Hrushikesh Budhale

My Website | hbudhale@umd.edu | LinkedIn | College Park, MD, USA

OBJECTIVE

Keen interest in Autonomy with focus on controls, planning and embedded engineering, Experienced engineer with strong desire to work on innovative projects and contributing to solve real world problems.

EDUCATION

M Eng Robotics, University of Maryland, College Park, MD (3.8/4.0) **Aug 2021 - Dec 2022**
Relevant Coursework: Planning, Perception, Robot Learning, Control System, DL Frameworks

B Tech Electronics, Walchand College of Engineering, India (8.2/10) **Aug 2015 - May 2019**

TECHNICAL SKILLS

Languages & Tools: C++, Python, Git, Docker, Pytorch, ROS1, ROS2, NI-Veristand, Javascript
Software: Gazebo, RViz, CANalizer, CANoe, Coppelia sim **Controls:** MPC, LQG, LQR, PID, Stanley, Pure Pursuit
Planning: A*, RRT*, PRM, Dijkstra, Sampling based **Localization:** ORB SLAM, KF, EKF, PF, Bayesian Filters

EXPERIENCE

Nuro CA, USA
Software Engineer Intern *(Controls & Planning Team)* *May 2022 - Aug 2022*
- Delivered production ready product to unblock the team for critical public road deployment milestones.
- Scaled a proposed concept to an automated framework to validate actuator and controller performance.
- System built with hardware agnostic APIs at its core, allowed it to scale and support different types of actuators and multiple comm. buses in parallel. Resulted in significant reduction in validation time per SW release.

Maryland Robotics Center MD, USA
Graduate Research Assistant *(Planning and Behavior)* *Dec 2021 - May 2022*
- Developed behavior tree and behavior plugins for the autonomous package delivery robots.
- Development and integration of custom RL based Local planner and controller plugins.
- Designed a training environment with intelligent pedestrians to mimic the real world scenario in a crowded building.

Flytbase Inc. Pune, India
Robotics Engineer *(Localization and Path Planning)* *Jan 2020 - Aug 2021*
- Developed Visual odometry for monocular camera. Package developed using Geometric projection, predictive filter and DL based approach, achieved accurate localization in a GPS denied environment.
- Developed hierarchy based rapid Path Planner for the fleet of drones. Implemented (LaneNet DL) detection pipeline for drone localization.
- Developed flyzone optimization module based on google OR-tools.

CS Dept., Indian Institute of Technology Mumbai, India
Research Intern *(Path Planning)* *June 2018 - Aug 2018*
- Implemented robust controller for stability of drone while tracking from fixed monocular camera.
- Path planning for MAVs using RRT* planner and trajectory following capable of avoiding moving obstacles.
- Tests showed robust performance allowing drone to fly through 40cm diameter hoops. Effective use of simulation software (Coppelia Sim) to emulate the real scene.

PROJECTS

Structure From Motion | Vision & Tracking *2022*
- Developed computer vision pipeline for generating 3D point cloud from images of a scene.

Planning Experiments | Reinforcement Learning *2022*
- Trained RL agent using DQN to navigate in constrained spaces with increasing levels of difficulty.
- Tuning of controller parameters using Actor Critic algorithm in high dimensional input spaces.

Gantry Crane Control | Control & Filtering *2021*
- Designed LQG and LQR control of a gantry crane. Analyzed controllability and observability..
- Implemented Kalman filter to account for gaussian noise in the sensor measurements. Link

Home organizing robot | SLAM & ROS *2021*
- Mobile manipulator for indoor search and manipulation of objects.
- Autonomous navigation using Movebase ROS, Moveit for manipulator control. Entire stack in C++ with GitHub Continuous Integration and gtests. Link

Pose Estimation in Structured Environment | Perception & Localization *2020*
- Developed pose estimation package working on GPU based DL inference.
- Pose prediction/correction using DTW and projective geometry
- Efficient vectorized implementation using Numpy. Link

LEADERSHIP / VOLUNTEER EXPERIENCE

Volunteered in a campaign to teach school kids in nearby villages about computers. *2019*
Mentor: Chief coordinator of the college event in the Robotics committee. *2019*
Leadership: Led college team in National level Robotics competition 'Robocon'. *2018*
Leadership: Team leader of Semi-finalist Team in National level robotics competition. *2017*