

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

TECHNICAL SKILLS

Programming	C, C++ (C++17), Python, MATLAB (YALMIP/MOSEK, Gurobi, SCIP), Bash
Tools & Frameworks	Git, Docker, CMake, Bazel, ML (PyTorch, OpenCV, Open3D), Robotics (ROS, ROS2, MoveIt!, PX4)
Simulators	NVIDIA Isaac Sim, Gazebo, PyBullet, Gym, Softgym, PyFlex, Simulink, CARLA
Research Interests	Trajectory Optimization, Motion Planning, Optimal Control, State Estimation, Perception-Aware Planning

EXPERIENCE

Komatsu Mining Corp

Robotics Software 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 Research Group

Research Assistant | *P.I.: Prof. Dr. Yue Yu*

Minneapolis, MN

Jan '25 – Present

- Designed motion-capture lab infra, built PX4 drones and ROS ground robots for experiments accessible to ~500 students
- Developing optimization algorithms for energy- and sensing-aware trajectory generation for UAV-UGV teams using MINLP

MARMot Lab, National University of Singapore

Robotics Engineer | *P.I.: Prof. Dr. Guillaume Sartoretti*

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](#))

SELECTED PROJECTS

Cooperative UAV-UGV localization using Extended Kalman Filter (EKF) ([code](#))

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 for 3D Environments ([code](#))

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., Grezma, 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](#))