

# Advaith Balaji

(734) 881-4420 | [advaithb@umich.edu](mailto:advaithb@umich.edu) | [linkedin.com/in/advaithb](https://www.linkedin.com/in/advaithb) | [github.com/adi-balaji](https://github.com/adi-balaji) | [adi-balaji.github.io/portfolio](https://adi-balaji.github.io/portfolio)

---

## EDUCATION

- University of Michigan College of Engineering, Ann Arbor, MI (2022-Present)  
**Major:** Robotics **GPA:** 3.87  
**Expected Graduation:** Dec 2025  
**Coursework:** Computational Linear Algebra, Intro Human-Robot Systems, Data Structures and Algorithms, Robot SLAM and Navigation, Deep Learning for Robot Perception, Intro to Circuits, Robotic Manipulation, Autonomous Drones, Robot Operating Systems, Dynamics and Vibrations, Deep Learning for Planning and Control
- 

## SKILLS

- Programming Languages:** C++, C, Python, Julia, MATLAB, Scala, Java
  - Technical Skills:** Git, PyTorch, Tensorflow, ROS, SLAM, Path Planning, NLP, PCL, SSH, OpenCV2, Apache Flink, AWS S3, Docker, MongoDB, Arduino, RPi, Jetson, Linux, Differential Equations, Linear Algebra, Calculus, Data Analysis
- 

## WORK EXPERIENCES

### Johnson & Johnson - Robotics and Controls Intern

May 2025 - Present

- Developing and testing **control algorithms** for next-generation **surgical robots** to enable safe robot-assisted procedures.
- Designed and implemented a full **impedance-mode control architecture** in C++, including ROS message definitions, real-time control loop development, user interface integration, and control parameter tuning to meet surgical performance requirements. Allows for manual repositioning of robots arms while in use.
- Prototyped and analyzed several control schemes ranging from **PID** to **second-order dynamic systems** to improve robot responsiveness, compliance, and stability.
- Participated in code reviews, design reviews, and contributed to clean, modular software through functional and object-oriented programming best practices, supporting integration with broader surgical systems.

### UM Robotics - Researcher

Aug 2023 - Present

- Led **three** major research projects in reasoning for robots, mobile manipulation in outdoor environments, and human-robot interactions across various different robot platforms.
- Created **OVAL-Grasp**, a task-oriented grasping framework that leverages **LLMs and VLMs** to enable robots to grasp objects at semantically correct locations. Achieved **78.3% real-world grasp success** and **95% part segmentation accuracy** in both uncluttered and cluttered environments using the **Fetch mobile manipulator**.
- Developed an **autonomous object search system** for mobile manipulation in agricultural environments, combining **LLM-guided semantic navigation** with visual perception. Deployed the system on the Boston Dynamics **Spot robot**, achieving state-of-the-art performance with an **80% object retrieval success rate**.
- Developed an **outdoor grasping system** for Spot combining Grasp Pose Detection and RANSAC grass filtering to ensure dependable grasps while partially **occluded by grass**.
- Designed a **virtual pedestrian safety robot** in Unity and conducted a VR-based HRI study with 21 participants to evaluate trust and comfort during crosswalk navigation.

### HERE Technologies - Traffic Prediction Intern

May 2023 - August 2023

- Deployed a **Flink pipeline** in **Scala** to efficiently extract traffic prediction data from **AWS S3** and efficiently evaluate predictor performance, resulting in **20 predictions evaluated per second**.
  - Developed a performance calculation algorithm using extracted road speed prediction data and published the performance metrics of each prediction to **MongoDB**.
- 

## ACADEMIC EXPERIENCES

### UM Robotics - Deep Learning for Robot Perception

Jan 2024 - Aug 2024

- Constructed a deep learning based vision model for **grape localization** using a grape bunch and stem segmentation model for grasp pose estimation to support robotic harvesting.
- Implemented a RANSAC cylinder fitting algorithm for **pose estimation** of the grape bunches
- Tested grape localization pipeline on the Fetch mobile manipulation platform resulting in a grasp **success rate of 87%**

### UM Robotics - Unmanned Aerial Systems

Aug 2024 - Present

- Constructed a quadrotor drone from scratch and implemented a **4DOF PID drone controller** for highly precise and stable teleoperated control of roll, pitch, yaw and altitude..
- Implemented **3D position control** using OptiTrack for accurate autonomous waypoint navigation and **visual object tracking** from above to allow the drone to follow objects.