

# Mohammad Kazzazi

✉ smohammadok@gmail.com ☎ +30 697 672 22 37 🔗 LinkedIn 🐙 GitHub 🎓 Google Scholar

## Education

### École Polytechnique Fédérale de Lausanne (EPFL)

M.Sc. in Electrical Engineering

Sept 2026 – Present

Lausanne, Switzerland

### Sharif University of Technology – GPA: 18.53/20 (3.95/4)

B.Sc. in Electrical Engineering (Digital Systems)

Sept 2021 – 2025

Tehran, Iran

## Research Interests

- Computer Vision
- Vision-Language Models (VLMs)
- Vision-Language-Action Models (VLAs)
- Multimodal Learning
- Generative Models
- Trustworthy Machine Learning

## Research Experience

### Research Assistant – Aalto University

Supervisor: Prof. S. Khajavi

Apr 2026 – Present

Espoo, Finland (remote)

- Developed a **knowledge-distillation framework** combining KL-divergence and cross-entropy supervision to compress a 7B Qwen2.5 vision-language teacher into 0.5B–3B student models for efficient on-device **vision-language understanding**.
- Applied the approach to contextual fire understanding on the DetectiumFire benchmark: the 0.5B student retained **95.2%** of the teacher's burning-object accuracy with **14× fewer parameters** and achieved **99.5%** fire/non-fire accuracy after deployment.
- Deployed and profiled distilled models on a **Raspberry Pi 5** (CPU-only), achieving 1.9 GB peak memory,  $\approx 4$  s end-to-end latency, and 2 false alarms on 1,452 test images. Resulted in a first-author submission to **AAAI 2027 IAAI**.
- Currently investigating **prompt optimization and reasoning** strategies for **Vision-Language-Action (VLA)** models.

### Research Assistant – Raderon AI Laboratory

Supervisor: Dr. S. Sarabi

Aug 2024 – Jan 2025

British Columbia, Canada (remote)

- Conducted ML research on medical image analysis combining the Discrete Wavelet Transform with swarm-based optimizers; co-authored a paper published in Elsevier *Machine Learning with Applications*.

### Research Assistant – Artificial Creature Laboratory (ACLab), Sharif University

Supervisor: Prof. S. Bagheri Shouraki

Jul 2024 – Sept 2024

Tehran, Iran

- Built a smart IoT socket (Arduino, ESP32/ESP8266) integrated with the lab's custom AI platform.

## Publications

### 1) Distilling Vision-Language Models for On-Device Fire Understanding

Sept 2026 – Aalto University, Finland | Submitted to *AAAI 2027 Innovative Applications of AI (IAAI)*

Authors: **Mohammad Kazzazi**, Zixuan Liu, S. Khajavi

[arXiv:2609.05782](#)

### 2) Minimal-Sensor TDOA/FDOA Fusion for Moving-Source IoT Localization: A Closed-Form, Two-Stage, Low-Complexity Estimator

Oct 2025 – Sharif University of Technology | Submitted to *IEEE Transactions on Aerospace and Electronic Systems*

Authors: **Mohammad Kazzazi**, Mohammad Morsali, R. Amiri

[arXiv:2510.04160](#)

### 3) Enhancing SCD Using Late Discrete Wavelet Transform and New Swarm-Based Optimizers

Nov 2024 – Raderon AI Lab, Canada | Published in Elsevier *Machine Learning with Applications*

Authors: R. Mousa, M. Morsali, S. Chamani, **M. Kazzazi**, P. Hatami, S. Sarabi

DOI: [10.1016/j.mlwa.2025.100811](#)

## Selected Projects

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### Football Object Detection and Multi-Object Tracking

[code](#)

- Fine-tuned **YOLOv8** on the SportsMOT football split (720p, 25 fps) to detect players and the ball: **mAP@50 0.947**, mAP@50–95 0.779, precision 0.93, recall 0.94 on validation; 1.4 ms inference per frame on a P100 GPU.
- Built multi-object tracking on top with **ByteTrack** and **DeepSORT** (evaluated with **MOTA** and **IDF1**) and **CSRT** single-object tracking with movement heat-maps; analysed occlusion and ID-switch failure cases.

### Membership Inference Attacks Against Diffusion Models

[code](#)

- Re-implemented **SecMI** (ICML 2023) against DDPMs on CIFAR-100 and proposed a **hyperparameter-free variant** that learns to fuse several denoising timesteps instead of hand-picking one.
- Raised attack **AUC from 0.971 to 0.984** and TPR@1%FPR from 0.519 to 0.642; evaluated transfer of CIFAR-100-trained attackers to a CIFAR-10 victim model.

### Machine Unlearning and Private Training

[code](#)

- Implemented **SISA** sharded training with ResNet-18 on CIFAR-10 across shard/slice settings  $S, R \in \{5, 10, 20\}$  and three aggregation rules (92% accuracy, 0.995 AUROC).
- Unlearned 500 samples, then verified removal with a  $3 \times 3$ -patch **backdoor attack** (attack success rate before vs. after) and **membership inference**.

## Technical Skills

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**ML / CV:** PyTorch, Hugging Face Transformers, OpenCV, Ultralytics YOLO, scikit-learn, VLMs/VLAs, generative models, knowledge distillation, object detection, multi-object tracking

**Programming:** Python, C/C++, CUDA, Java, MATLAB

**Tools:** NumPy, pandas, Git, Linux,  $\LaTeX$

**Languages:** Persian (native), English (TOEFL iBT 105), Spanish (A1)

## Relevant Coursework

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### EPFL – Fall 2026 (in progress)

- Machine Learning
- Mathematics of Data
- Convex Optimization
- Fundamentals of Inference and Learning

### Sharif University of Technology – selected courses (grades out of 20)

- Deep Learning – 17.2
- Deep Generative Models – 17.2
- Introduction to Machine Learning – 17.9
- Convex Optimization II – 19.7
- Linear Algebra / Mathematical Methods – 20
- Parallel Computing – 18.4

## Teaching Experience

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### Teaching Assistant – Sharif University of Technology

*2022 – 2025*

- Engineering Probability and Statistics, Mathematical Methods in Engineering, Communication Systems, Logic Circuits and Digital Systems, Object-Oriented Programming, Basic Programming.

## Awards & Academic Distinctions

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- Ranked in the **top 0.1%** of approximately 180,000 participants in Iran's National University Entrance Exam; admitted to Sharif University of Technology with a fully funded scholarship.
- **Top 15%** of the B.Sc. Electrical Engineering class and **top 3** in the Digital Systems specialization.

## References

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### Prof. R. Amiri

Associate Professor, Electrical Engineering  
Sharif University of Technology  
[amiri@sharif.edu](mailto:amiri@sharif.edu)

### Prof. S. Bagheri Shouraki

Full Professor, Electrical Engineering  
Sharif University of Technology  
[bagheri-s@sharif.edu](mailto:bagheri-s@sharif.edu)

### Prof. S. Khajavi Haghighat

Assistant Professor, Industrial Engineering and Management  
Aalto University  
[siavash.khajavi@aalto.fi](mailto:siavash.khajavi@aalto.fi)

### Dr. S. Sarabi

Director, Raderon AI Lab  
[s.sarabi@raderonlab.ca](mailto:s.sarabi@raderonlab.ca)