

Venkata Harshavardhan Bontalakoti

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Education

Johns Hopkins University, U.S.A	Masters in Robotics Engineering	Aug'25 - Present
Indian Institute of Technology, Hyderabad, India	B.Tech in Mechanical Engineering(Exchange)	Aug'24 - May'25
National Institute of Technology, Silchar, India	B.Tech in Mechanical Engineering	May'21 - May'24

Technical Skills

Robotics & Simulation: ROS 1/2, Gazebo, MuJoCo, Unity, SLAM, Nav2, MoveIt, Sensor Fusion, Trajectory Planning

Programming: Python, C++, C, MATLAB, C#

AI & Computer Vision: PyTorch, TensorFlow, OpenCV, Pose Estimation, Object Detection, Reinforcement Learning

Work Experience

Indian Institute of Technology Madras, India (Robotics Research Intern)	May'24 - Jul'24
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- Won the prestigious **Summer Fellowship (SFP-2024)** at the Department of Aerospace Engineering, standing out among **1000 plus** applicants for excellence in robotics research.
- Built complete maritime simulation platform using **Unity** and **ROS2** with realistic ocean and wind physics for autonomous vehicle research. Open-sourced on [GitHub](https://github.com/Harshavardhan) with active community adoption.
- Reduced marine drone deployment iteration time by more than **10%** by enabling algorithm testing without physical hardware prototyping.

Defense Research and Development Organization, India (Robotics Engineer Intern)	May'23 - Jul'23
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- Designed **sensor-mounting systems** for autonomous aerial, ground, and naval platforms, optimizing for vibration isolation and measurement accuracy in field conditions.
- Developed **hardware-software integration pipeline** for multi-sensor payloads on mobile defense platforms, enabling rapid payload deployment.
- Prototyped an autonomous coastal surveillance system using distributed sensor-equipped ocean buoys, reducing projected operational costs by more than **15%**.

Projects

Vision-Based Quadruped Robot with Real-Time Sensor Fusion	GitHub
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ROS2, Python, MoveNet, C, MuJoCo, Sensor Fusion, Object Detection, Pose Estimation

- Built **12-DOF open-source quadruped robot** with 2-DOF gripper and real-time **pose estimation** (MoveNet) and IMU-camera sensor fusion for autonomous navigation and multi-agent research combining ground and aerial platforms.

ClipSort: DeepSort Implementation with CLIP features	GitHub
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Python, OpenCV, Multi-Object Tracking, PyTorch, Object Detection

- Developed **Multi-Object Tracking** framework with DeepSort and YOLOv11, employing Hungarian Algorithm and Kalman filter for enhanced data association. Implemented a novel feature extraction pipeline using Contrastive Language-Image Pretraining(**CLIP**) model.

Multimodal Embedded Perception Assistant using On-Device LLM	GitHub
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Python, OpenCV, Quantized LLM, Audio-Visual Perception, C, Edge Computing

- Built lightweight on-device **perception pipeline** integrating vision, speech, and ambient sensing for real-time human-aware autonomy; deployed emotion analysis, drowsiness detection, and presence modules without cloud dependence, improving the inference time by more than **5%**.

Human-Guided SLAM using TurtleBot3 and Pose Estimation	GitHub
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ROS2, Gazebo, TensorFlow Lite, PID Control, SLAM, Computer Vision, Pose Estimation

- Integrated human pose estimation (**TensorFlow Lite**) with TurtleBot3 for autonomous SLAM guided by real-time human motion; implemented PD-controlled **visual servoing** pipeline in ROS2, achieving **25%** faster mapping than manual approaches.

Achievements

- YCP Hacks 2025 (MLH) (2nd Place Overall and Hardware Track Winner):** Built PerceptEye, a real-time accessibility system deployed on RaspberryPi combining face recognition with TTS, sign language detection, and object detection to enable independent navigation for blind and deaf users.
- Academic Exchange Scholar, Indian Institute of Technology Hyderabad:** Selected for a prestigious academic exchange awarded to the **top 10%** students post-junior year based on **academic excellence and research interest**.
- Smart India Hackathon 2024 Winner (Hardware Edition):** Engineered a **drone-based automation** system addressing a real-world smart automation challenge for social security and monitoring. Emerged as the winners out of more than a 100 teams

Publications

- Improvement in Multi-resident Activity Recognition System in a Smart Home Using Activity Clustering(IFIP IoT 2023), Topics: Machine Learning, Deep Learning, Multi-Modal Learning** [\[Paper\]](https://arxiv.org/abs/2309.13420)