Aditya Bondada

857-376-7792 | bondada.a@northeastern.edu | linkedin.com/in/adityabondada | bondada-a.github.io

Education

Northeastern University, Boston, MA **CGPA: 3.838**
Master of Science in Robotics, Electrical and Computer Engineering Aug 2022 – May 2024
– Coursework: Robot Dynamics, Control Systems, Nonlinear Optimization, Sensing and Navigation

Manipal Institute of Technology, Manipal, India **CGPA: 3.6**
Bachelor of Technology in Mechanical Engineering, Minor in Machine Design July 2017 – Sept 2021

Technical Skills

Languages: Python, Bash, MATLAB, SQL , C++,CUDA
Software: ROS/ROS2, RViz, Gazebo, Git, NumPy, OpenCV, SolidWorks, AutoCAD, CARLA, Tensorflow, Pytorch, SSH, Docker
Operating Systems: Linux (Ubuntu/Debian-based), Windows, MacOS, Kali Linux
Design and Manufacturing: SolidWorks, OnShape, AutoCAD, Ultimaker S3/S5 3D printers, ULTRA R9000 Laser Cutter

Experience

Research Assistant **Sept 2022 – April 2024**
Silicon Synapse Robotics Lab, Northeastern University Boston, MA
In collaboration with NASA Jet Propulsion Laboratory (JPL) and California Institute of Technology (Caltech)
– Spearheaded the development and maintenance of mechatronic design and software stack for Harpy, an innovative thruster-assisted bipedal robot designed for traversing rugged terrains, improving locomotion efficiency by over 40%.
– Designed the dynamic control model through capture point control and optimized performance across variable terrains, achieving a 95% improvement in gait stability and a 50% boost in push recovery using thruster actuation.
– Performed comprehensive simulations of thruster-assisted locomotion, securing a 90% success rate in recovery from unstable states, thereby enhancing walking dynamics using sophisticated control algorithms and innovative push recovery strategies.
– Engineered and tested a lightweight and robust actuator system using 3D-printed components reinforced with carbon fiber and Kevlar to ensure high power density, precise control, and impact resistance for the robot's leg joints.

Robotics Engineer **Oct 2021 – Aug 2022**
ALOG Tech Hyderabad, India
– Led the development of an advanced autonomous navigation framework for a cutting-edge warehouse robot-trolley system, securing seed funding to further advance the technology.
– Developed a simulation environment in ROS and Gazebo to validate and refine path planning algorithms, addressing challenges related to joint behavior, accurate physical representation, and trailer attachment in a virtual environment.
– Implemented and evaluated geometric, hybrid A*, and deterministic grid-based path planning algorithms for non-standard tractor-trailer robot systems, incorporating obstacle avoidance and cost functions based on wheel error to optimize navigation.
– Designed custom attachments for ALOG T-1000 using SolidWorks, enhancing the robot's capability to move 30% more trailers.

Teaching Assistant **Aug 2023 – April 2024**
Robot Sensing and Navigation, Northeastern University Boston, MA
– Modernized ROS lab curriculum by transitioning all assignments from ROS1 to ROS2, ensuring students worked with the latest robotics framework and provided extensive technical support to over 100 students in sensor-fusion, ROS and Python
– Developed GPS and Vectornav IMU sensor emulators in Python for ROS labs, enabling hands-on learning and creating assignments that strengthened students' data visualization skills and understanding of sensor principles.

Projects

AI-Powered Autonomous Driving System with Robust Perception and Planning **Jan 2023 – May 2023**
– Developed a high-performance behavior cloning system in Unity Docker using optimized CNN architectures, achieving significant improvements in steering precision (35%) and trajectory smoothness (25%) for autonomous vehicles.
– Built a multi-modal perception stack in CARLA integrating state-of-the-art object detection models (Faster R-CNN, SSD variants), enabling real-time, accurate object identification in diverse driving scenarios.

Modular Autonomy using Consumer Technology (i-SLAM) **Aug 2022 – Dec 2022**
– Designed and implemented a novel mapping system utilizing iPhone LiDAR, camera, and IMU data streams to achieve robust and accurate simultaneous localization and mapping (SLAM) in diverse environments.
– Implemented state-of-the-art algorithms (RTAB-Map, PySLAM2) and custom dead reckoning for robust localization and mapping, demonstrating 92% mapping accuracy with LiDAR and 80% accuracy in GPS-denied areas with dead reckoning.

Design and Optimization of Drone-Assisted Wildfire Fighting System **Jan 2021 – Aug 2021**
– Spearheaded the development of a multi-UAV wildfire detection system leveraging ROS, thermal imaging, and path planning algorithms, resulting in a 30% increase in fire detection coverage and a 20% reduction in response time.
– Developed and integrated thermal imaging capabilities into the UAV platform, enabling precise identification of high-temperature areas indicative of wildfires, further improving the system's accuracy and timeliness in detecting fire outbreaks.

Academic Publications

Dynamics of Multiple Pendulum System Under a Translating and Tilting Pivot **July 2023** | **Springer**

Capture Point Control in Thruster-Assisted Bipedal Locomotion **Accepted for IEEE AIM 2024** | **Thesis**