Pushkar Dave

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EDUCATION

Northwestern University — *Evanston, IL* Masters of Science in Robotics Dec 2025
Visvesvaraya National Institute of Technology — *India* Bachelors of Science in Electrical Engineering May 2024

SKILLS

Programming: C++, Python**,** C, MATLAB, C#, Bash, Unit Testing
Robotics: ROS2, ROS, Robot Kinematics, Control Systems, Computer Vision, MoveIt, OpenCV, Gazebo, RViz
Software: Linux, Git, Docker, CMake, PX4, QGroundControl, Unity, PyTorch, Genesis, CoppeliaSim
Hardware: Onshape, Quadrotors, Quadrupeds, Embedded Systems, Microcontrollers, ESP32, PIC32, UART, SPI, I2C
Machine Learning: Reinforcement Learning, ConvNets, Autoencoders, RNNs, GANs

WORK EXPERIENCE

Caterpillar Inc. Jun 2025 - Present
Robotics Integration Intern
- Integrating 3D laser scanning for automating visual weld inspection on manufacturing assembly lines

Multi-robot Systems Group, Czech Technical University May 2023 – Sept 2023
Robotics Research Intern
- Developed a triangulation algorithm to correct vertical drift for the leader UAV in a swarm system
- Performed localization using follower UAVs by fusing UVDAR, IMU, RangeFinder data with a Kalman Filter
- Analyzed and recorded ROS simulation metrics and debugged plots to set up real world experiments

IvLabs, VNIT Jul 2021 – Oct 2021
Robotics Intern
- Implemented PD control system and minimum snap trajectory generation for quadrotors in MATLAB
- Designed a state space quadrotor model and solved seventh-order polynomial functions for trajectories
- Experimentally modeled a tethered quadrotor by modeling it as a damped spring-mass system

FEATURED PROJECTS

Collaborative Mapping using a Quadruped and Quadrotor Winter 2025
- Created occupancy grids using ORB feature extraction, FLANN feature mapping, loop closure using RTABMap
- Optimized ROS 2 middleware, enabled data throttling and transport relay to achieve lossless camera streaming
- Deployed multi-session mapping to generate an exhaustive and feature-rich point cloud

Reinforcement Learning on a Quadruped Winter 2025
- Formulated and trained locomotion policies for Unitree Go2 for tasks like jumping, strafing and crawling
- Implemented an Actor-Critic network structure, integrated into a proximal policy optimization algorithm
- Designed reward functions and tuned parameters to train and visualize the task within 100 episodes

Whack-A-Mole with 7-DOF Robot Arm Fall 2024
- Developed ROS 2 MoveIt package to detect colored moles, plan trajectories and control a servo-driven hammer
- Applied OpenCV to detect mole illumination events, caching positions for millisecond-level reaction time

Feedback Control of Omnidirectional Mobile Manipulator Fall 2024
- Generated a cartesian trajectory, simulated kinematics, and implemented feedforward control on a KUKA youBot
- Utilized modern screw theory to transform twists into commanded speeds using Jacobian pseudoinverse
- Verified the calculations and implementation using ODE physics simulation in CoppeliaSim