Aditya Bondada

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Education

Northeastern University, Boston, MA **CGPA: 3.84**
Master of Science in Robotics, Electrical and Computer Engineering Aug 2022 – May 2024
– Coursework: Robot Dynamics and Control, 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: C++, Python, Bash, MATLAB, SQL ,C#,CUDA
Software: ROS/ROS2, 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

Silicon Synapse Robotics Lab, Northeastern University **Sept 2022 – April 2024**
Research Assistant | Control System Design, MATLAB, C++, Simulink, Simscape, Motion Planning Boston, MA
In collaboration with NASA Jet Propulsion Laboratory (JPL) and California Institute of Technology (Caltech)
– Spearheaded the development of high-fidelity modeling of a unique thruster-assisted bipedal dynamics and mechatronic design for Harpy, a bipedal robot designed for traversing rugged terrains, enabling rigorous testing and validation of the control algorithm.
– Designed a novel dynamic control system through modified capture point control using thrusters 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 system analysis using 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.

ALOG Tech **Oct 2021 – Aug 2022**
Robotics Engineer | Python,C++, ROS, Gazebo, SolidWorks, MATLAB, OpenCV, Linux Hyderabad, India
– Developed a robust framework for precise control of a robot with n-trailers, enhancing efficiency by 33%, employing advanced simulation techniques in Gazebo, ROS and MATLAB to ensure safe navigation through complex warehouse environments.
– Implemented and evaluated geometric, hybrid A*, and deterministic grid-based motion 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.

Northeastern University | Robot Sensing and Navigation Course **Aug 2023 – April 2024**
Teaching Assistant | Python, C++, ROS/ROS2, Linux, Python Boston, MA
– Mentored and led over 100 graduate students in developing and deploying localization and mapping algorithms, using real-world sensor data (IMU, GPS, LiDAR) from NUance ,NEU's autonomous vehicle, enabling safe and efficient path planning and obstacle avoidance
– Designed comprehensive lab exercises that enabled students to apply theoretical robotics knowledge to practical scenarios, focusing on control systems, sensor fusion, state estimation and computer vision using ROS, Linux, Python, and OpenCV.

Projects

Dynamic Gait Optimization and Energy Efficiency Enhancement in a 3-Link Biped **Jan 2023 – May 2023**
– Devised and implemented a novel gait stabilization framework leveraging Lagrangian dynamics and feedback control, resulting in a measurable 25% improvement in bipedal robot gait stability and energy efficiency across diverse terrains.
– Engineered energy-efficient gait patterns through meticulous optimization techniques, achieving an impressive 70% reduction in power consumption during locomotion, demonstrating a significant advancement in robotic energy conservation.

Drone Controller Optimization Performance Comparison **Aug 2023 – Dec 2023**
– Implemented and fine-tuned PID controllers for yaw, pitch, and roll axes of a quadrotor drone, achieving stable flight, precise maneuverability and disturbance rejection in the simulated environment.
– Utilized advanced control techniques (Sliding Mode, Backstepping) within the Simulink framework for the drone and performed comparative analysis, demonstrating the potential for enhanced performance and robustness in quadrotor control systems.

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

Relevant Certification

Self-Driving Cars Specialization | (State Estimation, Localization and Motion Planning) **June 2024** | Coursera