Devesh Bhura

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Education

Northwestern University **Sep. 2021 – Dec. 2022**
Master of Science in Robotics *GPA: 3.9*

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

Experience

Trumpf Photonics **May 2023 – Present**
Automation Engineer - Software *Princeton, NJ*

- Refactored Python code to use multithreading using PyQt, and reduced the overall process time by 30% from 2 hours 45 minutes to under 1 hour 55 minutes

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

- Designed Kalman Filter using system modeling and friction modeling to estimate torque sensor output
- Established baseline performance criteria for torque sensor error detection for a 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 - Dec 2022**

- Designed a swarm robot simulator using client-server software architecture and socket programming for communication
- Implemented communication protocol for the existing robot API to run user programs in the physics simulator

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

- Implemented a feature-based EKF SLAM and object detection in a 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

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 whiteboard 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

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 a dynamical system, for both collocated and non-collocated control

Technical Skills

Software: Python, C++, C, ROS, Linux, Git, MATLAB, SIMULINK, LaTeX, Solidworks, NX
Robotics: Gazebo, MoveIt, OpenCV, PCL, Robot Dynamics, Signal Processing, Linear Algebra, Controls, Algorithms
Others: Machine Learning, Statistics, Particle Filters, BFS, DFS, A^* search, RRT, Markov Decision Process