

# Amber Handal

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## EDUCATION

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**Northwestern University — Evanston, IL** Sep 2025 – Dec 2026  
M.S. in Robotics

**University of Florida — Gainesville, FL** May 2019 – May 2024  
B.S. in Computer and Information Science Engineering

## SKILLS

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<b>Software</b>	Python, C, C++, Embedded C, TypeScript, SQL, Git, CI/CD, AWS, Docker
<b>Robotics</b>	ROS/ROS 2, SLAM, Motion Planning, Kinematics, State Estimation
<b>Perception &amp; ML</b>	Computer Vision, Deep Learning, Reinforcement Learning, On-Device Inference
<b>Embedded Systems</b>	Microcontroller Architecture, Peripherals (PWM, ADC, I2C, SPI, UART), PID Control, Brushed DC Motors, Sensor/Actuator Interfacing, Real-Time Systems, PCB Design
<b>Systems &amp; Low-Level</b>	Linux Kernel Concepts, Drivers, Interrupts, Concurrency, Memory Layout, GCC Toolchain, Debugging (JTAG, Logic Analyzer, QEMU), Custom Linking

## WORK EXPERIENCE

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**Software Engineer** Infotech — Gainesville, FL Sep 2022 – Aug 2025

- Built automated PDF pipelines using Python, TypeScript, and AWS Lambda to retrieve and classify plan data.
- Mentored three engineers to extend the system for DOT clients using token-based authentication and S3 APIs.
- Conducted code reviews and optimized Lambda concurrency and database queries for improved scalability.

## PROJECTS

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**WatchDog — Autonomous Quadruped Inspection** Jan 2026 – Mar 2026

- Built autonomous inspection system on Unitree Go2 with Nav2 and custom velocity command bridge.
- Configured RTAB-Map visual + ICP registration for SLAM using Unitree L2 LiDAR and RealSense D435i.
- Resolved multi-machine ROS 2 issues including DDS discovery, TF timestamp sync, and QoS tuning.
- Implemented frontier-based exploration for autonomous mapping with 2D LaserScan obstacle avoidance.
- Integrated SAM 3 on external GPU, projecting segmentation masks to 3D for object change detection.

**EKF SLAM from Scratch — TurtleBot3 Localization & Mapping** Jan 2026 – Mar 2026

- Engineered Extended Kalman Filter SLAM from scratch in C++ for TurtleBot3 using ROS 2 and Armadillo.
- Constructed EKF predict/correct cycle with Jacobian linearization for joint robot-landmark state estimation.
- Created Mahalanobis distance-based data association to match laser observations to known map landmarks.
- Architected landmark detection with LiDAR clustering, SVD circle fitting, and inscribed angle classification.

**PenPal — Vision-Guided Conversational Writing Robot** Dec 2025

- Co-developed a ROS 2 system for a 7-DoF Franka arm to read and write on a moving whiteboard with 3 peers.
- Led perception using RealSense RGB-D, AprilTags, and OpenCV to estimate board pose and publish TF.
- Integrated a Gemini vision-language model for OCR + response generation via a ROS 2 service interface.
- Supported Cartesian writing execution by aligning the pen TCP to the board frame for consistent strokes.
- Generated font-based toolpaths by parsing OTF files to produce multi-language writing trajectories in 3D space.

**Aggro-Bots — Biometric-Responsive Swarm Robotics Game** Nov 2025 – Dec 2025

- Developed an embedded C control stack on Micro:bit (nRF52) with joystick input and heartbeat telemetry.
- Implemented a lightweight wireless protocol with serialized messages and role-based swarm coordination.
- Wrote low-level drivers for SAADC, GPIO, and I<sup>2</sup>C motor control to drive chassis at deterministic rates.
- Built closed-loop pursuit and avoidance behaviors using distributed heuristics and filtered velocity commands.