

# RAHUL KALPANA ANWARDEEN

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## EDUCATION

### Johns Hopkins University

*M.S.E Robotics*

August 2024 – December 2025

*Baltimore, MD*

### PSG College of Technology

*B.E Robotics and Automation Engineering*

July 2019 – May 2023

*Coimbatore, India*

## TECHNICAL SKILLS

**Languages:** C++, C, Python, Typescript, Lua, MATLAB

**Technologies/Frameworks:** Robot Operating System (ROS), ROS2, OpenCV, PCL, G2O, FreeRTOS, POSIX, Linux, Wireshark, Docker, Solidworks, OpenGL, ThreeJS, Godot, Unreal Engine, Pytorch

## EXPERIENCE

### Sonatus

*Software Engineering Intern, Network Services Team*

May 2025 – August 2025

*Mountain View, CA*

- Built a simulation system using the OMNET software stack to verify and evaluate Sonatus' network architecture, and integrated features into the simulated network including Time-Sensitive Networking and SOME/IP
- Developed and demonstrated an LLM-based chatbot to help onboard new employees as part of Sonatus' AI-first policies.

### Uhnder India

*Engineer, Radar Application Software*

August 2023 – July 2024

*Chennai, India*

- Built support for multicast packet transmission and packet fragmentation in Uhnder's radar by porting an embedded RTOS-based IP stack into the radar.
- Improved time synchronization precision in Uhnder's radar from the scale of milliseconds to nanoseconds by porting the Precision Time Protocol daemon (PTPd) into the radar.
- Enhanced the flexibility of Uhnder's Software Development Kit (SDK) by replacing interrupt-driven services, with pre-emptive RTOS-based equivalents.
- Increased software development speed by porting a POSIX wrapper for FreeRTOS to Uhnder's SDK, making the development of embedded applications more accessible.
- Improved ROS/ROS2 capabilities by maintaining and adding features to Uhnder's ROS and ROS2 repositories.

### Uhnder India

*Intern, Radar Application Software*

December 2022 – August 2023

*Chennai, India*

- Ensured compliance with industry standards by implementing ISO-23150 compliant data structures for radar data transmission.
- Improved debugging efficiency for developers by designing a Lua plugin for Wireshark that enables parsing of Uhnder's proprietary communication protocol

### ARobotNX Geos Pvt. Ltd.

*Summer Intern*

June 2022 - July 2022

*Chennai, India*

- Designed and developed an end-to-end attendance system that performs video feed-based attendance for factory workers using computer vision and a machine learning model.
- Developed a Django-based website that allows visualization of this data for factory administrators
- Integrated PostgreSQL for scalable data storage and retrieval

## PROJECTS

### ROS2 Source Code Contributor | C++, C, ROS2

July 2024 – Aug 2025

- Worked with members of the ROS2 Client Library Working Group to modify ROS 2 source code (RCL and RCLCPP) to allow structured YAML strings to be parsed as parameters .
- These changes allow users to pass in complex data structures as ROS2 parameters as structured YAML strings, and access them in code as dictionaries, improving versatility.

### Autonomous Racing using Deep Reinforcement Learning | Python, Pytorch, TD3

April 2025 – May 2025

- Trained a deep reinforcement learning agent using the Deep Deterministic Policy Gradient (DDPG) algorithm to autonomously navigate a simulated BMW GT3 race car with a top speed of 207 KMPH (128 MPH) through a race track.

**Garbage Collection Robot** | *ROS2, C++, Nav2, MoveIt, Ignition/Gazebo* **April 2025 – May 2025**

- Implemented proof-of-concept for a garbage collection robot that integrates the Open Manipulator X and the Turtlebot 4 mobile platform to autonomously collect tagged objects and deposit them in a set waypoint, in both simulated and real-world environments.
- Utilized MoveIt for planning manipulator motion, Nav2 for navigation, AMCL for localization, and the SLAM toolbox for mapping.

**Model Predictive Path Integral Control** | *MATLAB* **May 2025**

- Implemented Model Predictive Path Integral Control to allow control of an 2D air-glider to reach target positions as part of Dr. Joseph Moore's Learning-Based Control for Robotics course at Johns Hopkins.

**Autonomous Vehicle Development** | *Python, NumPy* **January 2025 – February 2025**

- Implemented a PID-based steering and throttle control system for making a vehicle navigate through fixed waypoints in a simulated CARLA testing environment.
- Implemented the Extended Kalman Filter (EKF) for vehicle state estimation within a simulated CARLA testing environment.

**Autonomous Greenhouse Navigation** | *ROS1, Gazebo Classic* **November 2021 – December 2021**

- Developed a state-machine-based navigation algorithm for a 4-wheeled robot to navigate through a greenhouse autonomously.
- Deployed and tested this algorithm using ROS1 and Gazebo Classic.

**Computer Graphics Rendering System** | *C++, OpenGL* **May 2021 – June 2021**

- Developed a rendering system in C++ using OpenGL which supports lighting, shadows, and mesh importing using ASSIMP.

**IOT-based Home Security System** | *Python, MQTT, SMTP, OpenCV* **Oct 2021**

- Developed a low-cost home security system utilizing MQTT, SMTP, and OpenCV.
- Deployed the system using a Raspberry Pi 4 and a ESP32, allowing for automated motion detection, video capture, and user alerts via email.