MAHDI BAGHERI

PROFESSIONAL SUMMARY

Innovative **AI & Computer Vision Research Engineer** with strong expertise in **Deep Learning**, **Edge AI**, and **3D Vision**. Proven track record of optimizing object detection models for real-time edge performance and developing medical AR navigation systems. Proficient in Python, C++, PyTorch, and CUDA, with a passion for bridging the gap between state-of-the-art research and scalable industrial applications.

TECHNICAL SKILLS

- **Core**:Computer Vision, Deep Learning, Machine Learning, 3D Reconstruction, Object Detection/Tracking, Model Optimization
- **Programming Languages:** Python / MATLAB / C++ / C / C# / Java / JavaScript
- **Libraries:** Pytorch / OpenCV / Open3D / LangChain / Numpy / Pandas / Matplotlib / Scikit-Learn / TensorRT / TensorFlow
- **DevOps & Deployment:** Docker / CUDA / Git / FastAPI
- **Databases**: PostgreSQL
- **Engines**: Unity3D / Solidworks
- **Embedded Systems**: HoloLens 2 / Arduino / RaspberryPi / NDI Polaris Tracker

PROFESSIONAL EXPERIENCE

JAN 2024 - PRESENT

Computer Vision Research Engineer

Vali Smart Agricultural Systems

- Proposed a novel **lightweight modification of YOLO** by changing the architecture, achieving a **20%** reduction in inference latency on edge devices while maintaining mAP, facilitating real-time sorting.
- Developed a **semi-supervised knowledge-distillation pipeline** for object detection and classification using EfficientNet, **YOLO** as well as finetuned **DINOv2** using **LoRA.**
- Investigated the **few-shot learning** approach using **CLIP** to significantly alleviate the labeling labour achieving the same accuracy with up to **90% less data** required.
- Proposed a vision-based sorting machine algorithm for **real-time multi-view inspection** using 2, 3 and 4 cameras working concurrently with minimum latency.
- Incorporated **TensorRT** to further enhance the inference speed up to **10x** faster.
- Developed an optical imaging approach to detect aflatoxin on pistachios, with image acquisition performed via a camera.
- Developed a high-throughput **MVP** for agricultural falling sorting machine, integrating Computer Vision algorithms with mechanical actuation to achieve 95% sorting accuracy at a capacity of 250 kg/h.(link)

FEB 2022 - PRESENT

Computer Vision Research Engineer

Arassis

A **novel** solution for neurosurgery navigation, enabling surgeons to use a head-mounted device (HoloLens 2) to view various modalities augmented on real anatomy in form of holograms.

- Proposed an **automatic point cloud registration pipeline** by deveoping **a robust modification of ICP** using HoloLens2 and CT-scanned 3D-reconstructed mesh (Demo) and further investigating **Deep Learning-based** approaches for point cloud registration. (RPM-Net, SE(3) Diffusion-based model, GeoTransformer, …)
- Designed a **novel assessment method** for measuring registration and tracking errors.(*arXiv.*)
- Developed an **automatic method to calibrate** an inside-out tracking system (Hololens 2) and outside-in tracking system (HTC Vive) using Kabsch algorithm**,** RANSAC, etc with 0.6 deg rotation accuracy and 2.5 mm translation accuracy.
- Developed a registration pipeline (algorithm, backend, frontend) using **NDI tracking system** for TSS surgeries with ~1.5mm accuracy.

FEB 2021 - APR 2022

Computer Vision Research Engineer

Freelancer Researcher

- Developed a deep learning-based **multi-object tracking system** to count cattle entering/exiting animal husbandry.(Demo)

AUG 2021 – DEC 2021

AI and Mechatronic Intern

Agricultural Robotics Lab & Sharif Agrobot

- Implemented an **experimental setup**, using Raspberry Pi hardware and a **YOLOv5-based** software.

JUN 2020 – AUG 2020

Computer Vision Intern

Social & Cognitive Robotics Lab (link)

- Investigated and fine-tuned deep learning models for **recognizing human facial expressions**.
- Collected a **costume dataset** based on participants' different facial expressions.

PUBLICATIONS

- **Bagheri, M.**, Piri, F., et al. "End-to-End assessment of AR-assisted neurosurgery systems" *arXiv*

KEY PROJECTS

- **LLM-powered** Web Crawler Agentic framework and recommendation system for Academic Position Search using **LangChain** (2025)
- Solar Panel Detection and Analysis of Singapore using **satellite imagery** (2024)
- **Hand Motion Recognition** using Manus gloves (2024)
- Sheet Metal Stack Counter using **Fourier Transform** (2023)
- Foot Sole Pressure Distribution Heat map Calculator for Physiotherapy (2021)

EDUCATION

SEP 2018 – SEP 2023 **B.Sc. Mechanical Engineering (major) and Computer Science (minor)**

Sharif University of Technology

- GPA: 16.92/20, last two years: **17.16/20**
- B.Sc. thesis: Vision-based Artificial Sorters (Grade: **20/20 – Full Mark**)

HONORS AND CERTIFICATES

2025 **GRE** test score **321** (Q: 170/170, V:151/170)

2025 **IELTS** band score **8.0** (L8.5, R8.5, W:7.0, S7.0)

2016 **Bronze medalist** in the National Physics Olympiad

2018 Ranked 973 among +300,000 in Iranian University Entrance Exam (**TOP 0.3%**)