Reza Karbasi

Robotic Engineer

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

Summary

Experienced programmer in different fields of robotics from path planning and decision making all the way to control and perception. Participated in developing various C/C++ and Python programs. I have a master in **AI and Robotics** and I'm passionate about multidisciplinary projects to expand my horizons.

Work Experience

Algorith 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 Decision Planning and Control(DPC) team.

- Implemented a CI/CD pipeline (using **GTest**) for our implementing codes to reduce the on-field tests. For this purpose 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 worked on designing a path planning algorithm for an aerial vehicle to avoid to be collided with obstacles and also remain undetectable from surveillance devices. In this regard, we made a graph with our knowledge of the obstacles and the formula of detection(having SNR). Then we applied differnt algorithms such as DP, A*, etc to tackle the problem. Also, we dockerized the project at the end

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

QDM was a company which 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 Deep Q network in python. Metatrader and the RL algorithm was 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 holds some workshops and presents robotic courses to bachelor and master students. I presented **An Introduction to Reinforcement Learning** in its 2021 summer school.

Embedded Software Engineer *Raiwan*
Dec. 2017 - Jun. 2019 (19 months) *Tehran, Iran*

Raiwan works on designing and building IoT and industrial manufacturing and laboratory devices. I participated in 2 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 taxies in order to facilitate payment of customers. Also, I was responsible for interacting of **ESP32** (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 vaious robotic devices and projects from UAV to Small Size football league. I was there as electronic and control engineer in SSL team (Small Size League).

- Designer and maintainer of main boards of our soccer players. The board had a Xmega processor and 4 ST processors to drive motors. We applied higher level commands (wheel velocities) on each BLDC motor using a PID controller.
- I applied **Kalman Filter** on the estimated position of the ball (based on camera) to have a more stable strategy in the play.
- I developed a GUI to monitor robots condition during the game. It's been connected to the main transmitter board to receive the data and showed 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

Semantic Segmentaion

- Implementing Segnet neural network for **Semantic Segmentaion**. It was one of the projects of the Deep Learning course.

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.

Implementing Transformer Network

- Implenting encoder part of a **transformer** network and use it for a translation application(English to Persian). It was one of the projects of the Deep Learning course.

Localizing of A Robot

- Localizing Anki robot in **Gazebo** using **particle filter** and **EKF**. It was our final project for the Advanced Robotic Course.

EEG Signal Classification Feb. 2021 - Aug. 2021

- Our project was to use **EEG signals** to play a simple video game. My task was to implement an Adaptive neuro fuzzy inference system (**ANFIS**) algorithm to the classify the brain signal to 2 distinctive actions in the game.

A Freelance Project Sep 2021

- Make a gym environment for simulating the results alongside a deep RL agent (**A3C**) to set each station's power some how reduce their conflict while maximizing the coverage area.

Estimating the Velocity of a device Using its position and acceleration

- Predicting accurate values of acceleration, velocity and position using GPS and Accelometer. We implemented **Kalman Filter** to filter the sensor values and estimate the device's velocity. I used **Arduino DUE** to collect the data and applied the filter in **Matlab**. This project was the final assignment of the Instrumentation course.

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 put 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 differnt kinds of surgeries. I got this project from this freelance website.

Sentiment Analysis on Comments May 2020

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

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