

ADITYA PATIL

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ROBOTICS ENGINEER

Robotics Engineer specialized in designing control software for **Autonomous Mobile Robots** using ROS/ROS2 framework. Expertise includes developing **Robot Behaviors** and **Navigation Stack** to optimize autonomous robot performance.

EDUCATION

Pune Institute of Computer Technology, Pune, India
Bachelor of Engineering in Electronics and Telecommunication

Aug 2020 – July 2024
CGPA: 9.0/10.0

TECHNICAL SKILLS

Frameworks : ROS, ROS2, [Nav2](#), [CasADi](#)
Libraries : [BehaviorTree.CPP](#), [OMPL](#), [BONXAI](#), [grid_map](#)

Languages : C++, MATLAB, Python
Computing Environments : Linux

EXPERIENCE

Peppermint Robotics

Robotics Engineer

Jun 2024 – Present

Pune, Maharashtra, India

- Implemented **Persistence** in the obstacle layer of grid map, where voxels within a FOV decay at an accelerated rate if not in the current sensor measurement and otherwise decayed linearly reducing blind spots in the robot's perception.
- Developed an **Auto-Localization** feature that reduces error in the initial pose provided to AMCL by applying ICP between robot's and initial pose's point clouds, minimizing overhead of AMCL's particle filter.
- Enhanced obstacle detection with 3D LiDAR using PCL's crop box filtering and **RANSAC plane segmentation** for ground detection while addressing robot's speed during detection.
- Applied image processing techniques, including Gaussian Blur and Thresholding, to implement a Salt-and-Pepper noise filter, evaluated using PSNR, MSE, and SSIM metrics, while maintaining integrity in the Occupancy Grid Map post-mapping.

Rigibel Labs

Robotics Software Developer (Intern)

Jan 2024 – May 2024

Pune, Maharashtra, India

- Constructed **Reactive Robot Behavior** utilizing BehaviourTree.CPP.
- Developed Odometry system for Autonomous Mobile robots with the help of LiDAR and IMU sensors using **Extended Kalman Filter** and **Iterative Closest Point** algorithms to improve accuracy to 4cm.
- Implemented Dynamic Prohibition Layers, enabling the addition or removal of prohibited areas based on user specifications.
- Integrated Checkpoints within warehouse AMRs to facilitate task resumption directly from designated checkpoints, thereby eliminating the need to return to home or docking position, reducing time factor by 10%.

PICT Robotics

Lead Robotics System Designer

Sep 2022 – Aug 2023

Pune, Maharashtra, India

- Led a team of 9 to design and develop modular code-base to semi-automate ABU Robocon 2023 Robots using [ROS](#).
- Integrated data from an IMU and Optical Flow Sensor to enhance robot **Localization** and provide accurate odometry.
- Resolved ESP32 pin count limitations by crafting a Motor Controller HAT using Atmega328p micro-controller, communicating via I2C protocol for each Swerve pod.

Kanan Park

Electronics Engineer (Intern)

Apr 2022 – Jun 2022

Pune, Maharashtra, India

- Developed control software with a **Teensy** microcontroller as the master to interface with RC transmitter, and Atmega328 as the slave to manage PID control for swerve pods.
- Established communication between Atmega328 and Teensy via MAX485 (TTL to RS485) with acknowledgment for synchronized data transmission.

PROJECTS

Multi-Robot Mapping | ROS2, Multi-Robot Control, C++

Feb 2024 – May 2024

- Combined multiple robots' individual maps into a single map using **Image Stitching** techniques in a shared environment.
- Real-time Cartographic Data Generation and Propagation by the robots through a localized mesh network.
- Adaptive Task Assignment** via a Health State Dependent mechanism for the Robotic entities.

Optical Odometry | ROS2, USB-Driver, Python | [GitHub](#)

Nov 2023 – Mar 2024

- Experimental project to generate precise Odometry data for Autonomous Mobile Robots utilizing **Optical Flow Sensor**.
- Development of a USB driver node utilizing pyusb library to publish sensor data on respective topics.
- Conjugation of multiple sensors to achieve 3 DOF measurements, compensating for the 2 DOF limitations of optical sensors.

Hologlyph Bots (EYRC) | ROS2, Computer Vision, System Design, Python

Sept 2023 – Jan 2024

- Implementation of a Proportional Control Driver for Autonomous Mobile Robots employing a **Finite State Machine**.
- Robot Localization through Aruco Markers, with Fail-Safe Mechanisms for cases in which Not All Markers are detectable.
- Performance optimization using Multiple Instances of node and Multi Threading using ROS2 Executors.