

# Tejas M. Bhade

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## Professional Summary

Robotics Software Engineer with 3+ years developing autonomous systems across motion planning, control algorithms, perception, and ADAS-grade safety workflows. Skilled in ROS2, multi-sensor fusion, deep learning-based computer vision, reinforcement learning, and physics-accurate simulation using Isaac Sim and MoveIt. Experienced in real-time embedded execution on Jetson platforms, building digital twins, optimizing autonomy stacks, and delivering reliable robot behavior through rigorous testing, modeling, and system-level integration.

## Technical Skills

**Robotics & Control Systems:** Motion Planning, SLAM, Robotic Kinematics, Trajectory Optimization, Robot Dynamics, Model Predictive Control, Force-Torque Control, Real-Time Control Loops, Autonomous Navigation, Compliance Control, Sensor-Driven Control Architectures

**Perception, AI & Computer Vision:** 3D Vision, Deep Learning-Based Perception, Multi-Sensor Fusion (LiDAR, Radar, IMU), Visual Odometry, Object Tracking, Semantic Segmentation, Scene Understanding, Depth Estimation, Neural Radiance Fields, Vision Transformers, Spatiotemporal Reasoning, Uncertainty-Aware Perception Models

**Robotics Software Engineering:** C++ (ROS/ROS2), Python Robotics Frameworks, Middleware Communication, Real-Time Systems Development, Distributed Robotics Software, Hardware-Accelerated Compute Pipelines, Robotics SDK Integration, Simulation-Driven Development, Robotic Middleware Abstraction Layers

**Simulation, Modeling & Testing:** Gazebo, Isaac Sim, PyBullet, Mujoco, Digital Twins, Physics-Based Simulation, Dynamic Modeling, Monte Carlo Validation, Structured Testing Pipelines, Robotics Benchmarking Frameworks, Continuous Integration for Robotic Systems

**Embedded Systems, Platforms & Tools:** Embedded Linux, RTOS Integration, Microcontroller Interfacing, CAN/UDP/TCP Protocols, FPGA-Accelerated Robotics, Edge AI Deployment, GPU-Optimized Robotics Workflows, Robot Calibration Tooling, Diagnostics & Telemetry Systems, Robotics Data Logging Pipelines, Platform-Level Safety Frameworks

## Professional Experience

### Robotics Researcher, DRONES Lab

May 2025 – Present | USA

- Developed a reinforcement learning framework in NVIDIA Isaac Sim to train bucket-filling control policies using physics-accurate digital twins, enabling effective sim-to-real transfer supporting full-scale autonomous excavator deployment.
- Contributed to the Localization, Navigation, and Control stack for a MOOG-funded autonomous excavator by recording ROS bag datasets analyzing Safety Nodes and motion-planning behavior to strengthen overall system reliability.
- Engineered an AprilTag detection pipeline using OpenCV and a multi-layer perceptron, estimating real-time angles and poses while correlating inclinometer readings with ground-truth measurements through targeted deep-learning techniques.
- Created a digital twin of an excavator in MoveIt-2 using its URDF model, enabling realistic simulation and learning workflows that significantly reduced physical prototyping cycles and resource requirements.
- Integrated Nvidia Orin Jetsons with ROS2 to optimize control-architecture interactions while streamlining lossless ROS topic acquisition for IMU, pressure, CAN, and FLIR data, improving visualization through efficient MCAP conversions.

### Robotics Software Engineer, TCS

Aug 2021 – Jul 2024 | Mumbai, India

- Designed a ROS2 motion-planning navigation framework optimizing trajectory generation, validating control algorithms, and stabilizing autonomous inspection behavior across construction environments supporting ADAS-inspired enhancements.
- Implemented multi-sensor fusion integrating LiDAR, IMU, encoders, strengthening localization, reducing drift, and improving cluttered-site mapping performance through control-aware state estimation aligned with ADAS principles.
- Engineered GPU-accelerated perception using Vision Transformers, orchestrating ROS2 inference nodes, advancing defect detection reliability and supporting predictive ADAS perception functions for autonomous inspection navigation.
- Developed semantic-segmentation with depth-based 3D vision, identifying hazardous zones, improving obstacle interpretation, and enhancing autonomous navigation reliability using motion-planning-centric ADAS safety strategies.
- Created AprilTag visual-servoing synchronized with actuator feedback, improving manipulator precision, strengthening control-loop stability, and supporting ADAS-aligned alignment behaviors for reliable inspection workflows.
- Constructed Isaac Sim simulation environments modeling complex construction physics, validating autonomy behavior, testing motion-planning algorithms, and accelerating scenario evaluation for ADAS-driven reliability improvements.
- Integrated Jetson Orin pipelines with embedded Linux and ROS2, optimizing real-time perception, improving low-latency control responses, and enabling deterministic execution essential for advanced motion-planning and ADAS functionality.

## Education

**Master of Science, State University of New York**  
Engineering Sciences – Robotics

Aug 2024 - Dec 2025 | NY, USA

**Bachelor of Technology, Mumbai University**  
Mechanical Engineering

Aug 2017 – Aug 2021 | Mumbai, India