

# MIN KYU KIM

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## EDUCATION

### University of Michigan

M.S. in Robotics

Aug. 2024 – May. 2026

GPA: 4.0/4.0

### University of Illinois at Urbana-Champaign

B.S. in Mechanical Engineering, Minor in Computer Science

Aug. 2020 – May 2024

GPA: 3.93/4.0

## EXPERIENCE

### Honda Research Institute (Industry-Sponsored Research)

Graduate Student Researcher

Sep. 2025 – Present

Ann Arbor, MI

- Leading confidential industry project to improve perception/localization in unstructured marine environment
- Developing real-time **Visual-LiDAR 3D pose estimation** pipeline in C++, enabling precise landmark localization for relative navigation tasks
- Deploying robust **GPS/IMU fusion localization** pipeline, implementing an active heading correction mechanism based on an **Invariant EKF** to resolve fundamental yaw unobservability
- Implementing rigorous **spatiotemporal calibration** and synchronization for **multi-modal sensor fusion**

### Computational Autonomy and Robotics Laboratory

Graduate Research Assistant

Jul. 2025 – Present

Ann Arbor, MI

- Developed a landmark-based **pose-graph SLAM** system utilizing **GTSAM** for backend optimization, integrating **semantic segmentation** outputs with multi-modal sensor data (LiDAR, Camera, IMU, GNSS)
- Automated data pipeline using **SAM 2** to bootstrap datasets, modifying temporal tracking logic to auto-propagate labels for **YOLOv11** training
- Conducted feasibility analysis of monocular depth estimation (**Depth Anything V2**), benchmarking metric calibration against **LiDAR** ground truth to validate performance
- Validated navigation performance in **Gazebo** and on an autonomous vessel powered by **NVIDIA Jetson Orin**

### Amazon Robotics

Robotics System Engineer Co-op

Jan. 2025 – Jun. 2025

North Reading, MA

- Led on-site integration for a **\$10M outbound dock automation** retrofit, coordinating 25+ staff to deploy the **autonomous mobile robot (AMR)** fleet
- Executed robot deployment tests (**QA, sensor validation, performance testing**) across 3+ Amazon warehouses
- Collected data and summarized failures to unblock operations and inform follow-up tests with engineering teams
- Authored technical documentation to **standardize deployment**, enabling **scaling** from beta to all Amazon sites

## PROJECTS

### Exposure-Robust Masked ORB-SLAM3 | Python, C++, ORB-SLAM3, OpenCV

2025

- Engineered a lighting-invariant frontend for ORB-SLAM3 using **adaptive gamma correction** and **exposure-aware masking** to filter unstable keypoints
- Achieved a **9x reduction** in trajectory error (RMSE) on nighttime datasets while maintaining **real-time performance** with only 30ms latency overhead

### TEM Cell Segmentation using Deep Learning | Attention U-Net, PyTorch, HDF5

2025

- Developed a **multi-class semantic segmentation** pipeline using an **Attention U-Net**, utilizing sliding-window inference to process high-resolution scans
- Optimized a hybrid Cross-Entropy and Dice loss function to resolve class imbalance, achieving a 0.79 mean Dice score on validation sets

### MBot Autonomous Navigation | C++, ROS 2, LiDAR

2024

- Engineered a custom **Monte Carlo Localization (MCL)** particle filter in C++, generating high-fidelity **occupancy grid maps** from raw 2D LiDAR scans
- Integrated **A\* path planning** and **frontier-based exploration** with a **PID** motion controller to enable fully autonomous mapping of unknown environments