

Aditya Bidwai

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EDUCATION

Birla Institute of Technology and Science, Pilani (BITS-Pilani) Aug 2018 – May 2022
Bachelor of Engineering in Electronics and Communication Goa, India

Relevant coursework: Machine Learning, Digital Image Processing, Software for Embedded Systems[#], Embedded System Design[#], Modern Control Systems, Control systems, Object Oriented Programming, Probability and Statistics, Linear Algebra, Differential Equations, Multivariate Calculus {#: graduate level}

RESEARCH EXPERIENCE

Research Engineer at National University of Singapore Oct 2022 – Present
Multi Agent Robotic Motion (MARMot) Lab. Supervisor: Prof. Guillaume Sartoretti Singapore

- Worked on **active exploration** using omnidirectional locomotion of legged robots in complex environments.
- Developed an algorithm for **heading/gaze optimization** of robots equipped with limited FoV sensors for autonomous exploration of indoor environments using a receding-horizon frontier-based utility approach. [{paper}](#)
- Currently working on **ergodic search** methods for spatiotemporal-aware robot-agnostic autonomous exploration
- Worked on the ST-MR-TA problem, proposed an RL-based solution based dynamic coalition formation.

Research Intern at National University of Singapore Jan 2022 – Sept 2022
Multi Agent Robotic Motion (MARMot) Lab. Supervisor: Prof. Guillaume Sartoretti Singapore

- Designed and conducted experiments for stable online gait transitions using a **keyframe-based CPG** approach for legged robots [{video}](#)
- Implemented **workspace-CPG** controller for omnidirectional locomotion on Hebi's Daisy hexapod robot [{video}](#)
- Published a review paper on **object manipulation using legged robots** with Prof. Daltorio (CWRU) [{paper}](#)

PUBLICATIONS

Dynamic Coalition Formation and Routing for Multirobot Task Allocation via Reinforcement Learning
W Dai, A Bidwai, G Sartoretti

Accepted at 2024 IEEE International Conference on Robotics and Automation (ICRA)

Legged robots for object manipulation: A review

Y Gong*, G Sun*, A Nair, A Bidwai, R CS, J Grezmak, G Sartoretti, KA Daltorio

Published in Frontiers in Mechanical Engineering 9, 1142421 | [link](#)

FANS: Flying Ad-hoc Network Simulator

SC Dhongdi, MP Tahiliani, O Mehta, M Dharmadhikari, V Agrawal, A Bidwai

Published in Proceedings of the 2022 Latin America Networking Conference, 34-41 | [link](#)

PROJECTS

Disaster Surveillance using Quadrotor Swarm [{paper, code}](#) Aug 2020 – Aug 2022

Supervisor: Prof. Sarang Dhongdi, Assistant Professor, EEE Department, BITS Goa

- Development of an integrated framework for multi robot control and network simulations.
- Used PX4 SITL using ROS for drone control simulations and NS3 for simulating networks.

Geometric Control Strategies for Trajectory Tracking of Quadrotors [{code}](#) Aug 2021 – Dec 2021

Supervisor: Prof. Rakesh R Warier, Assistant Professor, EE Department, NIT Calicut

- Implemented geometric controllers on the SE(3) manifold to track aggressive trajectories of a quadrotor performing complex maneuvers.
- Researched on quadrotor dynamics, geometric control theory, and optimal control.

Project Kratos - University Rover Challenge — [{web, code}](#) Aug 2019 – Apr 2021

Controls Subsystem Lead, Supervisor: Prof. Toby Joseph

- Development of a planetary rover capable of autonomous navigation and manipulation for the international University Rover Challenge (URC) competition.
- Designed high-level and low-level path tracking controllers for the arm and drive systems.
- Interfaced all the electronic components to embedded microcontrollers and onboard SBC.

Autonomous Quadrotor Navigation — {code}

Course Project for CS G523 (graduate level) Software for Embedded Systems, Supervisor: Prof. Neena Goveas

- Built a quadrotor from scratch and developed a software stack for autonomous navigation (tested using RotorS)
- Studied path planning algorithms like RRT/RRT*/RRG and implemented them.

Control System for Self Reconfigurable Modular Robots

Aug 2019 – Apr 2021

Research Project, Supervisor: Prof. Rakesh R Warier

- Extensively researched the control systems of self-reconfigurable modular robots like ATRON and MTRAN
- Developed a kinematic model with module connections for a 5 DOF modular robot.

TECHNICAL SKILLS

Programming Languages: C/C++, Python, MATLAB, Shell scripting (Bash)

Tools & Frameworks: ROS, RViz, Gazebo, PyBullet, Simulink, MAVROS, PX4

SBCs/Development Boards: Atmega328p, STM32F1, ESP32, Teensy, Raspberry Pi, Jetson TX2

Robots: Hebi Daisy (hexapod), Unitree Go1 (quadruped), Robotis Turtlebot3

TEACHING EXPERIENCE

Teaching Assistant for Software for Embedded Systems (CS G523, graduate level) - Prepared weekly assignments and took lectures on ROS, Atmega328p and robotics for a cohort of **40+ graduate students**
Course Instructor and **Mentor** for student-organized courses on robotics software (ROS, Linux) and hardware for undergraduate students.

VOLUNTEERING AND POSITIONS OF RESPONSIBILITY

Project Kratos | 🌐

Aug 2019 – May 2021

Controls Subsystem Lead

- Led and mentored a group of 10+ undergraduate students for the University Rover Challenge (URC).
- Designed high-level and low-level path tracking controllers for the locomotion and manipulation systems of the autonomous planetary rover.

Electronics and Robotics Club | 🌐

Aug 2018 – Dec 2021

Core Member

- Participated in bot-making competitions, worked on several display projects for university's annual technical fest.
- Conducted teaching sessions, provided mentorship to several junior students regarding foundational concepts and problem-solving strategies in robotics.

Sandbox Innovation Laboratories | 🌐

Aug 2019 – Dec 2021

Student Committee Member

- Managed and maintained inventories and machinery like 3D printers, laser cutter, plasma cutter tools, etc
- Reviewed technical project proposals and applications to grant access based on compliance and safety protocols.

AWARDS AND HONORS

- Secured rank 10 (Project Kratos) among 35 finalists in International Rover Challenge in first attempt | 🏆
- Secured a place among top 20 teams of the country in the Flipkart GRID Robotics Challenge | 🏆