Hushmand Esmaeili

EDUCATION

Worcester Polytechnic Institute (WPI), Worcester, MA
Master of Science in **Robotics Engineering**, GPA: 4.0/4.0 — Expected: August 2023
Bachelor of Science in **Robotics Engineering**, GPA: 4.0/4.0 — Expected: May 2023

SKILLS

Programming Languages: C++, C, Python, C#, Java, MATLAB, Apache Derby, MongoDB, LINQ
Software Development Tools: ROS, Linux, Visual Studio, Visual Studio Code, GitHub, IntelliJ, Arduino, CCStudio
Agile Project Management Tools: GitHub Project, Jira, Trello
Other Applications/Software: RViz, Gazebo, SolidWorks, LoggerPro, Mathcad, IBM Maximo

WORK EXPERIENCE

Software Engineering Intern, Delsys, Natick, MA — May. 2022–Aug. 2022

- Developed new features and functionalities in C# for data acquisition software for wireless EMG system.
- Designed and implemented an event-marker system across modules for data collection and review modes.
- Contributed to the data management system overhaul using .NET Entity Framework.
- Worked in a small software team, attended daily software meetings, and utilized Jira and Git for project tracking.

PROJECTS

Bimodal Quadruped Robot, Master's Thesis Research & Bachelor's Senior Capstone Project, WPI — Aug. 2022–Present

- Implementing dynamic locomotion for a quadruped in team of 4 using whole-body impulse control (WBC) and MPC.
- Interfacing robot hardware with control logic software, including RC controller, camera, IMU and motor controllers.
- Contributing to robot software by applying design patterns, multi-threading, and memory management in C++.
- Fabricating and assembling to 12-DOF quadruped based on Solo12 design.
- Developing a computer vision (CV) module for person tracking, obstacle detection and mapping.

Drone Trajectory Tracking using SMC, WPI — Oct. 2022–Dec. 2022

- Designed and tuned a boundary-layer based sliding mode controller (SMC) for altitude and attitude control of drone.
- Generated a simple quintic trajectory to test drone controller's trajectory tracking.
- Implemented controller in Python in ROS to evaluate robot performance in Gazebo and wrote a script to visualize data.

Software Application for Brigham & Women's Hospital, WPI — Jan. 2022–Mar. 2022

- Applied Agile development methodologies and software design patterns in Java in team of 10 people.
- Coordinated software engineers as Assistant Lead Software Engineer and performed code reviews.
- Implemented embedded, client-server and cloud databases in MySQL and MongoDB using JDBC driver.

Unknown Environment Mapping, WPI — Oct. 2021–Dec. 2021

- Programmed a TurtleBot robot in Python to explore a maze using LIDAR and IMU in team of 3 people.
- Implemented path-planning (A*), frontier-exploration and configuration space algorithms to navigate to unexplored areas.
- Designed and implemented SLAM system in ROS for robot navigation and state estimation.

Pick and Place Robotic Arm, WPI — Aug. 2021–Oct. 2021

- Developed code in MATLAB for joint- and task-space control of robotic arm in team of 3 people.
- Implemented position and velocity kinematics for singularity detection and trajectory generation.
- Integrated a computer vision system to localize colored ball targets through an image processing pipeline.

Autonomous Performance of a Play with Robots, WPI — Mar. 2021–May. 2021

- Collaborated in team of 4 to build and program robots that autonomously performed scenes from a play.
- Programmed an AtMega 32U4 microcontroller, its hardware timers/counters and interrupts using C++.
- Integrated sensors through sensor fusion, including IMU, ultrasonic and IR distance sensors, encoders, and camera.
- Utilized I2C communication protocol for communication between microcontroller and peripherals.

Embedded Computing in Engineering Design, WPI — Jan. 2021–Mar. 2021

- Programmed mini-projects in a MSP430 microcontroller in C in Code Composer Studio IDE.
- Utilized SPI Protocol to interface with peripherals including an LCD screen, touchpad and temperature sensor.
- Studied microcontroller architecture and hardware, memory mapping, timers and interrupts, etc.

Robotic Replacement of Solar Panels, WPI — Aug. 2020–Oct. 2020

- Built a robot that autonomously navigated and replaced panels from roof of a scaled house in a team of 3.
- Designed lifting and gripping mechanisms through four-bar linkage synthesis using SolidWorks.
- Integrated and programmed several sensors and actuators using C++ and PID control.