

ROBIN SINGH TOMAR

ROBOTICIST

CONTACT

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SKILLS

ROS 2
C++
RL
Python

EXPERTISE

- Software Architecture:** Experience with designing complex software modules based on ROS and cpp for hardware integrations
- Robot Planning :** Trajectory planning (velocity profiling, path planning, smoothing)and optimisation based on acceleration and/or higher order continuity constraints.
- Robot Control :** Experience with Model Predictive Control, Cascaded PID with gain scheduling, Adaptive Pure pursuit, Timed Elastic Band planner, Dynamic Window Approach Planner.
- Hardware-Related Software Development:** Experience with resource-constrained systems, various sensors and actuators like LIDAR, IMU, depth cameras, Position tracking scanners etc.
- Communication protocols:** Experience with realtime hardware communication protocols like CANbus and EtherCAT
- Programming Languages:** Proficient in C++ and experienced in Bash scripting, working knowledge of python.

OBJECTIVE

As a self-taught robotics professional with a passion for cutting-edge innovation, I am looking for a challenging role that can spark my excitement for robotics. I am eager to apply my unique skillset, unconventional approach and hands-on experience with robots to develop sophisticated solutions.

WORK EXPERIENCE

Robotics Software Engineering Lead II

Clutterbot

2023 - Current

- Leading the manipulation team and control architecture for a first-of-its-kind household cleaning robot.
- Designed and implemented the CPDS (Clutter Pickup and Dump System) manipulation stack based on ROS2 with trajectory caching, recording and replaying systems.
- Migrated the codebase from classical planning to environment aware moveit based planning and further researching on implementing RL and Vision-Language-Action (VLA) models.
- Acted as bridge between mechanical, electrical, and software teams in india and New Zealand to resolve critical hardware bottlenecks for a major milestone.
- Grew the manipulation team from a single contributor to a high-performing unit of four engineers.
- Started initiatives to research into ML based approaches and proved its future value to SLT.

Robotics Tech Lead

ADDVERB

2022–2023

As a Tech Lead, my experience includes a wide range of responsibilities, from leading software development , Improving navigation and control of robots to fostering growth and collaboration within the team:

- Completed end-to-end development for a new product. A differential drive mobile robot which delivers a payload of up to 40 kg at 2 m/s. My role was to support in complete development, from prototyping to deployment. Developing individual device communication modules, component testing, prototype testing, tuning drives and improving control.
- Improved dynamics during high acceleration and deceleration. This was achieved by performing detailed stability and motion analysis with different speed and load scenarios.
- Improved existing pure pursuit controller by making it adaptive w.r.t curvature, current velocity and cross track error.
- Worked extensively on velocity profile generation in time optimal manner with focus on increasing overall throughput and smoothness in motion.

- **Data analysis and debugging** for performance improvement: Plot-juggler, foxglove studio.
- Version Control and Collaboration: Experienced with **Git**, **GitLab** (or similar), and **Docker** for collaborative software development, and **containerization**.

EDUCATION

M.Sc. INFORMATICS

IIC, DELHI UNIVERSITY

2018-2020

B.Sc. (H) PHYSICS

DDUC, DELHI UNIVERSITY

2104-2107

LANGUAGES

English



Hindi



Robotics Engineer

ADDVERB

2021-2022

As a Robotics Engineer, my experience includes working with guided mobile robots and contributing to various aspects of their development :

- Enhanced and refined the existing code base for better performance
- Worked on a deployment project in another country for a major client, handling extended work shifts, manufacturing defects, and site-specific requirements

GET-Mobile Robotics

Addverb

2020-2021

As a Graduate Engineer Trainee, my experience includes working on various aspects of Autonomous Mobile Robots (AMRs) that utilize natural navigation. This diverse experience has allowed me to gain expertise in several key areas:

- Developed proficiency in important ROS packages, such as robot localisation, AMCL and move_base
- Worked on navigation and control of AMRs, tuning parameters of controllers like MPC, PD, and TEB to minimize deviation and maximize speed
- Implemented path smoothing and velocity profiling using parameterized curves, such as Bezier curves and cubic splines
- Developed and tested multi-agent navigation and planning simulations using Gazebo and Stage simulators

Robotics Intern

Botics Labs

2019-2020

Worked on upper body of a 3d printed Humanoid robot. Learned about forward and inverse kinematics for robots. Written software module for coordinated hand and neck movements.

Mentor

Robotics Club DDUC

2017-present

As a mentor for students at my alma mater, my experience includes:

- Providing guidance and advice to students for different robotics competitions.
- Assisting students in doing their robotics projects.
- Conducting workshops on different topics related to robotics.
- Facilitating connections between students and industry professionals

TRAININGS AND CERTIFICATIONS

- **Design Patterns in C++** (online): learned about different design patterns such as singleton, factory class, etc.
- **Udacity, C++ nanodegree** (online): learned about concepts of OOP, memory management and concurrency.
- **ROS developers day**, The construct: learned about ros 2 architecture, behaviour trees and nav 2.
- Udacity, **Robotics software engineer nanodegree** (online): learned about concepts of ROS, gazebo, localization, mapping, SLAM, path planning and navigation.
- University of Pennsylvania, **robotics fundamentals** (online): learned about concepts of mathematical fundamentals for robotics, robot kinematics, kinematic path planning.
- Columbia University, **Robotics with ROS** (online): learned about different ROS concepts.