Pranav Kolekar

pranavkolekar.dev | pranavkolekar13@gmail.com | linkedin.com/in/pranav-kolekar | github.com/pranavk-2003 | ROS Discourse

Professional Summary

Robotics Software Engineer specializing in ROS 2, NVIDIA Isaac Sim, and physical AI — spanning simulation-to-real deployment, mobile manipulation, and multi-device embedded firmware integration. Experienced in Nav2, ros2_control, imitation learning (ACT, Diffusion Policy), and digital twin architecture on cloud GPU infrastructure. Contributor to the ROS 2 Navigation2 open-source stack. Applies structured multi-agent AI development workflows daily to production robotics codebases.

Work Experience

Robotics Software Engineer | ***Isaac Sim, ROS 2, Mobile Manipulation, Embedded C++*** Feb 2026 – Present
Neural Foundry *Hyderabad, India*

- Architected a custom NVIDIA Isaac Sim C++/Python extension bridging embedded firmware with an 8-device lab-automation digital twin, managing MQTT connection lifecycle across all four simulation states (play/pause/step/stop) to enable firmware-in-the-loop (FIL) testing entirely in the cloud.
- Engineered a Docker Compose cloud simulation environment (AWS + Brev L40S GPU) that collapsed a 6-step manual provisioning process into a single reproducible deployment; resolved 2 blocking production issues involving GPU instance lifecycle failures.
- Built an end-to-end mobile manipulation digital twin (differential-drive AMR + Doosan 6-DOF cobot) in Isaac Sim with full ROS 2 / ros2_control integration; tuned Nav2 across 5 subsystems (controller, costmap, planner, behavior tree, velocity smoother) to enable autonomous vision-guided pick-transport-place task execution.
- Diagnosed a confirmed NVIDIA Isaac Sim 5.1.0 bug — vacuum gripper surface-joint baking a world-frame anchor into USD at authoring time caused the articulation to fly off on reference spawn — via OpenUSD `Pxr` layer inspection; authored the team workaround and documented the NVIDIA-acknowledged defect, fix targeted for 6.x.
- Benchmarked multi-instance Isaac Sim scalability on NVIDIA L40S GPUs, quantifying a 15× FPS drop (120 → 8 fps) across 8 concurrent instances and isolating a ∼4-core-per-instance CPU ceiling, directly shaping infrastructure sizing decisions.
- Reduced vision-pipeline compute load by converting continuous AprilTag/ArUco detection to an on-demand ROS 2 service; restored production camera streaming from under 6 Hz to a consistent 15 Hz via targeted DDS QoS tuning.
- Operationalized a structured multi-agent AI development workflow across the full engineering cycle — dedicated subagents own context ingestion, library documentation loading, systematic root-cause analysis, enforced test-driven development, code review, and documentation authoring — applied daily to production ROS 2 and Isaac Sim codebases, enabling senior-engineer throughput as the primary engineering contributor on the simulation stack.

Robotics Software Engineer | ***ROS 2, Autoware, Manipulation, Imitation Learning*** Jun 2025 – Jan 2026
Nxtwave Disruptive Technologies *Hyderabad, India*

- Extended an existing ROS 2 SDK for the Unitree Go2 quadruped, authoring launch files and enabling dual-transport connectivity over WebRTC and CycloneDDS, reducing integration setup time for downstream developers.
- Implemented a serial communication and control stack for a 6-DOF manipulator driven by bus servos; derived DH parameters and computed forward kinematics to achieve real-time end-effector pose estimation.
- Established a leader–follower teleoperation pipeline using the LeRobot framework; collected over 50 demonstration episodes and trained ACT and Diffusion Policy models on CUDA GPUs, achieving repeatable task execution on physical hardware.
- Deployed the full Autoware autonomous driving stack on an F1TENTH vehicle and validated end-to-end indoor autonomous navigation including NDT localization, lane-keeping, and pure-pursuit path tracking.
- Produced Autoware-compatible vector maps using Tier IV Map Builder and processed raw LiDAR point clouds in CloudCompare through statistical filtering, subsampling, and dataset merging for improved localization accuracy.

Robotics Developer | ***Python, OpenCV, Pytest, CI/CD*** Feb 2025 – Present
Ondroid *Finland (Remote)*

- Developed Python/OpenCV automated computer vision pipelines for output verification, eliminating manual review and standardizing evaluation outcomes across assessment cycles.
- Integrated Pytest into the CI backend pipeline, increasing test coverage and enforcing regression-free deployments across multiple release cycles.

Robotics Lead – Robocon | ***ROS 2, Gazebo, URDF, LiDAR, IMU*** Feb 2024 – Jul 2024
M.E.S. Wadia College of Engineering *Pune, India*

- Led hardware and software R&D for a two-robot team, integrating closed-loop motor control and custom control firmware on Robot 1 to improve motion accuracy and competition reliability.
- Provisioned a complete ROS 2 navigation stack on Robot 2: URDF modeling, wheel encoder odometry, 2D LiDAR, IMU integration, and Gazebo simulation for iterative pre-competition testing; represented the team at ABU Robocon 2024, New Delhi.

Electronics Intern | ***IoT, Arduino Cloud, Python, Embedded Systems*** Mar 2024 – May 2024
Canspirit AI *Pune, India*

- Connected IoT sensor nodes to Arduino Cloud for real-time data acquisition; built cross-platform Python logging pipelines to streamline data storage, retrieval, and downstream analysis.

Embedded Systems Developer | ***Firmware, PCB Design, KiCad*** Oct 2023 – Jan 2024
Indkarta LLP *Pune, India*

- Designed custom PCB layouts in KiCad and owned firmware development from prototype through field testing for two embedded systems deployed in clinical medication-processing environments.

Open-Source Contributions

Bug Fix – **Nav2 Minimal TurtleBot Simulation** | *ROS 2 Navigation2* Merged

- Diagnosed and fixed a LiDAR sensor misconfiguration where rays at maximum range generated false floor collision detections (Issue #26), restoring correct obstacle detection behavior for autonomous navigation testing.

Projects

Autonomous Terrain Exploration Robot | *ROS 2, SLAM, LiDAR, IMU, Sensor Fusion* Aug 2024 – Present

- Built a tracked mobile robot for autonomous exploration in GPS-denied environments using a frontier-based exploration strategy; wrote custom ROS 2 sensor fusion packages combining 2D LiDAR and IMU data to construct real-time 3D occupancy maps, enabling autonomous traversal without prior environment knowledge.

nav2_pose_saver | *ROS 2 Jazzy, Nav2, C++* Mar 2025 – May 2025

- Developed a lightweight ROS 2 C++ node for Nav2-integrated pose persistence in industrial environments; implements atomic file-swapping to prevent data corruption, periodic pose saving, and service-based dynamic control — fully tested on ROS 2 Jazzy.

Education

M.E.S. Wadia College of Engineering Pune, Maharashtra

Bachelor of Engineering, Electronics and Telecommunications | First Class *Dec 2021 – May 2025*

Technical Skills

Programming Languages: Python, C/C++, MicroPython, Bash
Robotics Frameworks: ROS 2 (Humble/Jazzy), Nav2, ros2_control, MoveIt 2, Autoware, LeRobot
Simulation & Visualization: NVIDIA Isaac Sim, Gazebo, OpenUSD, RViz 2, Foxglove Studio
Perception, SLAM & Mapping: RTABMap, Cartographer, GMapping, OpenCV, PCL, AprilTag/ArUco, sensor fusion (LiDAR, IMU, depth)
Robot Learning: Imitation Learning, ACT (Action Chunking Transformer), Diffusion Policy, CUDA, PyTorch
Infrastructure & Tools: Docker, AWS, MQTT, FastAPI, Git, Pytest, KiCad, Tier IV Map Builder, URDF/SDF, DH parameters
Hardware & Interfaces: ODrive S1, CAN bus, Unitree Go2, Doosan cobots, NVIDIA Jetson, Raspberry Pi, Arduino, bus servos