Hushmand Esmaeili

hesmaeili@wpi.edu | hushmandesmaeili.github.io | (202) 412-7448 | 1 Carver St., Worcester, MA 01604

EDUCATION

Worcester Polytechnic Institute (WPI), Worcester, MA
    Master of Science in **Robotics Engineering**, GPA: 4.0/4.0   Expected: December 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: LaTex, RViz, Gazebo, SolidWorks

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

Characterization and Optimal Control of Motion Primitives, WPI   Jan. 2023–Present
- Researching new ways to characterize motion primitives and find optimal switching points and controllers between them.
- Exploring offline trajectory optimization methods and online optimal melding of trajectories.

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 control (WBC) and MPC.
- Interfacing robot hardware with control logic software, including RC controller, camera, IMU, and motor controllers.
- Contributing to robot software stack by applying design patterns, multi-threading, and memory management in C++.
- Developing a computer vision (CV) module for person tracking, obstacle detection and mapping.

Drone Trajectory Tracking using Sliding Mode Control (SMC), WPI   Oct. 2022–Dec. 2022
- Designed and tuned a boundary-layer sliding mode controller (SMC) for control of CrazyFlie 2.0 quadcopter.
- Generated a 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.

Robust Feedforward Control for Trajectory Tracking of RRBot, WPI   Sept. 2022–Nov. 2022
- Designed and tuned a robust feedback-linearization based controller for trajectory tracking of a 2-link robot.
- Simulated and tested performance of controller in MATLAB and in Gazebo using ROS.

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 back-end 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.
- 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.
- 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.
- 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 in SolidWorks, and integrated sensors and actuators using C++ and PID control.