

Saikiran Juttu

juttu.s@northeastern.edu — LinkedIn — GitHub — Portfolio — (857) 693-1723

Summary

Robotics Engineer with hands-on experience deploying **field robotics systems** across hardware integration, motion control, and perception. Specializes in **SLAM**, **State Estimation**, and **Multi-Robot Planning**. Proficient in modern **C++ (14/17)** and **Python**, with extensive experience deploying **ROS 2** navigation stacks on embedded edge devices (Jetson). Proven track record of implementing graph-based optimization (GTSAM) and perception pipelines in GPS-denied environments.

Skills

- **Languages:** C++, Python, MATLAB
- **Robotics Middleware:** ROS 1 / ROS 2 (Nav2, Gazebo, TF2), DDS, Behavior Trees, URDF
- **Algorithms & Math:** Graph SLAM (GTSAM), Kalman Filtering (EKF/UKF), A*, RRT*, ICP, PnP, Projective Geometry
- **Libraries:** OpenCV, PCL (Point Cloud Library), Eigen, Ceres Solver, PyTorch, NumPy, SciPy
- **Software Tools:** Linux (Ubuntu), Docker, Git
- **Hardware:** NVIDIA Jetson, Intel RealSense, 3D LiDAR, IMU Integration, ODrive Motor Controllers, CAN Bus

Experience

Robotics Engineer, Barn Owl AG — Colorado March 2026 – April 2026

- Built and containerized motion control features (**in-place rotation**, **reverse driving**) using the **Stanley controller** in **Docker**; validated end-to-end in simulation and field deployments on an autonomous agricultural platform.
- Integrated **BMS over CAN bus** and designed electrical systems for **IPC auto-ignition** and **Wake-on-LAN** on Jetson AGX, enabling automated power sequencing and reducing manual intervention in field deployments.
- Deployed and configured field hardware; performed servo and rail calibration for precision automation.

Robotics Engineer Co-op, Northeastern University — Boston, MA Jan 2025 – Jun 2025

- Engineered a robust **autonomy stack** for the Scout Mini Rover using **ROS 2**, achieving **time-synchronized** sensor fusion of **3D LiDAR** and **Intel RealSense** RGB-D data on an **NVIDIA Jetson Orin**.
- Implemented and tuned state-of-the-art SLAM solutions (**Fast-LIO**, **LIO-SAM**, **VIO**) in **C++**, optimizing backend parameters to reduce translation drift by **35%** in GPS-denied environments.
- Developed waypoint navigation pipelines for UAVs using the **motion capture system**, achieving fully automated takeoff, trajectory execution, and precision landing with **sub-centimeter accuracy**.
- Configured **Nav2** behavior trees and costmaps running at **20Hz** to enable dynamic obstacle avoidance and autonomous waypoint navigation with a **95% success rate** in cluttered environments.
- Developed a **Dockerized** deployment pipeline to standardize build environments, reducing device setup time by **80%** and ensuring reproducibility across development and field units.

Graduate Research Assistant, Multi-Agent Robotics Laboratory — Boston, MA Apr 2024 – Dec 2025

- Architected a heterogeneous UAV-AGV system in **ROS 2/C++**, implementing a centralized **Finite State Machine (FSM)** coordinator to synchronize autonomous exploration, precise docking, and failure recovery triggers.
- Engineered a **multithreaded Dynamic Exploration Planner** that solves the **Orienteering Problem** using **GRASP metaheuristics**, improving path planning efficiency by **40%** while calculating obstacle-aware costs via Dijkstra's algorithm.
- Implemented **battery-aware planning logic** that dynamically adjusts solver constraints based on real-time flight metrics, ensuring safe UAV return while maximizing information gain.
- Designing and testing custom FPV drone hardware, tuning flight controller using ArduPilot/PX4 to improve performance.

Teaching Assistant, Northeastern University — Boston, MA Sep 2024 – Apr 2025

- Architected a **remote Sim-to-Real workflow**, creating a high-fidelity **Simscape** simulation that requires students to validate kinematic safety and control logic before unlocking remote execution on physical hardware.
- Engineered a modular **perception-and-control stack** for the PincherX-100, implementing a custom **Analytical Inverse Kinematics (IK)** solver and **ArUco-based extrinsic calibration** to achieve $\pm 2.5\text{mm}$ precision.
- Established the standard **laboratory framework** for a **MathWorks-funded**, cost-optimized curriculum, deploying a structured **software repository** that empowered students to bridge theoretical concepts with hands-on robot control.

Mechanical Engineer, Technip Energies — Noida, India Feb 2021 – Jul 2023

- Designed and optimized large-scale piping systems using Smart3D, Navisworks, SolidWorks, CATIA, gaining expertise in CAD modeling, system integration, and safety-compliant mechanical design.
- Engineered a predictive **Load Monitoring System** using signal processing on sensor data to estimate equipment fatigue life.
- Collaborated with clients, vendors, and cross-functional teams to manage on-site integration and digitize workflows, implementing **version control** to ensure timely delivery of engineering assets.

Computer Vision Intern, Robic Rufarm India Pvt Ltd — Hyderabad, India Jun 2019 – Aug 2019

- Built a real-time defect detection pipeline using **Python and OpenCV**, utilizing morphological operations and contour detection to classify manufacturing defects.
- Optimized image processing algorithms for an edge device, increasing throughput by **75%** while maintaining **90%** detection accuracy.

Technical Projects

Photo Mosaicking & Image Registration — *C++, Python, OpenCV, GTSAM*

- Developed a robust image registration pipeline for low-contrast underwater images using **SIFT features** and **RANSAC** for outlier rejection.
- Implemented a **GTSAM factor graph** backend to solve for homographies and loop closures, minimizing reprojection error via **Levenberg-Marquardt** optimization.

Sparse 3D Reconstruction (SfM) — *Python, NumPy, OpenCV*

- Built a custom Structure-from-Motion (SfM) pipeline implementing **Epipolar Geometry** concepts: Fundamental Matrix estimation, Triangulation, and **Perspective-n-Point (PnP)**.
- Performed **Bundle Adjustment** to jointly optimize 3D point cloud and camera poses, reducing reconstruction error by 20%.

Semantic Geometric SLAM (SG-SLAM) — *ROS, PyTorch, C++*

- Implemented SG-SLAM algorithm, which integrates a **YOLO-based** object detection network into the ORB-SLAM2 frontend to filter out dynamic features (e.g., walking humans) from the tracking thread.
- Achieved a **31% accuracy improvement** on the TUM-RGB-D dynamic sequence benchmarks by preventing dynamic objects from corrupting the map optimization.

Control Strategies for Quadrotor Position and Altitude — *MATLAB, Simulink*

- Conducted a comprehensive study on optimal control strategies for quadrotor position and altitude, implementing **Model Predictive Control (MPC)**, **Linear Quadratic Regulator (LQR)**, **LQG**, and **LQR-PI** controllers.
- Evaluated system performance regarding stability and adaptability, incorporating real-world factors such as sensor noise and process disturbances to ensure robust flight dynamics.

Autonomous Race Driving with Action Mapping RL — *Python, PyTorch, NumPy, Matplotlib*

- Implemented reinforcement learning algorithms (**DDPG**, **TD3**, **SAC**) with an **Action Mapping** mechanism in a custom racing simulator, incorporating a friction-aware reward function to enforce vehicle dynamics and tire-road constraints.
- Validated **TD3** against baseline DDPG, achieving up to **11% faster lap times** and smoother trajectories, demonstrating superior policy stability and constraint adherence.

Publications

S. Juttu et al. “Energy-Aware Collaborative Exploration for a UAV–UGV Team.” *Submitted to IEEE/RSJ IROS 2026*.

Proposed a density-aware layered PRM and coupled orienteering formulation for energy-bounded UAV–UGV collaborative exploration with rendezvous constraints; validated through simulation benchmarks and real-world experiments.

Education

Northeastern University, Boston, MA

Dec 2025

Master of Science in Robotics — GPA: 3.99/4.0

Dr. B.R. Ambedkar National Institute of Technology, Jalandhar, India

May 2020

Bachelor of Technology in Mechanical Engineering