Rithwik Udayagiri

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EDUCATION

School of Engineering and Applied Sciences, *University of Pennsylvania* — Sep 2021 — May 2023
Master of Science in Engineering in Robotics — **GPA: 3.87/4.0**
Courses: Control, Optimization and Motion Planning for Autonomous Systems; Machine Perception; Sensor Fusion and Localization

National Institute of Technology Karnataka, *Surathkal* — Aug 2016 — May 2020
Bachelor of Technology in Electronics and Communication — **GPA: 9.25/10.0**
Courses: Data Structures & Algorithms; Control Systems; Dynamical Systems; Digital System Design

TECHNICAL EXPERIENCE

Robotics Engineer, Milwaukee Tool — **Nov 2023 — Present**
Python, C++, ROS Noetic, Arduino, Git, Outdoor Autonomy, Planning, Control, Localization, Mapping, Manipulation, MoveIt

- Spearheading the development of the planning, control, mapping and localization packages of an outdoor autonomous robot
- Managed and mentored two interns, boosting team productivity and project outcomes through leadership and guidance
- Led the development of an autonomous mobile manipulator for rough terrains, focusing on navigation, localization, sensor integration, and manipulation using ROS

Research Engineering Intern, Recupero Robotics, LLC — **Jul 2023 — Nov 2023**
Python, Arduino, CAD, OnShape, Git, Medical Device Research, 3D printing, Microsoft Office

- Development and design of the existing TheraDrive robot, used for upper limb rehabilitation
- Built the company website, recuperorobotics.com highlighting the product, motivation and vision

Research Assistant, Rehabilitation Robotics Lab, University of Pennsylvania — **June 2023 — Nov 2023**
Python, Data Analysis, CAD, OnShape, Git, Medical Device Research, 3D printing, Microsoft Office, CircuitMaker, ML

- Invented a novel smart sensing medical toy for collecting and classifying 4 basic infant interactions
- Published "Towards an AI-driven soft toy for automatically detecting and classifying infant-toy interactions using optical force sensors" in Frontiers in Robotics and AI, Volume 11 - 2024

ASIC Engineer, NVIDIA, Bangalore, IND — **Jul 2020 — Aug 2021**

- Performed Functional Timing Analysis and Timing Closure with PrimeTime
- Debugged timing exceptions and contributed to enhancing the internal timing tool to optimize analysis by 2 times

PROJECTS

SauberBOT[Video][Report] — **Oct 2022 — May 2023**
Python, C++, ROS Melodic, Git, LiDAR, Market research, Product Development, CAD, OnShape, RTK-GPS, Jetson AGX, Team size: 5

- Won 1st place, $10000, for ingenuity and presentation with a market-research-backed solution
- Significantly contributed to control, motion planning, and software-hardware integration of the robot

Indoor-Outdoor Localization[Report][Media][Github] — **Apr — May 2023**
C++, Python, ROS Melodic, Git, LiDAR, GPS, SLAM, Autonomous Vehicles, RViz, RTK-GPS, Jetson AGX, Team size: 3

- Successfully implemented precise indoor-outdoor localization employing advanced 3D LiDAR and HDL Graph SLAM methods
- Orchestrated seamless integration of Velodyne 3D LiDAR and GPS, bolstering navigation capabilities using ROS Melodic platform

F1 Tenth – Autonomous Racing[Media] — **Jan — May 2023**
C++, Python, ROS2 Foxy, Git, LiDAR, SLAM, Autonomous Vehicles, Hardware testing, RViz, LiDAR, Jetson NX, Team size: 4

- Led the development and coding of high-performance control and motion planning modules
- Achieved top ranking in reactive racing, follow the gap, and 3rd position in map-based racing, employing Pure Pursuit strategy

Multi-agent Planning using Chance Constrained Model Predictive Control[Poster][Report][Media][Github] — **Nov — Dec 2022**
C++, Python, ROS2 Humble, Git, Rviz, Drake, Team size: 3

- Implemented multi-agent motion planning and control featuring static and dynamic obstacle avoidance through non-linear MPC
- Optimized trajectories by minimizing the probability of collision of uncertain robot regions, caused due to noisy localization

Autonomy stack for Quadroters[Report] — **Jan — May 2022**

- Executed motion planning with minimum jerk trajectory and a non-linear geometric controller, ensuring obstacle avoidance
- Integrated state estimation through Visual Inertial Odometry and Error State Kalman filter methodologies

SKILLS

Languages Python, C++, MATLAB   **Platforms** Jetson, RPi   **Simulation** Gazebo, RViz, Foxglove
Tools and Packages ROS, ROS2, Git, CAD, SolidWorks, OnShape, Microsoft Office, OpenCV, Drake, CircuitMaker, EDA, Docker, Linux