Ritwik Rohan

Delhi, India | +919953001443 | ritwikrohan7@gmail.com | LinkedIn | Github

Aspiring Robotics Engineer with a strong foundation in mechanical engineering, programming, automation, control system design, and project management across various roles. Possess a strong track record in analysing and optimizing robotic systems to support organizational goals, fostering cross-functional collaboration for successful project outcomes, and driving efficiency improvements through strategic-problem solving and innovative solutions. Dedicated to leveraging emerging technologies to advance automation capabilities and optimize operational performance.

CORE COMPETENCIES

- Robotics Engineering
- Electromechanical Systems
- Robotics Software Architecture
- Robotics Hardware Integration
- CI/CD
- System Kinematics
- Simulations Modelling
- Control System Design
- Data Analysis
- Robotic Manipulation
- AI & Machine Learning
- Human-Robot Interaction

TECHNICAL EXPERIENCE

Robotics Frameworks and Tools: ROS, ROS2, URDF, Xacro, Nav2, SLAM, MoveIt2, Rviz2, Lidar, Gazebo, Ignition Gazebo, AMCL, Particle Filter, Simple Commander API, Pure Pursuit, ROSLIB
Programming Languages and Libraries: C++, Python, HTML, CSS, JavaScript, React
Development and Deployment: Docker Containerization, Docker Compose, CI/CD, Jenkins, Git, GitHub
Other: Tableau, P-controller, PID controller, Computer Vision, OpenCV, GUI

PROFESSIONAL EXPERIENCE

Tata Motors Ltd **Pune, India**
Senior Manager, Production July 2019 – June 2022

- Optimized Tata Ultra Vehicle BIW robotic line efficiency by improving the work content of 24 KUKA and FANUC robots, improving production line lead time by 20%.
- Acquired in-depth knowledge of KUKA and FANUC robotics through gripper design, operator maintenance, and effective breakdown troubleshooting, resulting in a 15% reduction in breakdown losses.
- Executed Pascal robotics programming for 2 upcoming Ultra models and achieved the highest production of BIW Ultra Cabins in a single 8-hour shift.
- Conducted comprehensive assessment and diagnosis of process inefficiencies in the new BS6 ILCV automated line.
- Performed B&R Automation Studio PLC programming using ladder logic for line automation and achieved assembly of 20 frames per shift within five months using the new automated line.

General Electric **Chennai, India**
Engineering Intern Jan 2019 – Jul 2019

- Performed structural and thermal analysis on GE power converters using computational fluid dynamics (CFD) and finite element analysis (FEA), including cold plate performance, modal and harmonic analysis, and temperature and flow distribution assessment.

PROJECT EXPERIENCE

The Construct - Robotics Developer Masterclass Program Sep 2023 – Mar 2024
RB1 Robot Warehouse Navigation Project

- Developed a Python script utilizing the Simple Commander API to orchestrate navigation tasks for the RB1 mobile robot, including localization, shelf manipulation, and waypoint navigation.
- Implemented a Costmap Filter to generate a Keepout Mask, employing navigation algorithms and path planning techniques to enhance the robot's safe navigation in complex environments by avoiding predefined obstacle areas.
- Integrated the Costmap Filter into the navigation stack by configuring navigation launch files, planner settings, and controller parameters.

UR3e Pick and Place Project Using Perception

- Developed a Perception node using ROS2 to detect the position of a cube on a table using point cloud data from the UR3e robot's wrist camera.
- Created a C++ client program to communicate with the Perception action server and retrieve object coordinates, enabling the robot to autonomously pick and place objects based on real-time perception data.

Web Development Project for Robotics

- Developed a web application to control the TortoiseBot robot, leveraging HTML, CSS, JavaScript (Vue.js), and ROSLIB for web development and ROS integration.
- Integrated features including map visualization, 3D robot model display, live camera feed, virtual joystick for manual control, and waypoint buttons for navigation.
- Designed an intuitive and user-friendly interface for robot control and provided real-time visualisation of mapping progress, robot model, and camera feed.

Docker Project for Robotics

- Developed Docker images for deploying the TortoiseBot robot in both ROS1 and ROS2 environments, ensuring consistent and reproducible environments across different platforms, and enhancing development and deployment workflows.
- Created separate images for simulation and real robot setups, including components for Gazebo simulation, mapping, waypoints, web application, camera, and laser.
- Utilized Docker and Docker Compose for containerization and orchestration of robot applications, simplifying the setup and deployment process and facilitating use by new users.

Trash Table Detection Using Lidar Sensor

- Developed a trash table detection system using 2D Lidar segmentation algorithms, successfully deploying a real-world application on the Cleaner robot to autonomously detect, approach, and pick up trash tables.
- Developed ROS2 nodes to control the Cleaner robot's approach to the trash table and its elevator mechanism, implementing Nav2 for autonomous navigation.

SAE International – Robotics for Autonomous Vehicle Systems Bootcamp May 2023 – Aug 2023

Pure Pursuit (Carrot Planner) Implementation

- Recorded waypoints using waypoint_logger.py and manual driving, developing and implementing the pure pursuit algorithm in pure pursuit.py for waypoint following.
- Parsed the waypoint .csv file and implemented logic for 'instantaneous carrot position.' Tested and adjusted lookahead_distance for accurate interpolation, culminating in the implementation of pure pursuit control code for the car to follow waypoints.

Capstone Project on Real TurtleBot3 Burger Robot

- Achieved fully autonomous navigation of Turtlebot3 Burger in a structured environment, leveraging skills in ROS development, SLAM, object detection and tracking, navigation algorithms, python programming, and OpenCV for image processing.
- Integrated wall following, line following, go-to-goal navigation, obstacle avoidance using laser scans and object detection, and autonomous navigation task switching based on predefined triggers or positions.

EDUCATION

Manipal Institute of Technology **Manipal, India**

Bachelor of Technology in Mechanical Engineering 2015 – 2019

- Grade: 9.26/10

OTHER

Certifications: Robotics Developer Masterclass Program – The Construct (2023), Robotics for Autonomous Vehicle Systems Bootcamp – SAE (2023), Thermal and Structural Analysis of Electrical Power Convertors – General Electric (2019)

Languages: Hindi (Native), English (Advanced)