

Pushkar Dave

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SKILLS

Programming: Python, C, C++, MATLAB, C#, Git, Bash, Linux, Docker

Robotics: ROS2, ROS, Raspberry Pi, PIC32, Arduino, CoppeliaSim, Gazebo, Unity, RViz, Onshape(CAD)

Libraries: NumPy, Matplotlib, PX4-Autopilot, MoveIt, SymPy, ModernRobotics, OpenCV, PyTorch

EDUCATION

Northwestern University

Master of Science in Robotics

Sept 2024 - Dec 2025(Expected)

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

Advisor: Dr. Martin Saska

- 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 data using rosbag and visualized UAV's tracked states with PlotJuggler

IvLabs, VNIT

Summer Intern

Jul 2021 – Oct 2021

Advisor: Dr. Shital Chiddarwar

- Built an MNIST digit classifier from scratch using gradient descent implemented with NumPy
- Programmed and implemented an image denoising autoencoder model on the MNIST dataset using PyTorch
- Tuned model hyperparameters by applying mini-batching, regularization techniques, and the Adam optimizer

PROJECTS

Collaborative Mapping using a Quadraped and Quadrotor(In Progress)

Jan 2025 - Mar 2025

- Created navigable occupancy maps by merging point clouds generated with RGBD odometry and mapping techniques
- Built a ROS2 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 Zenoh DDS

Whack A Mole with 7-DOF Robot Arm

Nov 2024 - Dec 2024

- Led a team of 4 in developing a Python, ROS2 package for a Franka 7-DOF robot arm to play the whack-a-mole game
- Set up serial communication between a ROS2 node and Arduino to control a servo-driven hammer end effector
- Wrote a custom Python wrapper for the MoveIt2 API to plan, inspect, save and modify the robot's trajectories

Feedback Control of Omnidirectional Mobile Manipulator

Oct 2024 - Nov 2024

- Generated a trajectory for the end effector of a 5-DOF 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

Multibody Dynamics Simulation

Nov 2024 - Dec 2024

- Modeled a free falling jack and box system using Lagrangian mechanics with NumPy and SymPy
- Simulated impacts between the jack and box using Runge-Kutta method for integration
- Created animations of the dynamic trajectories for the jack and box using the Plotly library in Python

Sequential Planner for Multi UAV Mobility

Aug 2023 - Dec 2023

- Designed a high-level sequential approach to prevent collisions between UAVs operating in the same airspace
- Tested and optimized the approach in multi-robot ground and aerial environments in MATLAB

ESP32 based Navigation Device

Mar 2023 - May 2023

- Developed a program to showcase animations synchronized with audio signals using an ESP32 and 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