

Aditya Bidwai

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EDUCATION

Master of Science, Robotics

University of Minnesota Twin Cities {DL for Manipulation, Computer Vision, ML, NLP}

Sept 2024 – May 2026 (expected)

Minneapolis, MN

Bachelor of Engineering, Electronics and Communication

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

Aug 2018 – May 2022

Goa, India

EXPERIENCE

OptimalX Group, University of Minnesota

Jan 2025 – Present

Graduate Research Assistant. **Advisor:** Prof. Yue Yu

Minneapolis, MN

- Designing uncertainty-aware motion planning algorithms for active sensing in a multi-agent scenario using POMDPs
- Developing multi-agent trajectory optimization algorithms for UAV-UGV collaboration in large environment exploration

MARMot Lab, National University of Singapore

Dec 2022 – Aug 2024

Research Engineer (full-time). **Advisor:** Prof. Guillaume Sartoretti

Singapore

- Developed active perception algorithms for autonomous exploration (and efficient SLAM) in GPS-denied, resource-constrained environments, focusing on omnidirectional legged robots for single-pass inspection settings (**paper**)
- Contributed to a solution of Multi-Robot Task Allocation problem by dynamic coalition formations using reinforcement learning, yielding 100x faster solutions than exact solvers. Published at **ICRA '24 (paper)**
- Designed and set up a testbed (cage) and motion capture system (Optitrack) for robotics research experiments
- Mentored graduate students for quadrotor hardware assembly and multi-agent object transportation project

MARMot Lab, National University of Singapore

Jan 2022 – Sept 2022

Research Intern. **Advisor:** Prof. Guillaume Sartoretti

Singapore

- Designed and conducted real-robot experiments for stable online real-time gait transitions using a keyframe-based central pattern generator (CPG) algorithm for legged mobile manipulation. Published at **CDC '22 (video)**
- Implemented bio-inspired workspace-CPG locomotion controller on a hexapod resulting in stable and directed vision (**video**)
- Conducted an in-depth review analysis on object manipulation techniques by legged robots. Published in **Frontiers (paper)**

TECHNICAL SKILLS

Programming

Advanced {C, C++, Python}, *Intermediate* {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

Microcontrollers/SBCs

ATmega328p, STM32F1, ESP32, Teensy, Raspberry Pi, Nvidia Jetson family

SELECTED PROJECTS

Clothbot - Cloth Manipulation using Self Supervised Value Network (**poster, web**)

Sept 2024 – Dec 2024

- Implementation of paper 'FlingBot: The Unreasonable Effectiveness of Dynamic Manipulations for Cloth Unfolding'
- 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

Workspace CPG controller for stable direction vision in legged locomotion

Jan 2022 – Sept 2022

- Bio-inspired locomotion controller for legged robots based on central pattern generators (CPG)
- Developed a heading control system for stable vision during omnidirectional locomotion (gaze tracking)
- Validated the approach on an 18 degree-of-freedom Hebi Daisy hexapod robot (**video**)

Flying Ad-hoc Network Simulator for multi-UAV exploration (**code**)

Aug 2020 – Aug 2022

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

Kratos: Mars Rover for University Rover Challenge (**code**)

Aug 2019 – Apr 2021

- Integrated electronics (actuators, sensors, microcontrollers) with software control algorithms to control the rover
- Designed trajectory generation and tracking (PID) controllers for the manipulation and locomotion systems
- Managed and mentored a team of 10 undergraduate students as the lead of arm/drive control subsystem
- Secured an international rank of 19 in the URC 2022 competition held in Utah (in the first attempt)

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**)