Vaishanth Ramaraj

+1 (240) 413 1281 - Portfolio - vrmrj@umd.edu - linkedin.com/in/vaishanth-ramaraj - github.com/vaishanth-rmrj

EDUCATION

University of Maryland — **College Park, MD, USA**
Master's in Robotics Engineering — *Aug 2021 - May 2023*
Kongu Engineering College — **Chennai, TN, India**
Bachelor's in Mechatronics Engineering — *May 2016 - May 2020*

TECHNICAL SKILLS

Programming Languages: Python, C++
Libraries and Tools: ROS, PyTorch, Sklearn, Pandas, Numpy, OpenCV, Git, Docker, Tensorflow, SolidWorks, Linux
ML Architectures: KNN, SVM, Softmax, MLP, CNN, YOLO, Transformers(BERT, LSTM), RAFT

WORK EXPERIENCE

Research Assistant
Children's National Research Center, DC, USA — *Jun 2022 - Apr 2023*

- Led a team to develop a modular autonomous navigation system for a powered wheelchair.
- Designed and developed end-to-end pipelines for mapping and localization using ROS, PyTorch, RTabmap and OpenCV with real-time performance of 35 FPS.
- Tested the software system in the Gazebo simulation with a dense environment to validate the system's integrity.
- Deployed the system using ARM-based docker container on Jetson Nano with Intel RealSense stereo camera and ESP32, resulting in 52% cost savings and less than 10W power consumption.
- Developed a real-time object detection system for smart wheelchair using YOLOv5 and Point Cloud algorithms for obstacle avoidance.
- A lightweight KIVY framework GUI for touch navigation was implemented, for a user-friendly and intuitive control interface.

Software Developer
Bariflo Labs, TN, India — *Jul 2020 - Jun 2021*

- Worked with a team of engineers to build a robust software system to remotely control Water Aeration device.
- Integrated algorithms for environmental data capture using sensors to collect water quality data every 10 seconds and perform regression algorithm analysis on the cloud with a latency of 160ms.
- Deployed the system on Raspberry Pi with remote operation implementation using onboard WiFi.

Intern - Robotics Developer
National Institute of Ocean Technology, Chennai, India — *Dec 2019 - April 2020*

- Led a team to design and fabricate a soft-gripper robotic manipulator prototype using flexible material 3D prints.
- Designed mechanical linkages for underwater manipulation using SolidWorks. Utilized micro-controllers to create a compact gripper mechanism with a max payload of 500g.

PROJECTS

- **Monocular depth estimation and Path planning in partially known environments**, implemented MiDaS using PyTorch for mapping and D* lite path planner using OpenCV. Achieved 30FPS in simulation. Link
- **Simultaneous Segmentation and Depth Estimation**, an innovative implementation to achieve precise monocular depth analysis for segmented objects and deployed on the cloud using Gradio GUI. Try it!
- **Water Level Detection** for ship hulls,using python RAFT (PyTorch) algorithm and OpenCV, achieving accurate estimates of water level up to 10 meters at 30 FPS, outperforming conventional optical flow methods. GitHub
- **Automation solution for industrial warehouse** using C++, ROS melodic and Gazebo simulation as part of ARIAC challenge to perform pick, place, and transport operations with an optimized control system. GitHub
- **SLAM navigation system** using ROS for a real-time search and rescue on Turtlebot3 in Gazebo simulation, using C++ to locate missing persons represented by Aruco markers and map the environment for improved search efficiency. GitHub

PUBLICATIONS

- Ramaraj, V., Paralikar, A., Lee, E. et al. Development of a Modular Real-time Shared-control System for a Smart Wheelchair. J Sign Process Syst (2023). Link
- Krishnamurthy, K., Meenakshipriya, B., Shree, K.I., Vaishanth, R., Sandeep, V. and Vijay, V.P., "Design and Development of Spherical Robot Using Pendulum Mechanism", 2020. Link