Mahdi Farhadi

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Research Interests

Multi-modal Sensor Fusion (LiDAR / Camera / Radar) • 3D Object Detection & Tracking • Real-time Perception Systems • Semantic Segmentation • Foundation Models • Vision Transformers • Self-supervised Learning • Edge Optimization • Robust Perception • Uncertainty Quantification • Generative AI

Summary

I am an AI developer who likes turning research-grade perception models into systems that actually drive a car. Over the past 4+ years I have worked across the full 3D-vision stack, designing, training, pruning, and deploying detectors such as PointPillars and BEVFusion for real-world ADAS. These days I help design a Level-4 self-driving system for Iran's all-electric YOOZ vehicle, and I also build digital-twin talking-head avatars and run real-time inference on embedded and ROS 2 platforms. What I enjoy most is the messy gap between a model that shines on a benchmark and one that holds up in the field, and as a PhD candidate I am channelling that experience into research on perception for autonomous driving.

Education

MSc in Digital Systems Electronics Sept 2021 – 2025
Iran University of Science and Technology *Tehran, Iran*

- **GPA:** 18.33/20
- **Thesis:** Road anomaly & obstacle segmentation using deep neural networks for autonomous cars
- **Supervisors:** Dr. Shahriar Baradaran Shokouhi, Dr. Abdollah Amirkhani

BSc in Electronic Engineering Sep 2015 – Aug 2020
University of Isfahan *Isfahan, Iran*

- **GPA:** 15.06/20
- **Supervisor:** Dr. Mohammad Kazemi
- **Robotics:** Active member of the University of Isfahan Robotics Society designed and built line-tracking (line-following) robots and took part in IEEE robotics activities.

Work Experience

AI Developer – Mid Level January 2025 – Present
MCI (NAK) – R&I Department *Tehran, Iran*

- Design and help manage the development of a **Level-4 (L4) ADAS** self-driving system for the Iranian all-electric **YOOZ** car.
- Build and integrate the autonomy stack perception, sensor fusion, and real-time decision-making toward full self-driving capability.
- Develop a **digital twin** of a digital-avatar talking-head product, connecting generative AI models with real-time simulation.

Algorithm Developer – Senior Level July 2024 – Present
Software Motion *Suzhou, China / Iran (On-site)*

- Promoted to senior algorithm developer after joining as a mid-level developer in July 2024.
- Work in the perception team on 3D object-detection models such as **PointPillars** and **BEVFusion** for L2/L3 ADAS automotive systems.
- Build full training pipelines on in-house datasets preprocessing, annotation, training from scratch, and evaluation.
- Lead **model pruning and optimization**, compressing PointPillars and BEVFusion for fast, real-time inference on resource-constrained hardware.
- Develop and validate real-time perception models, testing them online inside a **ROS 2** pipeline.
- Own model releases and manage the team's Git repository, delivering optimized models to SoC teams for on-vehicle deployment.

- Contributed to collaborations with major Chinese automotive companies including **Tucson**, **JAC**, and **AICC**.

Data Scientist March 2024 – July 2024
Nerd Studio AI *Milwaukee, Wisconsin, USA*

- Collaborated at NerdStudio, a company working on large generative models.
- Developed the **Indox** framework, integrating OpenAI and Mistral models; packaged it for PyPI for easy developer access.
- Project page: github.com/osllmai/inDox

AI Engineer Jan 2023 – Dec 2023
IRIB *Tehran, Iran*

- Developed 3D reconstruction models for multi-task applications, including body/face recognition and 3D object reconstruction.
- Designed a user-friendly GUI to present the models as commercial products; conducted extensive model evaluation on datasets.
- Project subsidized by the Iran National Elite Foundation; supervised by Dr. Amirkhani.

Researcher Sept 2022 – Present
IUST Machine Vision Lab *Tehran, Iran*

- Explored a wide range of modern computer-vision research, following the latest developments from ICCV and CVPR.
- **Machine Vision:** developed an original method to detect urban road obstacles in segmentation (led to a conference paper).
- **Non-Destructive Test:** object detection for identifying cracks in X-ray images.
- **Meta-heuristic Algorithms:** in-depth assessment of the NAS-Unet segmentation model across datasets.

Teaching Assistant Feb 2023 – Aug 2023
Iran University of Science and Technology *Tehran, Iran*

- Taught and held office hours for the Machine Vision course (50 undergraduates) on Python programming and running GitHub code.
- Administered and graded midterms and quizzes; Dr. Shokouhi was the course supervisor.

Projects

Multi-Modal 3D Object Detection (BEVFusion) 2024 – Present
Perception Algorithm Engineer • Software Motion *Suzhou, China / Iran*

- Developed and optimized multi-modal object-detection models fusing **LiDAR** and **camera** data with **BEVFusion**-based architectures for autonomous driving.
- Boosted detection accuracy by roughly **10%** through improved data augmentation, view transformation, and fusion optimization.
- Released **9 versions** of the BEVFusion model, increasing accuracy, pruning the network, reducing latency, and optimizing the detection head.
- Integrated the BEVFusion backbone with **lane** and **occupancy** heads, and integrated **MapTR-Head-V2** with BEVFusion.
- Designed a pipeline to convert raw sensor data into a standardized dataset for **PointPillars** and BEVFusion training.

L4 Autonomous Driving & Talking-Head Avatar 2025 – Present
MCI (NAK) • R&I Department *Tehran, Iran*

- Managed and defined an **L4 YOOZ ADAS** self-driving project end to end.
- Researched and developed **talking-head avatar** models for a conversational-avatar product.
- Deployed an API for **SoulX-FlashHead** powering an avatar chatbot github.com/farhadi76m/VVC-flashhead.
- Researched **digital-twin** simulation for urban-traffic solutions.

3D Reconstruction Software 2023 – Present
IUST • Iran National Elite Foundation *Tehran, Iran*

- Built 3D-reconstruction models (body/face recognition and 3D object reconstruction) with a GUI for commercial

use; supervised by Dr. Amirkhani.

Line Navigation Robot 2018

IEEE Student Branch • University of Isfahan *Isfahan, Iran*

- Designed and built a line-following robot (circuit design in Proteus, microcontroller programming in CodeVision) for the IEEE robotics course.

Achievements

- **Best Employee of the Month** — Software Motion, perception team Dec 2025
- **Council Membership** — Robotics Society of the University of Isfahan 2017–2019

Skills

Programming	Python (expert), C, MATLAB, SQL, Bash / Linux
Core Expertise	Machine Learning, Deep Learning, **PyTorch**, **Git** (expert), TensorFlow, Scikit-Learn, Docker
Vision & 3D	3D Object Detection (**BEVFusion**, **PointPillars**), MMDetection3D, LiDAR–Camera Fusion, Semantic & Anomaly Segmentation, YOLO family; training, validation & evaluation
Deployment	ONNX, TF-Lite, TensorRT, CUDA, Quantization, FastAPI, ROS 2
Generative AI	LLMs (OpenAI, LangChain, HuggingFace, LlamaIndex), Text-to-Speech, Talking-Head Avatars, image & text generation — productionized via FastAPI & web apps
Soft Skills	Time Management, Presentation, Teamwork, Problem-solving, Documentation

Publications

M. Farhadi, S. M. Hazavei, S. B. Shokouhi. **Standardized ReACT Logits: An Effective Approach for Anomaly Segmentation in Self-driving Cars.** *2023 13th International Conference on Computer and Knowledge Engineering (ICCKE)*, Mashhad, Iran, pp. 312–316. DOI: 10.1109/ICCKE60553.2023.10326295.

Key Courses

Master	Pattern Recognition (16.31), Machine Vision (19.5), Meta-heuristic Algorithms (19.25), Digital Signal Processing (19), Advanced Microprocessor (18.6), Non-Destructive Test (17.6), Optic Electronic (16.3), Interface Circuits (19)
Bachelor	Project (19.5), Analog Electronics 2 (13), Principles of Microcomputer and Microcontroller (13.3), Communication Circuits (16), Signals and Systems (16.2)

Languages

English	Professional Working Proficiency
Persian	Native Proficiency

References

Prof. Shahriar Baradaran Shokouhi Iran University of Science & Technology

MSc Thesis Supervisor & Co-author

- Emeritus Professor, School of Electrical Engineering — Machine Vision & Signal Processing • Google Scholar

Dr. Abdollah Amirkhani Iran University of Science & Technology

MSc Co-Supervisor

- Associate Professor — Autonomous Vehicles, Computer Vision & Deep Learning • Google Scholar

Hamid Azadegan Iran University of Science & Technology

Researcher / Collaborator

- School of Electrical Engineering — Video Coding & Deep Learning • Google Scholar