

Aditya Bidwai

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EDUCATION

University of Minnesota Twin Cities

Master of Science (M.S.), Robotics

Minneapolis, MN, USA

Sept '24 – May '26

Birla Institute of Technology and Science, Pilani (BITS-Pilani)

Bachelor of Engineering (B.E.), Electronics and Communication

Goa, India

Aug '18 – May '22

EXPERIENCE

Komatsu Mining Corp

Automation Engineering Intern

Milwaukee, WI

June '25 – Aug '25

- Built a proximity sensor-based startup calibration routine in C++ for a robotic shovel, eliminating human intervention
- Developed a robust human-machine control interface in C++ for teleoperation of a client-demo prototype robotic truck

OptimalX, University of Minnesota Twin Cities

Lab Infrastructure Engineer

Minneapolis, MN

Jan '25 – May '25

- Designed motion-capture lab infra, built PX4 drones and ROS ground robots for experiments accessible to ~500 students

MARMot Lab, National University of Singapore

Robotics Engineer

Singapore

Dec '22 – Aug '24

- Built and evaluated an autonomous exploration pipeline using ROS/Gazebo, RTAB-Map SLAM, and RealSense (T265, D435), integrating perception-aware motion planning and heading optimization for environment inspection tasks ([paper](#))
- Contributed to a solution of Multi-Robot Task Allocation problem by dynamic coalition formations using reinforcement learning (PyTorch), yielding 100x faster solutions than exact solvers. Published at **ICRA '24** ([paper](#))

Robotics Intern

Jan '22 – Sept '22

- Developed tests for legged-robot gait-transition algorithm to adapt walking on changing terrain (concrete → grass) ([video](#))
- Implemented a CPG-based omnidirectional walking controller for hexapod locomotion using ROS and Python ([video](#))
- Conducted an in-depth review analysis on object manipulation techniques by legged robots. Published in **Frontiers** ([paper](#))

TECHNICAL SKILLS

Programming C, C++ (C++17), Python, MATLAB, Bash

Tools & Frameworks Git, Docker, **Deep Learning** (PyTorch, OpenCV, Open3D), **Robotics** (ROS, ROS2, MoveIt!, PX4)

Simulators NVIDIA Isaac Sim, Gazebo, PyBullet, Gym, Softgym, PyFlex, Simulink

Relevant Coursework Trajectory Optimization, Optimal Estimation, Computer Vision, Deep Learning for Robot Perception

SELECTED PROJECTS

Cooperative UAV-UGV localization using Extended Kalman Filter (EKF)

Sept '25 – Dec '25

- Developed a nonlinear UAV-UGV localization system in MATLAB using an EKF and simulation-based validation
- Evaluated estimator consistency using Monte Carlo testing with NEES/NIS analysis on simulated and real data

Optimization-based Motion Planning (minimum energy) for 3D Environments

Sept '25 – Dec '25

- Built a convex optimization-based collision-free trajectory generation framework in MATLAB using YALMIP/MOSEK
- Modeled cuboidal and cylindrical obstacles as convex sets using superellipse-based formulations for tractable optimization

Dynamic Visual SLAM for Crowded Indoor Environments

Jan '25 – May '25

- Integrated ORB-SLAM3 pipeline with Nvidia SegFormer to detect and reject moving objects in crowded environments
- Evaluated in real university environments, achieving 0.077 m ATE and 0.073 m / 1.33° RPE, showing robust localization

Clothbot - Cloth Manipulation using Self Supervised Value Network ([poster](#), [web](#))

Sept '24 – Dec '24

- Developed a self-supervised value network policy using spatial action maps for dynamic cloth unfolding on a dual UR5
- Achieved 95% coverage on rectangular cloths and 87.68% on unseen garments (T-shirts) with zero-shot sim-to-real transfer

Flying Ad-hoc Network Simulator for multi-UAV exploration ([code](#))

Aug '20 – Aug '22

- Developed a co-simulation platform integrating NS3 and Gazebo through ROS/C++ for testing multi-UAV swarm tasks
- Implemented UAV swarm motion planning (C++) and analyzed network metrics like PDR, hop-by-hop and end-to-end delay
- Simulated a wildfire rescue UAV swarm (PX4 SITL and ROS) for surveillance application. Published in **ACM LANC '22**

Mars Rover for University Rover Challenge (Controls Team Lead)

Aug '19 – Apr '21

- Designed path planning and tracking (PID, Stanley, Pure Pursuit) controllers for the manipulation and locomotion systems
- Developed ROS/C++ -based drivers and software interfaces to integrate sensors and motor drivers with Nvidia Jetson

PUBLICATIONS

- Dai, W., **Bidwai, A.**, & Sartoretti, G. (2024). *Dynamic Coalition Formation and Routing for Multirobot Task Allocation via Reinforcement Learning*. Published at **IEEE ICRA 2024**. ([paper](#))
- Gong, Y., Sun, G., Nair, A., **Bidwai, A.**, Cs, R., Grezmak, J., ... Daltorio, K. A. (2023). *Legged robots for object manipulation: A review*. Published in **Frontiers in Mechanical Engineering**. ([paper](#))
- Dhongdi, S., Tahiliani, M., Mehta, O., Dharmadhikari, M., Agrawal, V., & **Bidwai, A.** (2022). *FANS: flying ad-hoc network simulator*. Published at **2022 ACM LANC** (Latin America Networking Conference). ([paper](#))