Harshit Patro

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Profile

Robotics Engineer specializing in autonomous mobile robot navigation, perception, and system integration. Experienced in developing custom planners, multi-map navigation, and LiDAR-based docking using ROS 2. Strong background in Python, embedded systems, and building reliable navigation pipelines for real-world deployment.

Professional Experience

2025/04
Chennai

UAV ROBOTICS INTERN
Aero360-Dronix Technology ↗

- Warehouse drone: Integrated **Intel RealSense stereo camera** with a **Jetson Orin NX** for warehouse operations, enabling Stereo SLAM and odometry tracking. Improved mapping reliability by implementing **RTAB-Map** for real-time 3D mapping using point cloud and RGB-D data.
- Railway Inspection Drone: Equipped a micro drone with dual EO/IR camera and dual-antenna GPS for railway inspection, ensuring stable navigation under electromagnetic interference.
- FPV Drone: Integrated and tuned an FPV drone with ArduPilot firmware, ORQA F405, Zeus VTX, and dual EO/IR cameras for autonomous flight and real-time video in search-and-rescue applications.

Projects

Multi-Map Navigation in ROS 2 (Humble) ↗
- Implemented **multi-map navigation** enabling dynamic switching between multiple maps during runtime.
- Managed **map server, localization reset, and costmap reinitialization** during map transitions.
- Ensured seamless navigation across environments with **consistent TF and pose handling**.
- Validated system in **simulated and real indoor environments**

LiDAR-Based Autonomous Docking Using ICP ↗
- Implemented a **marker-less autonomous docking system using LiDAR point clouds**.
- Used **ICP (Iterative Closest Point)** to estimate relative pose (*x, y, yaw*) between robot and docking station.
- Integrated pose output with motion controller for **closed-loop docking**.
- Achieved **accurate and repeatable docking** under noise and partial occlusions.

Custom DWA Local Planner (From Scratch) ↗
- Implemented a **Dynamic Window Approach (DWA) local planner from scratch** without using Nav2 default planners.
- Designed **trajectory sampling and cost functions** for obstacle avoidance, goal alignment, and smooth motion.
- Integrated **LaserScan / PointCloud data** for real-time collision checking.
- Validated performance in **Gazebo and real-robot tests**.

Indigenous Logistics drone for Payload Delivery
SIH 2024
- Worked as a **UAV System Engineer**, focusing on **drone assembly and mechanical design**.
- Designed a **Smart and Simple Payload Carrying System** for **efficient weight distribution** and stability.
- Integrated **LiDAR and Camera sensors** for **mapping and perception**, enabling **autonomous navigation**.
- Optimized **drone arm positioning** to improve **thrust efficiency and endurance** in challenging terrains.
- Received appreciation for a **realistic, cost-effective design** addressing practical challenges.

Education

2018 – 2020 Bhilai, India	**Higher Secondary** *Senior Secondary School Sector 10* Secured a percentage of **88.4** in CBSE board
2021 – 2025 Bhubaneshwar, India	**Bachelor of Technology in Information Technology** *Odisha University of Technology and Research* Managed to secure Cummulative Grade Point of **7.52**

Skills

Programming Languages

C++, Python, C, Lua

Hardware

Arduino, NodeMCU(ESP8266), ESP32, Raspberry Pi, Ardupilot, STM32, LiDAR, Radar, Jetson Nano,Jetson Orin Nx

Frameworks

HTML,CSS, Streamlit

Robotics & AI

ROS (Melodic, Noetic), SLAM, Navigation, Computer Vision (OpenCV),ROS2 Humble

Tools & Technologies

Docker, Linux (Ubuntu), Git, OOPS, IoT

Awards

SIH -24 Finalist

Smart India Hackathon

Selected among top 5 teams nationwide for innovative drone solution