REZA KARBASI

Robotic AI Engineer

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EDUCATION

University of Tehran   08/2019 - 01/2022
MS in Artificial Intelligence and Robotics; GPA: 18.86/20   *Tehran, Iran*
- Thesis: An earthquake early warning system using smartphones as sensors
- Supervisors: Prof. Hadi Moradi, Dr. Mahmoud Reza Hashemi, Dr. Ali Moradi
- Notable Courses: Deep Neural Network, Reinforcement Learning, Advanced Robotics

K. N. Toosi University of Technology   08/2014 - 01/2019
BS in Electrical Engineering; GPA: 17.4/20   *Tehran, Iran*
- Thesis: Fault detection in gas turbine
- Supervisor : Dr. Mahdi Aliyari
- Notable Courses: Pattern Recognition, Advanced Programming, Digital Control, Signal and Systems

EXPERIENCE

Data Scientist   *03/2024 - Now*
PresentID   *Remote, France*
- Developed and deployed a face liveness detection system across multiple platforms, reducing the FRR by 10% in production. Optimized scalability by enabling concurrent request processing using Docker Swarm
- Developed **solar panel fault detection** using thermal imaging, fine-tuned **YOLOv8** to segment panels and detect faults. Built a **tracker** leveraging FLIR thermal data for fault localization. Deployed on a **12.7 MW** solar farm.
- Implemented car tracking in surveilance cameras, fine-tuned **Ultralytics** to precisely identify differnt lanes and vehicles
- Enhanced an OCR system using **EasyOCR** to detect and scan official documents. Integrated **pytest** for robust testing, utilized **MLflow** for experiment tracking, and synthesized datasets for model fine-tuning.

Automotive Software Engineer   *03/2023 - 03/2024*
SoftwareMotion   *Remote, China*
- Made a **CI/CD** pipeline in **Gitlab** with **GTest** for the Autosar-based codebase(**C/C++**), reducing on-field testing through automated unit and integration tests by 30%
- Evaluated and integrated advanced path planning solutions, such as lattice-based and Apollo's EM planner. Also, developed obstacle avoidance algorithms with **DP** and **A*** techniques, validated through a custom Python-based simulator.

Data Scientist   *03/2022 - 03/2023*
Hara AI Company   *Tehran, Iran*
- Automated audio file categorization by gender and age using Google's YamNet (in the TensorFlow framework) as the backbone, fine-tuning the model with the company's labeled data. Developed a custom metric to accurately evaluate classification accuracy, with equal emphasis on precision and recall.
- Conducted an in-depth assessment and visualization of the company's Speech-to-Text (**STT**) models under varied real-world conditions (such as noise and reverberation) to pinpoint vulnerabilities.

Instructor   *06/2021 - 09/2021*
Aras Academy   *Tehran, Iran*

Presented **an Introduction to Reinforcement Learning** at Aras Academy's 2021 summer school, basing the syllabus on Sutton's book, "Reinforcement Learning: An Introduction."

AI Engineer   *10/2022 - 12/2023*
Iran's National Elites Foundation   *Tehran, Iran*

Led a team to develop a microservice-based vehicle monitoring platform, focusing on **graph-based path planning**. Enhanced navigation precision and responsiveness using **Dynamic Programming** and **A***, achieving a tenfold increase in processing speed.

Embedded System Engineer   *12/2017 - 06/2019*
Raiwan   *Tehran, Iran*

Developed **Inner Hospital Communication** boards using **STM32 F1** microcontrollers, integrating audio signal transmission via **RS485** protocol. Implemented audio recording and playback functionalities. Deployed in 2+ hospitals, facilitating real-time communication between nurses and patients.

Researcher   *05/2015 - 09/2017*
KN2C Robotic Lab   *Tehran, Iran*

Contributed as an Electronic and Control Engineer in the SSL(Small Size football League) team, focusing on the design and maintenance of robot circuit boards and implementing control algorithms, including **PID** controllers for the wheel's speed and **Kalman Filter** to enhance the precision of detecting the ball in the playground.

Teaching Assistant

served as a Teaching Assistant in some courses:

- **Deep Neural Networks**: *Spring 2022*, working with Dr. Reshad Hosseini
- **Reinforcement Learning**: *Fall 2021*, working with Prof. Majid Nili Ahmadabadi
- **System Identification**: *Spring 2020*, working with Prof. Babak Nadjar Araabi
- **Pattern Recognition**: *Fall 2022 , Fall 2019 , Fall 2017*, working with Prof. Hamid Abrishami Moghaddam

SKILLS

Languages English(Toefl score: 99), Persian: Native

Programming Python(Advanced), C(Advanced), C++(Intermediate), Matlab(Intermediate), Agile(Intermediate)

Frameworks Pytorch(Advanced), Tensorflow(Advanced), MLflow (Intermediate), ROS2 (Familiar), Simulink(Familiar)

Libraries Numpy, Pandas, Matplotlib, OpenCV, Plotly, Selenium

Hardware Keil, Stm32Cube, ARM, XMega, Arduino, Altium

Databases SQL, InfluxDB, MongoDB

Misc Git, Linux, Docker, Software Testing, GTest, PyTest, Bash Scripting, REST API, Confluence, Jira, Django, Flask

NOTABLE PROJECTS

- Developed a Metatrader trading bot using a technical strategy, enhanced by a **Deep Q Network** in **PyTorch**. Leveraged a socket connection for real-time data and analysis of historical data from 2007-2019 in Metatrader. Documented a version on this Medium blog and this Github repo.

- Dockerized a **face recognition system** in videos using **Flask** and **deepface** library for identifying individuals by comparing faces with reference images, handling video processing, face embedding, matching, and output generation for applications like surveillance. Project link.

- Implemented the encoder component of a **Transformer** network for a translation application (English to Persian) as part of a project in the Deep Learning course.

- Conducted a comprehensive data analysis on surgical outcomes for various medical centers and procedures. Assessed performance, compared surgery types, and provided insights to enhance medical service quality.

- Led the web crawling of the Soroush app for the Big Data Course's final project, utilizing **Selenium** for data extraction and **Kafka** for transmission. Facilitated team collaboration for data analysis, with all contributions and code housed in our GitHub repository.

- Led sentiment analysis of mobile phone reviews on Digikala for a Social Network course project, developing a metric to quantify device opinions. Spearheaded website crawling with **Selenium** and crafted the analysis network. Code available in this repository.

- Localized Anki robot in a **Gazebo** environment using **particle filter** and **EKF** algorithms.

- Implemented an Adaptive Neuro-Fuzzy Inference System (**ANFIS**) algorithm in **Pytorch** for EEG signal classification, facilitating video game control through brain activity.

PUBLICATION

InProgress **Karbasi R.**, Rahimi M., Vahabi H. (2024) ECG paper record digitization to detect different peaks of the signal.

InProgress Tavakoli A., Alavi Moghaddam MR., Azadmehr AR., Ali Khan M., **Karbasi R.** (2024) CTAB Removal as an Emerging Contaminant: A Comparative Study of Multi-Response Optimization for Electrocoagulation Process using Machine Learning and RSM.

HONORS & CERTIFICATES

The National University Entrance Exam for M.Sc. degree in AI: Ranked 28th(top 0.2%)

National University Entrance Exams in Mathematics: Ranked 888th(top 0.7%)

Iran Open RoboCup: Ranked 5th in 2016's Small Sized League (SSL)

Snake League: Ranked 3rd in 2019's Snake League in Nasir Cup

Certificate in Database Principles and SQL Server: Link to the certificate

Certificate in Django Web Framework: Link to the certificate

REFERENCES

Dr. Mahdi Aliyari-Shoorehdeli Associate Professor, Control and Mechatronics Engineering, K. N. Toosi University of Technology, Tehran, Iran
Email: aliyari@kntu.ac.ir

Dr. Reshad Hosseini Assistant Professor, Department of Electrical and Computer Engineering, Cofouder of Hara AI company, UT, Tehran, Iran
Email: reshad.hosseini@ut.ac.ir

Dr. Ali Moradi Associate Professor, Institute of Geophysics, UT, Tehran, Iran
Email: asmoradi@ut.ac.ir

Dr. Hamid Abrishami Moghaddam Professor, Department of Electrical and Computer Engineering, K. N. Toosi University of Technology, Tehran, Iran
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