Vaidehi Som

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Education

University of Pennsylvania, U.S.A Aug'22 – May'24
Master of Science in Robotics Engineering (Specializing in Artificial Intelligence and Computer Vision)

Indian Institute of Technology (IIT) Jammu, India Aug'17 – Jun'21
Bachelors in Mechanical Engineering

Technical Skills and Coursework

Languages: C++, Pyton
Frameworks: PyTorch, Keras, ROS, Gazebo
Developer Tools: Linux, CMake, Git,VS Code
Libraries: NumPy, Matplotlib, OpenCV, Open3D, Sklearn, Eigen

Graduate Coursework: Deep Learning, Machine Perception, Machine Learning, Control and Optimization
Online: *C++ Nanodegree from Udacity*, *Robotics Software Engineer Nanodegree from Udacity* , *Controls for Mobile Robotics*, Pursuing *Photogrammetry I II* and *Mobile Sensing and Robotics*- Cyrill Stachniss

Work Experience

Research Assistant- Generalizing over unseen tasks | *Reinforcement Learning, Perception* Oct'22 – Present
Dr. Dinesh Jayaraman, PAL Group(GRASP Lab), University of Pennsylvania
- **Robot learning** based on minimal **3D visual data** for unseen robot tasks for homes
- Collecting data- joint positions, camera feed- for policy training using ROS communication with Kinova 7dof robotic arm
- Train and deploy a policy trained using **goal based offline RL**

Mobile Robotics Software Engineer | *C++, ROS, Controller, Automated Guided Vehicle* Aug'21 – Jun'22
Addverb Technologies, Noida, India
- Worked with automated mobile robot using **LIDAR, IMU**, and QR codes for navigation
- Implemented **motion (Pure pursuit, Lyapunov) controller** packages and **lower level driver** for **navigation** stack
- Improved odometry with calibration, controllers, and **IMU** infused data using **Kalman filter**

Research Intern- Cycle GANs for biometric conversion | *Deep Learning, Computer Vision* May'20 – July'20
Dr. Harkeerat Kaur, IIT Jammu
- Conceptualized from start to end- AI-driven biometric privacy using modified **cycle GANs** *Report*
- Implemented **encoders-decoders**, compared different matching algorithms, implemented **image augmentation** techniques, heatmap, used **latent vectors**, and prepared datasets
- In collaboration with the National Institute of Informatics, Japan and the Government of India

Research Intern- Behavioral cloning for SDCs | *Deep End-to-End learning, Computer Vision* May'19 – July'19
Dr. Virendra Singh, IIT Bombay Certificate/Report
- Developed deep learning model for self driving car based on **behavioral cloning** and for object detection using CNN
- Compared usage of end to end learning for **object detection** vs **path following**. Performed data augmentation

Deep Leaning and Computer Vision Projects

Gesture Recognition controlled Robotic Arm | *Deep Learning, Computer Vision, Python, ROS, Gazebo* Jun'20 – Dec'20
- Implemented **CNN, non-max suppression, cross-entropy** loss, and detected hand landmarks *Video/Report*
- Detected key-points using Intel-RealSense Camera, were used to define various gestures
- **Simulated** robotic arm using ROS and Gazebo to perform pick up tasks. Enhanced arm movements using gesture inputs

Mobile Robot: Simulation and SLAM | *ROS Navigation stack, C++, AMCL, EKF, Gazebo* May'21 - Jun'21
- **Simulated** ball chasing robot, detection via colors. Designed URDF model and arena *Video*
- Implemented localization using **AMCL, gmapping** for 2D and RTABMap for **3D mapping**
- Deployed SLAM and Navigation using **Dijkstra** algorithm and simulated pick and place operation

Dynamic obstacle avoidance for self driving car | *Python, CARLA, Deep Learning, Controller* Nov'22 – Present
- Implementing **LSTM** and **conformal prediction** for pedestrians and cars dynamic **trajectory prediction**
- Using the prediction, planning car's **optimal path** using MPC

Multi View Geometry Dec'19
- Compute camera pose and **3D point cloud** from images using **Structure from Motion, Bundle adjustment**
- Camera localization using **PnP, point triangulation, non linear refinement**

Others
- Implemented drivable space estimation in 3D, lane estimation from car using the output of semantic segmentation NN
- Implement **ES-EKF** to localize self driving car in simulation

Honors

Prof. Sudhir K. Leadership Award | *Leadership award* Apr'21
- 1 of 2 students from IIT Jmu selected for initiatives and contributions made in leadership towards student activity *Link*