

ABHINAV BHAMIDIPATI

✉ abhinav7@terpmail.umd.edu 📞 +1 (240) 791-8317 🏠 [Portfolio](#) 🌐 [LinkedIn](#) 🐙 [GitHub](#)

Domain Skills: Robotics, Reinforcement Learning, 3D Perception, Autonomous Navigation, Computer Vision

EDUCATION

University of Maryland, College Park, MD

Aug 2023 – May 2025

Master of Engineering, Robotics

GPA 3.84/4

- Cognitive Robotics, Perception, Machine Learning, Path Planning, Robot Programming, Robot Learning, Controls, Modelling

University of Mumbai, Atharva College of Engineering, Mumbai, India

May 2023

Bachelor of Engineering, Electronics and Telecommunication Engineering

GPA 8.97/10

- Embedded Systems, Data Structures and Algorithms, Digital System Design, Image Processing, FPGA, Machine Vision, AR and VR, Linux

SKILLS

Languages: Python, C++, MATLAB, Bash/Shell Scripting **Control Theory:** Model Predictive Control, PID, LQR, LQG, Kalman Filter

Libraries: ROS 1/2, OpenCV, PCL, PyTorch, TensorFlow, ONNX, scikit-learn, FastAPI, REST APIs, WebSocket, TCP/UDP, AWS

Tools & Platforms: Gazebo, Isaac Sim, Unity, Mujoco, SolidWorks, CAD, Git, GitLab CI, CMake, Docker, NVIDIA Jetson, Intel NUC

CV/ML: ResNet, YOLOv8, Transformers, CLIP, LSTM, NeRFs, Diffusion Models, TensorRT, Quantization, Few-shot Learning

EXPERIENCE

Robotics Software Engineer – RL & Perception | Inception Robotics, College Park

Sept 2024 – Present

- Terrain-Adaptive UGV Autonomy & Perception Stack
 - Designed and deployed **full-stack autonomy** pipelines for **Off-road UGV** on embedded Linux platforms (Intel NUC) using C++, Python, and ROS2; integrated **multi-sensor fusion** (LiDAR **Point Cloud + visual odometry**) with 3D ICP scan-matching and ORB tracking, improving **pose estimation** accuracy and system robustness in simulation (Isaac Sim, Unity) and field tests
 - Developed reinforcement learning-based terrain-adaptive planning models, achieving **90%** navigation success in dynamic environments; automated training & deployment via **Docker-based CI/CD** (GitLab) & **AWS**-hosted simulation pipelines.
 - Integrated **DWA**-based local planner with LLM-driven natural language interface to enable goal-directed behavior and reactive **obstacle avoidance**; validated through **SITL** pipelines with multi-run regression tests for deployment readiness.
 - Adapted a **CLIP**-(Transformer-based) multi-modal vision-language model for object damage assessment via **multi-angle semantic alignment**; fine-tuned embeddings and evaluated using retrieval accuracy and anomaly score thresholds.
- MedSort – Vision Pipeline for Medication Sorting
 - Developed a **real-time computer vision** system for automated medication sorting using a **3-axis** vacuum end-effector; deployed **OCR** to extract lot numbers, expiry dates, and medicine labels for structured data creation.
 - Tuned preprocessing and inference pipelines and **optimized CUDA** inference kernels for **Jetson deployment**, enabling low-latency OCR and increasing sorting throughput in pharmacy **automation workflows**.

Computer Vision & SLAM Engineer | Onki Robotics, New York City

Jun 2024 – Aug 2024

- Calibrated stereo camera pairs using OpenCV & integrated results into a **real-time ORB-SLAM2** pipeline on **Jetson Orin** with ROS2 and TensorRT; reduced latency by **25%** for robust multi-object tracking and **pose estimation** in crowded dynamic scenes.
- Enhanced environmental perception, with **sensor-fusion** of LiDAR and stereo camera data, generating denser occupancy maps & improving robustness to occlusions & cluttered scenes for consistent person-following behavior.
- Developed robust identity-aware **multi-object tracking** models, incorporating facial recognition & CV-based **feature extraction** with state-predictive **Kalman filtering** to enable persistent human-following behavior across occlusions and scene changes

Research Assistant | University of Maryland, College Park

Jan 2024 – May 2024

- Integrated multi-beam sonar and depth sensors into the **UUV perception stack** using probabilistic fusion for enhanced 3D situational awareness, obstacle prediction, and terrain reconstruction in **GPS-denied** domains.
- Designed and tuned **PID**-based control algorithms with real-time velocity feedback and dynamic reconfiguration, enabling precise **trajectory tracking**, stable station-keeping, and robust maneuverability under varying underwater current conditions.
- Designed and conducted underwater tank experiments to evaluate controller robustness against simulated results.

PROJECTS

Real-time Pallet Detection and Ground Segmentation | Python, Pytorch, Docker

[Github](#)

- Built a vision pipeline integrating YOLOv8 & UNet for **real-time pallet detection & ground segmentation**, preparing datasets via SAM+GroundingDINO & Roboflow, & deployed the system as a Dockerized node for live RGB-D camera inference.

Isaac Lab UGV Manipulation Simulator and Synthetic Data Generation | Isaac Lab, Isaac Sim, PyTorch

- Built a high-fidelity **Isaac Lab** simulation for UGV-arm manipulation with articulated **PhysX** dynamics, sensor modeling, and domain randomization; integrated **PyTorch RL** and **ROS2** pipelines for large-scale training and synthetic data generation.

Obstacle-Aware Path Planning with Model-Based Decision Making | Python

- Constructed a cutting-edge autonomous parking algorithm that merges an imaginative model with an **enhanced RRT** and a **path smoothing module**, optimizing the execution of safe, efficient, and collision-free parking maneuvers.

Multi-Robot UGV Perception & Surveillance System with Behavior Trees | Python, ROS2, Gazebo

[Github](#)

- Developed a **multi-UGV** coordination system using ROS2 (**Cyclone DDS** middleware) & **Behavior Trees** for real-time patrol & anomaly detection. Implemented task trees with **multi-threaded execution** for obstacle-aware navigation & detection.

Waypoint Navigation System for Mobile Robots | C++, ROS2, Gazebo, RVIZ

[Github](#)

- Implemented a ROS2 **Nav2**-based autonomous waypoint navigation system for TurtleBot using logical camera inputs, enabling sequential part detection and route execution; visualized navigation stack and debugged tf frames in RViz and Gazebo.

PUBLICATION

[1] Abhinav B., Tomer A., Yashveer J., William Wang Y., Sri Kiran K., Xiaomin L., Yantian Z. "AAM-SEALS: Developing Aerial-Aquatic Manipulators in SEa, Air, and Lands Simulator" *Submitted to NeurIPS 2025*. [Paper](#) [Website](#)