Devesh Bhura

☎ 213-275-7003 ✉ devbhura@gmail.com linkedin.com/in/devesh-bhura github.com/devbhura

Education

Northwestern University **Sep. 2021 – Dec. 2022**
Master of Science in Robotics *GPA: 3.87*

University of Southern California **Aug. 2017 – May 2021**
Bachelor of Science in Mechanical Engineering *GPA: 3.57*

Experience

Johnson & Johnson MedTech **June 2022 – September 2022**
Robotics & Conrols Intern | *Python, C++, Optimization* *Santa Clara, CA*

- Designed Kalman Filter using system modelling and friction modelling to estimate torque sensor output.
- Established baseline performance criteria for torque sensor error detection for surgical robot using the filter estimate.
- Deployed and validated the error detection scheme in C++, by conducting a sensitivity analysis on hardware prototypes.

Autonomous Microrobotics Systems Lab, USC **May 2020 – June 2021**
Undergraduate Research Assistant| *MATLAB, SIMULINK* *Los Angeles, CA*

- Implemented state estimation for noisy signals from VICON camera sensors, to make robot controllers stable.
- Compared and evaluated performance of filters such as Linear, Extended and Multiplicative Extended Kalman Filters.

Projects

Simulator for Swarm Robots | *Python* **April 2022 - Ongoing**

- Built a framework for swarm robot simulation using client server software architecture and socket programming.
- Incorporating TCP/IP network protocol for a custom swarm robot API to communicate with a simulation server.

Extended Kalman Filter SLAM from Scratch | *C++, ROS* **January 2022 - March 2022**

- Implemented a feature-based EKF SLAM and object detection in controlled environment for Turtlebot3 in simulation
- Wrote a 2D differential drive library from scratch, using software design patterns
- Built a simulation setup in ROS to test the effectiveness of the SLAM algorithm, with test driven development

Texture Classification using Record Needle as sensor | *Python, ML* **January 2022 - March 2022**

- Researched ML classifiers to classify 10 different textures ranging from acrylic to cloth, using data from a record needle
- Demonstrated 99% classification accuracy of the textures by extracting features in both time domain and frequency domain from the voltage data from record needle with my research partner
- Achieved 76% classification accuracy in a time window of 10 ms to demonstrate quick classification

3D-SLAM and Clustering based costmap for UGV terrain navigation | *C++, PCL* **January 2022 - March 2022**

- Created a ROS package that used a clustering algorithm using Jackal UGV lidar data to create a custom costmap to go over small obstacles during terrain navigation of a robot
- Employed RTABMap to achieve 3D Simultaneous Localizaton and Mapping, loop closure and navigation for the robot.

Control a Rolling Ball with a Robotic Arm and Computer Vision | *Python, ROS, OpenCV* **November 2021**

- Developed a ROS package, as part of a team, that controls a white board attached to the end effector of a 7 dof Franka-Emika Panda Arm and makes a ping pong ball follow trajectories drawn on the white board
- Implemented PD control on the position of the ball and the effort of robot joints
- Developed a maze solving algorithm which took a maze from the Realsense camera pipeline, solved the maze and gave the path to the control node which the ball would follow

YouBot Manipulation for picking and placing an object | *Python, CoppeliaSim* **November 2021**

- Accomplished manipulation of a 4 wheel mobile robot with 5 dof arm to pick up an object in CoppeliaSim
- Designed a feedforward PI controller to move the object with negligible error for different starting configurations
- Configured joint limits to prevent self-collisions and singularities while calculating the Inverse Kinematics for the robot

Modelling and control of rotational system | *MATLAB, Controls* **January 2021**

- Evaluated time and frequency domain system identification methods for 1 dof and 2 dof rotational systems.
- Designed and evaluated PD and PID controllers for dynamical system, for both collocated and non-collocated control.

Technical Skills

Programming: Python, C++, C, Robotic Operating System, Linux, Git, MATLAB, SIMULINK, LaTeX
Robotics: Gazebo, MoveIt, OpenCV, PCL, Signal Processing, Linear Algebra, Optimal Control, Algorithms
Machine Learning: Regression, Naive Bayes, Neural Nets, Gradient Descent, Reinforcement Learning