: Test-Guided Program Synthesis for Distributed System Checkers** 2025
Wanning He, **Mahdi Haji**, Peng Huang, Rui Dong
Submitted to 23rd USENIX Symposium on Networked Systems Design and Implementation - NSDI
- **Argos: A Decentralized Federated System for Detection of Traffic Signs in CAVs** 2024
Mahdi Haji, Alireza Hosseini, Amirali Shahriary, Soheil Hajian
Available as a preprint on arXiv; presented at the Flower Event, University of Cambridge.

RESEARCH EXPERIENCE

- **Research Assistant at Ordered Systems Lab**, University of Michigan 2023–Present
Supervised by Prof. Peng Huang
[Projects Repository](#)
 - Developed a runtime validator to detect silent semantic violations in distributed systems.
 - Contributed to finding silent semantic violations in systems such as Zookeeper, HBase, and Kafka for testing the synthesizer.
 - The results contributed to a paper submitted to NSDI 2026 titled "Chess: Test-Guided Program Synthesis for Distributed System Checkers".
- **Bachelor Thesis at University of Tehran** 2025–Present
Supervised by Prof. Kargahi
 - Investigating batch-invariance in LLM inference to eliminate nondeterministic outcomes in real-time embedded CPS.
 - Developing a shielded reinforcement-learning agent to mediate LLM decisions and enhance deterministic performance in safety-critical systems.
- **Research Intern at McGill University** (Remote) 2025–2025
Supervised by Dr. Majid Babaei
 - Expanded a Knowledge Graph-based framework for detecting system performance anomalies using tracing data from LTTng with a Retrieval-Augmented Generation (RAG) approach.

INDUSTRY EXPERIENCE

- **Software Engineer at rastai.ai** 2025–Present
Supervised by Prof. Majid Nili and Prof. Ramtin Khosravi
 - Working on a platform to personalize E-Learning for individuals using Reinforcement-Learning.
 - Served as the backend system architect, leading the design and development of the platform's core infrastructure (Kotlin).
- **Software Engineer at Engima Investing** 2023–2025
 - Designed and implemented a financial application to calculate NAV for investment portfolios with an event-sourcing architecture (Django).

- Launched a RAG agent in Django using LangChain with LLMs and ChromaDB as a vector database to answer user queries on Tehran Stock Exchange data and reduced query time from 1s to 0.3s.

• Co-founder at [Bibadeal](#)

2022–2023

- Led NLP and neural network initiatives to deliver strategic business insights and deployed LLMs for automated customer QA based on business data.
- Acquired by the accelerator of Iran University of Science and Technology.

TEACHING EXPERIENCE (UNIVERSITY OF TEHRAN)

Head Teaching Assistant

Software Testing, [Dr. Khames-Panah](#)

Head Teaching Assistant

Software Engineering, [Prof. Ghasemi](#)

Teaching Assistant

Computer Networks, [Prof. Khonsari](#)

Teaching Assistant

Compiler & PL, [Dr. Tavasoli](#)

Head Teaching Assistant

Introduction to Computing Systems & Programming, [Prof. Moradi](#)

Teaching Assistant

Data Structures & Algorithms, [Prof. Faili](#)

Teaching Assistant

Operating Systems, [Prof. Kargahi](#)

Teaching Assistant

Ordinary Differential Equations, [Dr. Rahami](#)

SELECTED PROJECTS

• [Distributed Systems Course Projects](#)

Go

- Implemented Raft protocol for replicated state machines, including leader election, log replication via RPC, persistent storage, and log compaction with snapshots.
- Built a distributed Map-Reduce service handling network uncertainties via RPC.

• [Design of Deep Neural Networks projects \(Graduate Course\)](#)

PYTHON, PYTORCH

- Constructed Oriented R-CNN for rotated object detection.
- Built image captioning models using hybrid LSTM-GRU networks.
- Studied robust zero-shot classification against adversarial attacks.
- Conducted unsupervised learning and domain transfer experiments using GANs.

• [Operating System Course Projects](#)

C, XV6

- Customized MIT XV6 OS with new terminal features, system calls, multiple schedulers, priority-based synchronization, and shared memory/CPU coherency.
- Prepared parallel image processing programs using multi-threading.

• [Stock Exchange Matching Engine](#)

JAVA, SPRING BOOT

- Built a stock exchange matching engine supporting real-time trade execution.

• [Full ARM Processor Implementation](#)

VERILOG

- Designed a complete ARM processor supporting forwarding, SRAM, and cache.

SKILLS

Programming

- Proficient: Python, Kotlin, C++, Java, GoLang
- Familiar: Rust, SystemVerilog, R, SQL, Bash

Technologies

Django, Spring Boot, Docker, Kubernetes, PostgreSQL, Redis, Mongo, ELK