Farhad Baghyari

Robotics engineer

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Technical Skills

- **Programming Languages:** Python (Proficient), Matlab (Proficient), C# (Intermediate), C++ (Intermediate).
- **Frameworks and Libraries:** Pandas, NumPy, CuPy, cuDF, Numba, NetworkX.
- **Tools and Technologies:** Isaac sim, Omniverse, Solidworks, Simulink, Matlab, ROS, Git, Docker, Linux, CUDA.
- **Machine Learning:** Reinforcement learning, Model development, predictive analytics, XGBoost, Random Forest.
- **Other Skills:** Robotics, mechanical design, algorithm development, optimization, real-time scheduling, simulation.

Summary

Experienced Robotics Engineer with a strong background in designing and developing advanced robotic systems and algorithms. Proficient in robotics, mechanical design, optimization, real-time scheduling, and simulation. Skilled in utilizing tools like Python, MATLAB, Isaac Sim, SolidWorks, ROS, and CUDA to create innovative solutions in robotics and automation. Expertise includes kinematics and dynamics calculations, workspace optimization for series and parallel robots, and development of various robotic projects such as industrial robot arms and motion simulators.

You can find a few images of my previous work in the last page.

Experience

R&D engineer, AVEC-lab, avec-lab.com, Sep 2022 – Present

- Pioneered the development of the Smart Selective Navigator (SSN) using Python, addressing complex arc routing problems with turn restrictions for autonomous vehicles. Designed in an OOP framework, SSN became a flexible routing solution, later adapted for multiple projects.
- Optimized operational data processing for Oshawa's winter services, creating feasible routes for snowplowing and salting operations.
- Developed a real-time scheduling algorithm for KITECH, enabling dynamic adjustments of vehicles and servicing areas.
- Enhanced the scalability of SSN for the city of Surrey, automating processes for large-scale routing scenarios.
- Designed an exploration algorithm for KIMM using Isaac Sim, ROS, and CUDA programming to minimize vehicle overlap and operation time in multi-vehicle tasks.

Product Designer, Arta Sanat Fardad Toos Co., Feb 2021 – Jul 2021

- Expanded the company's product line by designing a new series of products, including servo linear actuators and linear systems.
- Reverse engineered the Octopus Tissue Stabilizer based on customer orders.
- Designed and implemented the feeding section of an automated part insertion machine for rotary CNCs
- Developed a custom automated copper wire stripping device.
- Created a test setup for steel cable tension testing, ensuring product reliability and compliance with industry standards.

R&D engineer, FUM Robotics Lab., fum-care.com, Apr 2015 – Jan 2021

- **Project Portfolio:** Led the development of various robotics projects, including *a 3DOF motion simulator with rotary arms, a 4DOF motion simulator with linear actuators, a 6R industrial robot arm with a 200 kg payload and 2.5m reach, a 6R industrial robot arm with a 20kg payload and 1.4m reach, a SCARA robot with a 5kg payload (4DOF), a Rehabilitation Exoskeleton (lower body), an auto-lawnmower robot, and a two-parallel when E-scooter.*
- Led the design and development of various robotics projects, including industrial robot arms and motion simulators.
- Conducted kinematics and dynamics calculations for complex robotic systems.
- Optimized workspaces for series and parallel robots to improve operational efficiency.
- Managed teams focused on optimization, design, and calculations, fostering collaboration and innovation

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Senior Engineer, Forvest Inc., forvest.io, Sep 2021 – July 2024

- Engineered a suite of microservices using Python and FastAPI, enhancing system modularity and scalability.
- Developed an advisory algorithm leveraging SCC data to provide portfolio management suggestions, utilizing convex optimization techniques.
- Developed a prototype of an AI-powered chatbot using the OpenAI API, aimed at enhancing user interaction and support; currently undergoing fine-tuning before deployment.
- Led the creation of SCC, a predictive model forecasting coin correlations; oversaw model design, data validation, and deployment.
- Implemented algorithmic trading solutions in Pine Script and Python (Backtrader), automating data collection with custom web scraping tools using Selenium.
- Utilized InfluxDB and MongoDB for efficient data storage and retrieval of time-series and chat data.

Certificates

- Reinforcement Learning by University of Alberta & Alberta Machine Intelligence Institute on Coursera.

Publications & Patents

- Robotics - (2024): Advanced Path Planning for Autonomous Street-Sweeper Fleets under Complex Operational Conditions. Robotics
- ITOR- (2024): Surveillance UGV Path Planning with Path Smoothing and Vehicle Breakdown Recovery
- CSME - (2024): A Study of the Optimal Number of Clusters Proportional to the Number of Available Vehicles for the Cluster-First-Route-Second Problem
- ICCAS- (2023): Deploying Multiple Vehicles for Snow Plowing Using Smart Selective Navigator and its Effect
- 5th ICRoM- (2017): Explicit Inverse Kinematic Solution for the Industrial FUM Articulated Arm using Dual Quaternion Approach
- MDPI - (Under review): Smart Selective Navigator (SSN): Enhancing Urban Winter Road Maintenance through Optimized Arc Routing with Hard Turn Restrictions
- Patent: Ferdowsi university Alpha-model rehabilitation Exoskeleton for spinal cord injuries

Education

- Master of science in Mechanical Engineering, Specializing in Mechatronics
- Ontario Tech University, Sep 2022 – May 2024, GPA 4.1 out of 4.3
- Relevant Coursework: Advanced Robotics & Automation, Advanced Fluid Power control and simulation, Convex Optimization, Mechatronics design, Intro. to Embeded systems,

- Bachelor of science in Mechanial Engineering, Specializing in Robotics
- Ferdowsi University of Mashhad, Sep 2012 – Sep 2017, GPA 15.05 out of 20
- Relevant Projects: Various Robot design and optimization projects

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Portfolio

Here are some of my mechanical designs as well as simulations.