

# TEJAS M. BHADRE

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Robotics and AI engineer with expertise in developing and deploying AI models, product design, and autonomous systems

## Education

### Master of Science - Robotics and Computer Science

Expected: Dec 2025

University at Buffalo, The State University of New York, NY

Coursework: Deep Learning, Reinforcement Learning, Control Systems, Computer Vision, Robotics Algorithms

### Bachelor of Engineering – Mechanical Engineering

August 2017 - June 2021

University of Mumbai, India

## Skills

**Languages:** Python, C++, C#, C, R, MATLAB/Simulink.

**Robotics:** ROS2, MoveIt2, URDF, Nav2, SLAM, Path planning, ADAS, Gazebo, Foxglove, Kalman Filter, Digital Twin

**Computer Vision:** OpenCV, 3D Reconstruction, Object Detection, 3D Geometry, Fiducial Estimation

**Machine Learning:** PyTorch, LLM, Transformers, TensorFlow, CUDA, CNN, OpenAI Gym, Isaac Sim

**DevOps:** Docker, Linux, Git, AWS

**CAD and FEA:** PTC Creo, Solidworks, CATIA, AutoCAD, Siemens NX, ANSYS Fluent, Hyperworks, PTC Windchill

## Experience

### Robotics Researcher, DRONES Lab

May 2025 – Present

- Contributed to the Localization, Navigation, and Control stack for an autonomous excavator funded by MOOG Inc., including recording ROS bags for the analysis of Safety Nodes and motion planning algorithms.
- Developed a robust April Tag detection and real-time angle and pose estimation pipeline by leveraging OpenCV and a multi-layer perceptron, efficiently correlating inclinometer readings with ground truth values using deep learning.
- Created a digital twin of an excavator using its URDF model in MoveIt-2 to enable realistic simulation and learning, significantly reducing the need for physical resources and prototype testing.
- Incorporated and streamlined a ROS topics data acquisition pipeline to record lossless published topics such as position and velocity from IMU, pressure values, CAN messages, and FLIR camera messages.

### Student Researcher, Jun Liu Lab

Dec 2024 - May 2025

- Engineered a slip detection and mitigation algorithm using a two-finger gripper setup, enhancing grasp stability and precision in robotic manipulation tasks.
- Integrated NI-DAQ and Arduino with Dynamixel servos and a tactile sensor array to create a robust data acquisition pipeline—enabling high-resolution, real-time sensor feedback for robotic control experiments.
- Assembled and actuated hand from LEAP robotics integrating 16 servo motors. Designed a machine learning workflow to classify tactile sensor data, aiming to predict user-induced actions—advancing robotic perception capabilities.

### Design Engineer, Blue Star Ltd. – Mumbai, India

June 2022 – Aug 2024

- Revamped Product design of Packaged Air Conditioning System by creating 3D CAD model assembly using CATIA, detailed drawings of parts, subassemblies and unit assembly using GD&T to reduce the overall manufacturing cost by 30%.
- Facilitated cross-functional DFM (Design for Manufacturing) reviews by working with Electrical, Manufacturing, Production, R&D, and Supply Chain teams to improve manufacturability and sustainability of product.

## Projects

### AI-Powered Inverted Pendulum Balancing with Reinforcement Learning on Isaac Sim

- The project involved creating a detailed 3D model of an inverted pendulum system, including the cart, pole, and base, within the Isaac Sim environment.

### SLAM based mapping and cost-map generation

- Designed a cost-mapping algorithm that converted 3D point clouds into 2D occupancy grids using elevation gradient analysis, normalized cost thresholds to enable path planning for autonomous navigation.

### Autonomous Navigation System using RRT Path Planning

- Implemented Rapidly-Exploring Random Trees (RRT) algorithm within ROS and Gazebo, enabling TurtleBot3 navigation through intricate simulated environments and achieving a high rate of collision-free path planning.

### Stereo Visual Odometry

- Utilized the KITTI dataset to estimate robot motion by implementing visual odometry techniques and RANSAC algorithm, enabling accurate trajectory reconstruction with OpenCV.