HAMSAAVARTHAN RAVICHANDAR

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EDUCATION

University of Maryland *College Park, MD*
Master of Engineering (M.Engg.), Robotics *May 2025*

SKILLS (Robotics Engineer)

Robotics (Expertise): Autonomous Systems, SLAM, Perception, Modelling and Control Theory, Task and Path Planning.
Programming: C++ (Proficient), Python (Expert), C, MATLAB.
Technical tools: ROS2, Gazebo, RViz, Git, Docker, SolidWorks (AutoCAD), Linux/UNIX, ArduPilot, Fanuc.

TECHNICAL EXPERIENCE *College Park, Maryland*

Agile Robotics for Industrial Automation Competition (ARIAC) | LINK *May 2025*

- Accomplished high-precision part detection with a 95% accuracy in parts detection by implementing feature-based descriptor matching and refining HSV-based color segmentation for object recognition using template matching.
- Achieved agile robotic task execution, minimized collision occurrences by implementing adaptive motion planning strategies and implemented synchronized 7+ multi-robot coordination in the dynamic ARIAC environment.

Modelling Mobile 7 Degrees of Freedom (DoF) Agriculture Robot | LINK *Dec 2024*

- Assisted in the design and construction of a mobile truck and harvester-arm model with 7 DoF using SolidWorks (CAD), compatible to simulate using ROS2 and Gazebo, capable of automated traversal and fruit harvesting using vacuum gripper.
- Executed accurate mathematical modelling to the robotic arm's kinetics and dynamics, acquiring 100% virtually simulable model by analyzing Denavit-Hartenberg parameters, enhancing dynamic simulation performance.

Point-Cloud based 3D Object Detection Using Voxel-Net with ROI Pooling | LINK *Dec 2024*

- Established accurate LiDAR-based 3D Object detection using VoxelNet DNN architecture, achieving over 89.60% AP, by stacking feature-encoding layers, 3D CNN middle layers, and RPN of regional proposal for integration of robotic systems.
- Evaluated 1000+ images for 15 epochs resulting in an Intersection over Union (IoU) above 70%, indicating accurate detections.
- Developed and integrated Region of Interest (RoI) pooling layer, improving IoU by 15%, with over 15k+ KITTI 3D samples.

BERLIN - The Autonomous Robot | LINK *May 2024*

- Engineered a fully autonomous robot achieving Level 4 autonomy, leveraging advanced modeling and controls, perception systems, localization, SLAM algorithms, planning, and decision-making processes.
- Developed real-time control systems on Raspberry Pi via SSH communication to manage encoders, actuators, cameras, servo motors, DC motors, and IMU sensors. Achieved sensor fusion using Server-Client protocol with near ~100% autonomy.
- Optimized motion control accuracy (98%) using PID closed-loop feedback systems, applying industrial troubleshooting methods for hardware and software integration challenges.

Parking Assistance Using Homography | LINK *May 2024*

- Built a computer vision pipeline using Homography to create a 360 deg top view of a real-world vehicle with 4 cameras (1 front, 1 rear & 2 sides) mounted on it.
- Performed camera calibration, image processing and distortion correction, projective transform, feature detection and image stitching using OpenCV in Python for 1140+ image data to obtain instantaneous top-view video footage.

WORK EXPERIENCE

Defense Research and Development Organization (DRDO) *Hyderabad, India*
Design of Power Switching Circuits, Intern *May 2022 - July 2022*

- Investigated power switching circuit to conscientiously monitor and automate the pyro-bolt to accurately ignite from an autonomous launcher and manoeuvre over a range of 350-500Kms, reducing human intervention by 100% after launch.
- Assisted on Inertial Navigation System (INS) and On-Board Computer (OBC) for localization and controls, reaching over 99.98% accuracy by minimizing the Circular Error Probability (CEP) to less than 10 meters.

CERTIFICATIONS

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