

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 and Optimization, Control and Planning for UAVs, Autonomous Racing, 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

SKILLS

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

TECHNICAL EXPERIENCE

Researcher, Autonomous EV Go Kart Jan — Oct 2022
xLab, University of Pennsylvania
Python, C++, ROS2 Foxy, Git, RTK-GPS, CAD, Autonomous Vehicles, Manufacturing, Gazebo

- Developed an autonomous vehicle that achieved 1st place at the Purdue EV GrandPrix 2023, for reactive and map-based racing
- Pioneered efforts on control, planning, sensor integration and fusion for the vehicle
- Integrated RTK-GPS and IMU sensors to fuse data for localization and heading

Research Assistant, Smart Infant Toy Nov 2021 — Present
Rehabilitation Robotics Lab, University of Pennsylvania
Python, Data Analysis, CAD, OnShape, Git, Medical Device research, 3D printing, Microsoft Office, CircuitMaker, ML

- Soft Lossy Force Sensor: Signal loss in optical fibers directly relates to compression
- Researched sensor design and modelled structures for effective and safe sensing
- Inventing a novel smart sensing medical toy for collecting and classifying infant interactions

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

- Performed Functional Timing Analysis and Timing Closure with PrimeTime
- Debugged timing exceptions over multiple scenarios and contributed to improving internal timing tool

PROJECTS

SauberBOT [Video][Report] Oct — May 2022
Python, C++, ROS Melodic, Git, Autonomous Vehicles, Market research, Product Development, OnShape

- Earned 1st place overall for ingenuity and presentation with a market-research-backed solution
- Developing a mobile robot to be used for cleaning outdoor spaces and post-event cleanup
- Successfully contributed to software development, mechatronic system and sensor testing to build a robust product

Indoor-Outdoor Localization [Report][Media][Github] Apr — May 2023
C++, Python, ROS Melodic, Git, LiDAR, GPS, SLAM, Autonomous Vehicles, RViz

- Implemented indoor-outdoor localization with 3D LiDAR and HDL Graph SLAM
- Integrated Velodyne 3D LiDAR and GPS for robust navigation on a real robot using ROS Melodic

F1 Tenth – Autonomous Racing Jan — May 2023
C++, Python, ROS2 Foxy, Git, LiDAR, SLAM, Autonomous Vehicles, Hardware testing, RViz

- Engineered and deployed cutting-edge algorithms to ensure safe and robust autonomous racing of 1/10th model cars
- Developed and coded high-performance Control, Planning, and Perception modules
- Ranked 1st in reactive racing, follow the gap and 3rd in map-based racing using Pure Pursuit

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

- Adapted multi-agent path planning and control with obstacle avoidance using MPC
- Optimized trajectories by minimizing the probability of collision of uncertain robot regions, due to noisy localization

Autonomy stack for Quadroters [Report] Jan — May 2022

- Implemented path planning and generated a minimum jerk trajectory for smooth obstacle avoidance
- Designed a non-linear geometric controller for trajectory tracking that was tested on a CrazyFly 2.0 drone