Reza Karbasi

Robotic Software Engineer

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Summary

Robotics Software Engineer with 4+ years of experience spanning path planning to software development. Possesses a master's degree in AI and Robotics, excelling in Python and C. Proven track record as a key contributor within multidisciplinary teams, across both academic and global settings, of 5-10 members.

Work Experience

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

- Made a **CI/CD** pipeline in **Gitlab** with **GTest** for the Autosar-based codebase, reducing on-field testing through automated unit and integration tests by 30%
- Built a **PyQT** visualization software for AEB and ACC systems, integrating BEV plots to drastically reduce debugging time. Processed MF4 and CAN signals (BLF, DBC) to expedite vehicle issue diagnosis.
- 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.

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.
- Developed a filter to detect operator interruptions and poor voice quality by employing Voice Activity Detection (VAD) algorithms and conducted feature extraction from voice signals for classification with scikit-learn, achieving an average recall of 0.6 accross the classes.
- Deployed **MLflow** to facilitate experiment tracking.
- 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.

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.
- Crafted a real-time GUI in C# using Visual Studio for simultaneous condition monitoring of all robots, enhancing strategic decision-making.

Designer of a Trader Bot — *QDM*
04/2019 - 01/2020 — *Tehran, Iran*
Engineered a Metatrader trading bot with a technical strategy, incorporating a **Deep Q Network** in **PyTorch**.

Utilized a socket connection for data streaming and applied the algorithm on historical data spanning 2007-2019 in Metatrader. Documented a version on this Medium blog and this Github repo.

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

- Developed **Inner Hospital Communication** boards using **STM32 F1** microcontrollers, enabling efficient nurse and patient calls, deployed in 2+ hospitals.
- Designed **Taxi Payment Device** frame via CNC and worked on the device's **ESP32** integration.

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."

Notable Projects

- 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.
- Implemented an Adaptive Neuro-Fuzzy Inference System (**ANFIS**) algorithm in **Pytorch** for EEG signal classification, facilitating video game control through brain activity.
- Developed a gym environment with a Deep RL **A3C** agent to optimize station power settings and maximize coverage area while minimizing conflicts.
- Focused on web crawling the Soroush app and data transmission via **Kafka**, collaborating with teammates who conducted the analysis. Contributions documented in our GitHub repository.

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

Skills

Programming C++(Advanced), Python(Advanced), C(Advanced), Matlab(familiar)
Frameworks Pytorch(Advanced), Tensorflow(Advanced), MLflow(Intermediate), Simulink(familiar), ROS(familiar)
Libraries Numpy, Pandas, Matplotlib, OpenCV
Hardware Keil, Stm32Cube, ARM, XMega, Arduino, Altium, Soldering
Misc Git, Linux, Docker, Software Testing, GTest

Education

MSc. in AI and Robotics	Tehran University	GPA: 18.8/20	2019-2022
BSc. in Electrical Engineering	Khaje Nasir University	GPA: 17.4/20	2014-2019