


Hosna Oyarhoseini

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About Me

Master's student in Computer Science at the University of Waterloo with a focus on machine learning, information retrieval, and LLM systems. Interested in building scalable, efficient, and reliable AI-powered products, with experience in improving performance and latency of LLM agents and retrieval systems.

Education

- **Master of Mathematics (MMath) in Computer Science**, *University of Waterloo* 2025–2027
- Supervised by Jimmy Lin and Amir-Hossein Karimi; **GPA: 4.0/4.0** Waterloo, Canada
- Thesis: Robustness and explainability of LLM leaderboards and LLM agents
- **Bachelor of Computer Engineering**, *Amirkabir University (Polytechnic Tehran)* 2019–2024
- **Ranked 1st** among 150 students; **GPA: 4.0/4.0 (19.68/20)** Tehran, Iran

Experience

- **Research Assistant** — **University of Waterloo, Canada** Spring 2025 – Present
Supervisors: Prof. Jimmy Lin, Dr. Amir-Hossein Karimi
 - Benchmarking and Improving performance and latency of **LLM agents** and **RAG systems** by introducing reranking and summarization
 - Studied **robustness and explainability of LLM leaderboards** ([Chatbot Arena](#))
 - Developed a **unified adversarial training framework** for **retrievers, rerankers, and RLHF systems**
- **Research Assistant** — **Sharif University of Technology, Iran** Spring 2024 – Spring 2025
Supervisor: Dr. Mohammad Hossein Rohban
 - Improved **vision-language model robustness** by mitigating **spurious correlations**
 - Analyzed **optimization dynamics** and their impact on **shortcut learning** and **representation robustness**
- **Research Intern** — **EPFL (Switzerland)** Summer 2023
Supervisor: Prof. Amir Zamir
 - Expanded modalities in **4M (Massively Multimodal Masked Model)** for **multi-task vision learning**
- **Research Assistant** — **Amirkabir University of Technology, Iran** Fall 2022 – Spring 2023
 - Evaluated **adversarial attacks** on **face recognition models** and analyzed **security vulnerabilities**
- **Intern and Python developer** — **Tosan Techno AI group** Summer 2022
 - Implemented a scenario of question answering on **Pepper robot** (Aldebaran Robotics product).
 - Developed a **face detection microservice using FastAPI**, gaining expertise in microservice architecture, scalability, and pressure handling within a distributed system environment.
- **Teaching Assistant** Assisting undergraduate students in different courses like data structures and algorithms, artificial intelligence at the University of Waterloo and Sharif University

Publications

- M. S. Tamber, **H. Oyarhoseini**, J. Lin. *Unifying Adversarial Robustness and Training Across Text Scoring Models*. Under review, 2026. [arXiv]
- Z. Chen, X. Ma, ..., **H. Oyarhoseini**, et al. *BrowseComp-Plus: A Fair and Disentangled Evaluation Benchmark for Deep Search Agents*. Preprint, 2026. [OpenReview]
- N. Mirzaie, M. Ghaznavi, **H. Oyarhoseini**, A. Alipanah, E. Sobhaei, A. Abbasi, et al. *The Silent Helper: How Implicit Regularization Enhances Group Robustness*. High-dimensional Learning Dynamics, 2025.

Skills

- **Programming Languages:** Python, C, C++, Java, ROS
- **AI / ML Frameworks:** PyTorch, TensorFlow, Scikit-learn, NumPy, Pandas, Matplotlib, Keras, Hugging Face, vLLM, DeepSpeed, JAX
- **Systems & Tools:** Linux, Docker, Kubernetes, AWS, Spark, Hadoop, Bash, Git, \LaTeX
- **Web & Hardware:** JavaScript, HTML, CSS, React, FastAPI, Assembly, Verilog, VHDL, Arduino, ModelSim
- **Soft Skills:** Research communication, technical writing, problem solving, teamwork

Languages

- **Persian:** Native
- **English:** Full professional proficiency (TOEFL:103 : R:26, L:29, S:24, W:24)

Courses

- **Related Courses:** Data Structure & Algorithm Design, Cloud Computing, Linear Algebra, Artificial Intelligence, ML & Data Mining, [Deep Learning](#), [Large Language Models](#), Convex Optimization, Reinforcement Learning, NLP, ML4NLP, System Serving for GenAI
- **Online Courses:** DL for Computer Vision ([Stanford CS231n](#)), ML Specialization ([DeepLearning.AI](#)), Neural Networks & Deep Learning ([DeepLearning.AI](#)), Intro and Intermediate ML ([Kaggle](#))

Projects

- **OpenClaw Telegram Bot**
 - Used OpenClaw to make a personal Telegram bot assistant.
- **LLM Exercises** [[GitHub](#)]
 - Implemented parameter-efficient fine-tuning methods including Soft Prompting, Adapters, LoRA, and full fine-tuning for T5 using PEFT, OpenDelta, and AdapterHub frameworks.
 - Applied calibration techniques for in-context learning and label bias mitigation.
 - Designed and implemented unimodal and multimodal Retrieval-Augmented Generation (RAG) pipelines.
 - Guided and aligned a diffusion model with the CLIP representation space.
- **Efficient RAG and LLM Agent**
 - Improved latency and performance of LLM agents (agents with retrieval tools) by adding a reranker, relevance assessor, and summarization on the retrieved content.
 - Studied inference-time acceleration of LLM-based listwise rerankers in RAG by implementing context compression, and LoRA fine-tuned listwise rerankers; and analyzed latency–quality tradeoffs.
- **Machine Learning Exercises** [[GitHub](#)]
 - Built a Brain MRI classifier using transfer learning in PyTorch and evaluated performance.
 - Implemented anomaly detection pipelines for network server failure detection tasks.
 - Implemented and evaluated machine learning models including Naive Bayes, Decision Trees, Neural Networks, and SVM across tasks, including tabular prediction and classification, applying hyperparameter tuning, k-fold cross-validation, custom loss/activation functions, and evaluation.
- **Reinforcement Learning and Robotics** [[GitHub](#)]
 - Implemented SAC, DQN, PPO, and REINFORCE algorithms and compared them across environments.
 - Developed robotic navigation using VFH and PID controllers for path and wall following.
 - Integrated YOLO object detection for traffic sign recognition and behavior control.

Skills

Programming Languages

Python, C, C++, Java, ROS

Systems & Tools

Linux, Docker, Kubernetes, AWS, Spark, Hadoop, Bash, Git, \LaTeX

AI / ML Frameworks

PyTorch, TensorFlow, Scikit-learn, NumPy, Pandas, Matplotlib, Keras, Hugging Face, vLLM, DeepSpeed, JAX

Web & Hardware

JavaScript, HTML, CSS, React, FastAPI, Assembly, Verilog, VHDL, Arduino, ModelSim

Soft Skills: Research communication, technical writing, problem solving, teamwork

Awards

- **Vector Scholarship in AI** Scholarship awarded to students in AI-related master's programs (17,000 CAD).
- **EPFL Scholarship** —Funded summer research internship (4,800 CHF total for a three-month program).

Extracurricular Activities

- **Students' Scientific Chapter**, Participating at Students' Scientific Chapter of AUT-CEIT 2022
- **Mentoring**, Mathematics and physics teacher assistant for high school student. 2021
- **Olympiad**, Participated in National Olympiad of Computer at high-school. 2017