

Pushkar Dave

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SKILLS

Programming: C++, Python, C, MATLAB, C#, Bash, Unit Testing

Robotics: ROS2, ROS, Control Systems, Embedded Systems, MoveIt, OpenCV, CoppeliaSim, Gazebo, RViz

Software: Linux, Git, Docker, CMake, Unity, PX4, QGroundControl, PyTorch, Genesis

Hardware: Onshape, Quadrotors, Quadrupeds, Microcontrollers, Raspberry Pi

Machine Learning: Reinforcement Learning, ConvNets, Autoencoders, RNNs, GANs

EDUCATION

Northwestern University

Master of Science in Robotics

Sept 2024 - Dec 2025

Evanston, IL, USA

Visvesvaraya National Institute of Technology

Bachelor of Technology in Electrical and Electronics Engineering

Dec 2020 - May 2024

Nagpur, India

EXPERIENCE

Multi-robot Systems Group, Czech Technical University

Research Intern

May 2023 – Sept 2023

- Developed a C++ algorithm to estimate the position of a focal UAV in a swarm, mitigating noisy rangefinder data
- Integrated the novel UVDAR localization system and applied sensor fusion with a Linear Kalman Filter
- Recorded and analyzed ROS data using rosbag and visualized UAV's tracked states with PlotJuggler

IvLabs, VNIT

Robotics Intern

Jul 2021 – Oct 2021

- Created a PD control system for 3D quadrotor in MATLAB, enabling accurate tracking of linear and helical trajectories
- Generated and visualized a minimum snap trajectory using a seventh-order polynomial for the quadrotor model

PROJECTS

Collaborative Mapping using a Quadruped and Quadrotor

Jan 2025 - Mar 2025

- Created navigable occupancy maps by merging point clouds generated with RGBD odometry and mapping techniques
- Built a ROS 2 C++ package for quadrotor offboard control, enabling autonomous indoor flight using MoCap integration
- Implemented lossless camera streaming between a Raspberry Pi and remote workstation using RMW Zenoh

Whack A Mole with 7-DOF Robot Arm

Nov 2024 - Dec 2024

- Led a team of 4 in developing a Python, ROS 2 package for a Franka 7-DOF robot arm to play the whack-a-mole game
- Set up UART communication between a ROS 2 node and microcontroller to control a servo-driven hammer end effector
- Wrote a custom Python wrapper for the MoveIt API to plan, inspect, save and modify the robot's trajectories

Reinforcement Learning on a Quadruped

Feb 2025 - Mar 2025

- Developed and trained locomotion policies for the Unitree Go2 quadruped for tasks like jumping, strafing and crawling
- Implemented an Actor-Critic network structure, integrated into a Proximal Policy Optimization (PPO) algorithm
- Simulated and evaluated policies in Genesis simulator, tracking key metrics like mean reward per episode

Trajectory Generation using Particle Swarm Optimization

Feb 2025 - Mar 2025

- Applied Particle Swarm Optimization (PSO) in C++ to solve the Traveling Salesman Problem
- Generated trajectories from an optimal set of waypoints using an open source trajectory-generation package
- Validated and deployed the trajectories on the CrazyFlie quadrotors in simulation

Feedback Control of Omnidirectional Mobile Manipulator

Oct 2024 - Nov 2024

- Generated a trajectory for the a 5-DOF KUKA robot arm to perform a pick-and-place task in CoppeliaSim
- Simulated the kinematics of the omnidirectional robot with odometry equations to determine its next configuration
- Implemented and tuned a feed forward PI controller to minimize the error between the current and desired robot states

Embedded Navigation Device with ESP32 Microcontroller

Mar 2023 - May 2023

- Developed a C++ program to showcase animations synchronized with audio signals using on an LED matrix display
- Integrated the Waze navigation app as an audio source, transmitting data to the ESP32 for real-time navigation display
- Utilised Fast Fourier Transform (FFT) to extract frequency components from an audio sample