Sounderya Varagur Venugopal

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About Me

I'm a robotics enthusiast currently pursuing my **Master's in Robotics at the University of Maryland**. Over the past **four years**, I've had the exciting opportunity to work on a variety of robotic systems, from **collaborative robots to medical devices** and **autonomous robots**. My passion lies in developing smart, user-friendly **robots that can work safely alongside humans**. I've honed my skills in improving **robot vision, creating intuitive interfaces**, and ensuring robots operate safely when interacting with people. I love diving into cutting-edge tech like **ROS, Gazebo, Control, A.I.**, and I'm always eager to learn more. I have participated with a team in exciting challenges like the **European Rover Challenge(ERC)** and **International Rover Challenge(IRC)**! I am always looking for more opportunities where I can learn and contribute.

Technical Skills

Languages :	C, C++, Python
Tools/Frameworks	ROS, OOPS, Qt, Docker, Git, CMake, GTest, CI/CD, Model Predictive Control, RL, Embedded System, Control Systems, Gazebo, OpenCV, PyTorch, Roboflow, MoveIt, MuJoCo

Education

University of Maryland - College Park	MD, USA
M.Eng. Robotics(GPA-4.0)	*2024 – 2026*
Indian Institute of Information Technology, Design and Manufacturing, Kancheepuram	Chennai, TN, India
B.Tech in Electronics and Communication Engineering (CGPA-9.07)	*2019 – 2023*

Work Experience

Graduate Research Assistant — Feb 2025 – Present
University of Maryland - College Park — *Onsite - College Park, MD*

- Developed a **bike lane detection system** for the **self-driving escooter project**, **ReZoom** under the guidance of Dr. Derek A. Paley by utilizing a **YOLOv8 model** trained on a **custom dataset** and optimized the model by converting it from PyTorch to TensorRT, **doubling** the real-time inference FPS for image stream and point cloud outputs.
- Researching the effectiveness of **Gaussian 3D scene representations** over image-based inputs for policy learning (imitation and reinforcement learning) on a UR5 robotic arm
- Training a π_0 policy on end-effector poses from demonstrations to enable a UR5 robotic arm to successfully execute complex manipulation tasks (e.g., pouring and hooking).

Graduate Engineer Trainee - Mobile Robotics Division — September 2023 – June 2024
Addverb Technologies Limited — *Onsite - Noida, U.P., India*

- Enhanced the **vision pipeline** of the in-house collaborative robotic arm with the help of **YOLOv8** to **recognize gestures** for better collaboration.
- Debugged and improved the main stack of VPL using **gtests(C++)** by adding **mutex locks** to resolve **thread synchronization** issue at project sites in 2 months
- Enhanced the UI for the cobot by creating a custom **VPL(Visual Programming Language)** interface and extended the communication capabilities by employing **websockets**.

Robotic Software Intern - Mobile Robotics Division — May 2022 – September 2022
Addverb Technologies Limited — *Onsite - Noida, U.P., India*

- **Interfaced multiple grippers**(mechanical and electromagnetic) with the **collaborative robotic arm**(Syncro by Addverb Technologies) for different application scenarios and **Integrated safety flags** based on the **data from the drives** for safe collaborative interaction.
- Built a **simulation** for testing the in house **path planners of robotic arm** using **ROS** Controllers and **Gazebo** to validate the performance of the path generated.

Activites

Medical Robotics Software Developer — October 2022 – May 2023
Medical Imaging, Devices, and Soft Robotics Lab, IIITDM Kancheepuram — *Onsite - Chennai, TN, India*

- **Simulated and 3D printed** a prototype of a continuum robot for applications in colonoscopy.
- Interfaced the robot with **Simulation Open Framework Architecture(SOFA)** to perform Hardware in the Loop Testing.

Robotic Software Developer — July 2020 – January 2022
Mars Research Station, IIITDM Kancheepuram — *Onsite - Chennai, TN, India*

- Worked with an interdisciplinary team for the **design and development** of a **Mars Rover** and **simulated** a panda arm using Gazebo and ROS and **interfaced controllers** for teleoperation by leveraging MoveIt.
- Built a prototype of a **four wheeled mobile robot** from scratch and by employing **Arduino** and **Raspberry Pi** to **teleoperate** it.

Projects

Autonomous Bin-Picking Robot — Source Code

- Implemented an autonomous bin-picking solution by leveraging ROS2, MoveIt2 and OpenCV
- The system comprises of a UR5 robotic arm and a Robotiq gripper to perform pick and place

Footstep following for Cassie Robot — Source code

- Developed a bipedal walking controller to achieve footstep following for Cassie robot in a simulated(MuJoCo) environment.

Visual Servoing with MPC for Nonholonomic Robot Steering — Source code

- Developed a perception-driven MPC framework to implement a controller for a nonholonomic robot