

Ashrith Edukulla

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Education

University of Michigan, Ann Arbor

Aug 2024 – Dec 2026

B.E. in Robotics | GPA: 3.8/4.0

- Honors: Rank 3 (WRO), 4× IYRC medalist, 3× AMC qualifier, 2× AIME qualifier.
- Courses: Robot SLAM & Perception, Computer Vision, Deep Learning, ROS, Motion Planning, Robot Controls, Optimization, Dynamics, Robot Kinematics, Linear Algebra, Data Structures & Algorithms.

Work Experience

Field Robotics Group (FRoG) Lab @ University of Michigan

Dec 2025 – Present

Robotics Software Engineer – Computer Vision & Active Perception

- Designing a **multimodal dual-map framework** fusing sonar and stereo vision for underwater submerged object inspection, achieving **40% improvement** in surface coverage over single-modality sonar-only baselines in simulation.
- Developing **frontier-based active perception** with occupancy grid updates and uncertainty-aware coverage metrics, reducing redundant re-exploration by **35%** across cluttered low-visibility underwater inspection environments.
- Implementing **3D SLAM** via SLIM-VDB with boustraphedon decomposition for real-time coverage planning, maintaining consistent probabilistic map estimates at scale across **200m²** simulated inspection zones.
- Building a **dual stereo-sonar perception pipeline** dynamically transitioning between sonar-driven global exploration and stereo vision-guided close-range inspection passes, cutting total mission time by **28%**.
- Benchmarking full autonomy stack in **OceanSim** (Nvidia Isaac Sim) against single-map baselines across 10+ scenarios with varying turbidity, structural occlusion, and calibrated multi-axis sensor noise perturbations.

Michigan Mars ROVER

Nov 2024 – May 2025

Software Engineer

- Developed a **vision-based perception** pipeline to detect ArUco fiducial tags using trained detection models, enabling reliable autonomous landmark recognition, target identification, and waypoint homing across unstructured terrain.
- Implemented and optimized an **iterated EKF (iEKF)** for multi-sensor localization by fusing IMU, wheel odometry, and GPS measurements, achieving robust real-time state estimation with a **30% reduction** in pose drift.
- Architected and integrated the full **MROver ROS** software stack, designing subsystem nodes, message interfaces, launch configurations, and inter-module communication pipelines for reliable end-to-end hardware operation.

EECS 467: Autonomous Robotics @ University of Michigan

Dec 2025 – May 2026

Teaching Assistant

- Assisted instruction in **autonomous robotics**, covering perception, SLAM, motion planning, and feedback systems.
- Supported students in **ROS-based labs**, debugging, and end-to-end algorithm implementation on mobile robots.
- Held weekly office hours guiding **multi-sensor fusion**, navigation pipelines, and robot software architecture design.

Projects

SLAM & Perception on Differential-Drive Robot

Aug 2025 – Dec 2025

- Built a full-stack **2D LIDAR SLAM** pipeline on an **MBot** integrating odometry motion models, occupancy grid mapping, and particle filter localization for real-time pose estimation in cluttered indoor environments.
- Tuned **log-odds**, ray-casting, and likelihood-field sensor model parameters, implementing **frontier exploration** and path planning for autonomous goal-directed navigation without any prior map knowledge.
- Deployed **AprilTag visual detection** and camera-based perception for landmark-driven localization, evaluating and comparing drift, estimator consistency, and SLAM performance across hardware navigation challenges.

Skills

Programming & Robotics: C/C++, Python, Julia, MATLAB, Bash, ROS/ROS 2.

Computer Vision & Deep Learning: PyTorch, OpenCV, NumPy, multi-view geometry, camera models, calibration, stereo vision, ArUco/AprilTag detection, visual odometry, neural network training.

Perception, Estimation & SLAM: Sonar-vision fusion, EKF/UKF, iEKF, particle filters, occupancy grid mapping.

Planning & Autonomy: Trajectory optimization, frontier exploration, graph-based planning, navigation stacks.

Simulation & Hardware: Isaac Sim, OceanSim, Gazebo, RViz, MATLAB/Simulink; STM32, Arduino, IMUs, encoders, LiDAR, sonar.