Shivani Yogesh Velapure

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ROBOTICS SOFTWARE ENGINEER

Interdisciplinary robotics software engineer passionate about algorithm development for planning and control.

EDUCATION

Oregon State University (OSU), Corvallis, United States **April 2021 - March 2024**
Master of Engineering in Robotics

University of Mumbai, Mumbai, India **June 2016 - June 2020**
Bachelor of Engineering in Mechanical Engineering

CORE COMPETENCIES

Motion Planning	Multi-agent Systems	Autonomous Systems	Artificial Intelligence
Sequential Decision-Making	Control Systems	Kinematics & Dynamics	Reinforcement Learning

TECHNOLOGIES

Programming: C++, C, Python, Bash, MATLAB
Version Control: Git
Operating Systems: Linux, Robotics Operating System (ROS)
Hardware: RaspberryPi, Turtlebot3
Libraries: OpenCV
Sim Environment: Gazebo

WORK EXPERIENCE

Graduate Researcher, Human Machine Teaming Lab, OSU, Corvallis, OR **Mar 2021 - Jan 2023**
Languages and Tools: Bash, Git, Python, ROS

- Estimated the time step at which a multi-robot team executed tightly coupled first response tasks that can be stopped safely and optimally, when the planner must replan to solve for a new task.
- Developed code in ROS to extract information about the state of task execution, and to simulate the concurrent asynchronous execution of high-level multi-robot plans.

ROBOTICS PROJECTS

Trajectory Tracking Control for a Quadcopter: Python

- Developed code for a Linear Quadratic Regulator from scratch on a quadcopter in a simulated environment to make it follow a specified trajectory.

Plan Merging for Multi-robot coordination: Python, Bash

- Designed a novel strategy for merging multi-robot task plans to create a conflict-free global plan for tightly-coupled first-response tasks in dynamic environments.
- Reduced the search space and runtime of the Temporal Optimal Conflict Resolution Algorithm, while maintaining optimal make span.

Block Flipping Robot Arm: Python, OpenCV

- Implemented an object recognition algorithm to identify alphabets on faces of blocks using OpenCV.
- Developed code to pick up, place, and flip blocks to spell a predetermined word.
- Designed a line and lane follower for picar-x hardware using concurrency.

Turtlebot: Person Tracking: Python, ROS, OpenCV

- Implemented an object recognition algorithm that detects ArUco markers for different action commands
- Developed code for a proportional controller so robot followed the marker by maintaining a fixed distance
- Developed code to integrate all the modules in ROS

Discrete Path Planning on Stretch: Python, ROS

- Wrote code to implement the Probabilistic Roadmap and A* algorithms on Stretch in simulation.
- Experiments were conducted by changing the sampling density and obstacles to analyze its performance.

Moving Target Search Algorithm: Python

- Developed code algorithm and analyzed performance by changing the strategy of the moving target

Elbow Flexion under co-contraction: MATLAB, OpenSim

- Simulated the biceps and triceps under co-contraction and studied the effect of sudden impact on the joint stiffness at the elbow.