Reza Karbasi

AI Engineer

@ arzkarbasi@gmail.com | 🔗 LinkedIn | 🔗 Reza Karbasi | 🌐 Portfolio | 📍 Tehran, Iran

Summary

Experienced programmer in different fields from robotics all the way to machine learning, software development and decision-making projects. Participated in developing various C/C++ and Python programs. I have a master's in **AI and Robotics** and I'm passionate about multidisciplinary projects to expand my horizons.

Work Experience

Algorithm Engineer   *SoftwareMotion*
Apr. 2023 - Present   *Remote, China*

SoftwareMotion is a company that develops Advanced Driver Assistance Systems(ADAS).I worked there as an Algorithm Engineer in the Decision Planning and Control(DPC) team.

- Implemented a CI/CD pipeline (using **GTest**) for our implementing codes to reduce the on-field tests. In this regard, I compiled an Autosar-based codebase.
- Designed a comprehensive visualization app (using **PyQT**) for various functionalities, with a focus on AEB and ACC, incorporating BEV (Bird's Eye View) plots for enhanced system analysis. This tool reduced debugging time significantly.
- Developed a path planner using Dynamic Programming (**DP**) techniques.

ML Engineer   *Hara AI Company*
Jun. 2022 - Mar. 2023 (10 months)   *Tehran, Iran*

Hara AI is a B2B company specializing in AI services for businesses, including OCR and STT. As an ML engineer in the Call Center team, I contributed to the development of AI-driven solutions for call centers, such as quality control for operators and sentiment analysis on the calls.

- As part of my responsibilities at the company, I implemented a network to assign tags to audio files, such as gender, age, sentiment, and satisfaction. Additionally, I developed a filter to detect frequent interruptions by the operator, as well as poor voice quality.
- Assessing the company's STT model in various real-world conditions, such as applying different levels and types of noise to the sound, helped identify its vulnerabilities related to gender, age, and signal quality. This analysis enabled the development of more robust AI-driven solutions for call centers, ultimately improving customer experiences.
- By implementing **MLflow** workflow, we established a standard for deep learning workflows, enabling us to track experiments, capture experiences, and create referable documents.

AI Engineer   *Iran's National Elites Foundation*
Oct. 2022 - Dec. 2023 (14 months)   *Tehran, Iran*

Our team developed a path planning algorithm for an aerial vehicle to avoid collisions with obstacles and remain undetectable from surveillance devices. We created a graph using our knowledge of the obstacles and put the weights based on the formula for detection (based on SNR). We then applied various algorithms, such as DP, A*, etc., to address the problem. As the project manager and responsible party, I optimized the older graph-making process **10 times**.

Designer of a Trader Bot   *QDM*
Apr. 2019 - Jan. 2020 (10 months)   *Tehran, Iran*

QDM was a company that worked for 10 years in stock market trading. I was responsible for designing an automatic trader bot using RL.

- I made a trader bot in **Metatrader** and set the parameters using the Deep Q network in Python. Metatrader and the RL algorithm were connected by a socket. I published a minor version of the app in this medium blog and this Github repository.

Instructor *Aras Academy*

Jun. 2021 - Aug. 2021 (3 months) *Tehran, Iran*

Aras Academy offers workshops and robotic courses for bachelor and master students. In the 2021 summer school, I presented **an Introduction to Reinforcement Learning**.

Embedded Software Engineer *Raiwan*

Dec. 2017 - Jun. 2019 (19 months) *Tehran, Iran*

Raiwan specializes in designing and building IoT and industrial manufacturing and laboratory devices. I participated in two projects:

- **Inner Hospital Communication**: Designed and developed communication boards for in-hospital use with the ability to call nurses and patients. I used **STM32** microcontrollers for efficient data transfer and connectivity. It's been implemented for at least 2 hospitals in Iran.
- **Taxi Payment Device**: Led the mechanical and board design of a taxi payment device. The project intended to make a device for taxis to facilitate payment of customers. Also, I was responsible for interacting with **ESP32** (the main processor of the device) to the SIM card.

Student Researcher *KN2C Robotic Lab*

May 2015 - Sep. 2017 (2 years and 4 months) *Tehran, Iran*

KN2C Robotic Lab is a robotic lab that works on various robotic devices and projects from UAVs to Small Size football leagues. I was there as an electronic and control engineer in the SSL team (Small Size League).

- Designer and maintainer of the main boards of our soccer players. The board had an Xmega processor and 4 ST processors to drive motors. We applied higher-level commands (wheel velocities) on each BLDC motor using a PID controller.
- Implementing a **Kalman Filter** on the estimated position of the ball (based on the camera) to achieve a more stable strategy during gameplay.
- Developing a GUI to monitor the robots' condition during the game, connected to the main transmitter board to receive data and display essential flags for each player.

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

SKILLS

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

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

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

Databases SQL, InfluxDB, MongoDB

Misc Git, Docker, REST API, Confluence, Jira, Django

PROJECTS

Sentiment Analysis on Comments May 2020

- This was the final project for the Social Network course. In this project, we were going to do a sentiment analysis of mobile phones on the Digikala website and propose a metric to show the reviewers' opinions about a device. I was responsible for crawling the website using Selenium and designing the sentiment analysis network. I shared the code to crawl Digikala per category in this repository.

Online Analysis of News in Soroush App

- This was the final project of the Big Data Course. In this project we were supposed to crawl Soroush app(a social medium in Iran) and make an analysis on the public channels to be shown to the admin. I was responsible for the web crawling of Soroush messenger (I did it with **Selenium**) and establishing data transmission through **Kafka**. We stored the codes in this repository.

A Freelance Project   Nov. 2020
- The project was a data analysis on a dataset about surgical results. I analyzed the results of surgeries for certain medical centers and patients to assess the medical centers and make a comparison between different kinds of surgeries. I got this project from Ponisha.

Image Captioning
- Using **Resnet18** and **LSTM** model in an image captioning application with pytorch framework. It was one of the projects of the Deep Learning course.

Localizing of A Robot
- In this project, we aimed to localize the Anki robot in a **Gazebo** environment using **particle filter** and extended Kalman filter (**EKF**) algorithms. This was our final project for the Advanced Robotics Course.

Estimating the Velocity of a device Using its position and acceleration
- In this project, we aimed to predict accurate acceleration, velocity, and position values using GPS and an accelerometer. We implemented a **Kalman Filter** to filter the sensor values and estimate the device's velocity. I used an **Arduino DUE** to collect the data and applied the filter in **MATLAB**. This project was the final assignment of the Instrumentation course.

Semantic Segmentation
- In this project, we aimed to implement a SegNet neural network for **semantic segmentation**. This was one of the projects of the Deep Learning course.

A Freelance Project   Sep 2021
- Create a gym environment for simulating the results alongside a deep RL agent (**A3C**) to set each station's power and reduce conflict while maximizing the coverage area.

Implementing Transformer Network
- In this project, we aimed to implement the encoder part of a **transformer** network and use it for a translation application (English to Persian). This was one of the projects of the Deep Learning course.

EEG Signal Classification   Feb. 2021 - Aug. 2021
- Our project aimed to use **EEG** signals to play a simple video game. My task was to implement an Adaptive Neuro-Fuzzy Inference System (**ANFIS**) algorithm to classify the brain signals into two distinctive actions in the game.

EDUCATION

University of Tehran (It has the best ranking in Iran)   Tehran, Iran
MS in Artificial Intelligence and Robotics; GPA: 3.58/4.00   *Sep. 2019 - Jan. 2022*
- Notable Courses: Advanced Robotics, Deep Neural Network, Machine Vision, Reinforcement Learning

K. N. Toosi University of Technology(top 5 universities in Iran)   Tehran, Iran
BS in Electrical Engineering (major in Control Engineering); GPA: 3.58/4.00   *Sep. 2014 - Jan. 2019*
- Notable Courses: Pattern Recognition, Modern Control, Digital Control, Advanced Programming(OO)

HONORS & CERTIFICATES

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