REZA KARBASI

Machine Learning Researcher

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SUMMARY

Experienced AI and Robotics professional with a master's degree in Artificial Intelligence and Robotics from the University of Tehran. Skilled in Python, C/C++, and frameworks like PyTorch and TensorFlow. Proficient in signal processing and machine learning with a strong academic background. Demonstrated ability in algorithm development and software engineering roles. Research interests include Voice Command communication, Human-Robot interaction, and Signal Processing.

EDUCATION

University of Tehran   Tehran, Iran
*MS in Artificial Intelligence and Robotics; **GPA: 18.86/20***   *Sep. 2019 - Jan. 2022*
- 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 in Speech signals and Machine Vision, Reinforcement Learning

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

WORK EXPERIENCE

Automotive Software Engineer   *SoftwareMotion*
04/2023 - Now   *Remote, China*

At SoftwareMotion, developed a **CI/CD** pipeline in **Gitlab** using **GTest** for the Autosar-based codebase, enhancing testing efficiency by 30%, and created a **PyQT** visualization tool for AEB and ACC systems, significantly reducing debugging time by processing MF4 and CAN signals.

Machine Learning Engineer   *Hara AI Company*
06/2022 - 03/2023   *Tehran, Iran*

- Leveraged Google's YamNet within the TensorFlow framework to automate the categorization of audio files by gender and age, fine-tuning the model on the company's labeled dataset. Introduced a custom loss function that balances precision and recall, achieving an average precision of 0.55 and an average recall of 0.51 across various categories.
- Building a filter for detecting operator interruptions and poor voice quality using VAD algorithms.
- 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 reverbation) to pinpoint vulnerabilities.
- Deployed **MLflow** to facilitate experiment tracking.

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

12/2017 - 06/2019 *Tehran, Iran*

Developed **Inner Hospital Communication** boards with **STM32 F1** microcontrollers, incorporating audio signal transportation via **RS485** protocol, and implemented audio recording and playback on digital boards. Enabled efficient real-time communication between nurses and patients, successfully deployed in over 2 hospitals.

Robotic Researcher *KN2C Robotic Lab*

05/2015 - 09/2017 *Tehran, Iran*

- Led the electronics team in KN2C's SSL, enhancing robot performance by designing, soldering, and maintaining Xmega and ST processor boards for motor control and precise **PID** calibration. Fostered collaboration with mechanical and software teams to integrate system improvements.
- Boosted ball detection precision by implementing a **Kalman Filter** in **C++**, leveraging the Armadillo library.

Instructor *Aras Academy*

06/2021 - 09/2021 *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."

Teaching Assistant

I 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

NOTABLE PROJECTS

- 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.
- Applied an image captioning application using **Resnet18** and **LSTM** models in **PyTorch**.
- Localized Anki robot in a **Gazebo** environment using **particle filter** and **EKF** algorithms.
- 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.
- Implemented an Adaptive Neuro-Fuzzy Inference System (**ANFIS**) algorithm in **Pytorch** for EEG signal classification, facilitating video game control through brain activity.
- 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.

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

SKILLS

Programming C++(Advanced), Python(Advanced), C(Advanced), Matlab(familiar), Java(Intermediate)

Frameworks Pytorch(Advanced), Tensorflow(Advanced), MLflow(Intermediate)

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

Databases SQL, InfluxDB, MongoDB

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

REFERENCES

Dr. Mahdi Aliyari-Shoorehdeli Associate Professor, Control and Mechatronics Engineering, K. N. Toosi University of Technology, Tehran, Iran
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Dr. Reshad Hosseini Assistant Professor, Department of Electrical and Computer Engineering, Cofouder of Hara AI company, UT, Tehran, Iran
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Dr. Ali Moradi Associate Professor, Institute of Geophysics, UT, Tehran, Iran
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