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, Docker
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 Code
- **Robot learning** based on minimal **3D visual data** for unseen robot tasks for homes
- Breaking long horizon tasks into smaller goals for applying goal learning policies
- Implementing, training and deploying **goal based offline RL** for sub-tasks segmented by VIP using GPU computing

Mobile Robotics Software Engineer | *C++, ROS, Startup, Automated Guided Vehicle, Docker* Aug'21 – Jun'22
Addverb Technologies, Noida, India
- Deployed automated mobile robot which uses **LIDAR, IMU**, and QR codes for navigation
- Implemented safety relevant **motion (Pure pursuit, Lyapunov) controller** packages for **navigation** stack
- Improved odometry with calibration, controllers, and **IMU** infused data using **Kalman filter**
- Reduced testing time by 50% by automating odometry calibration and sensor testing

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

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 Learning and Computer Vision Projects

Trajectory prediction and Dynamic Obstacle avoidance for SDC | *PINN, LSTM, Deep Learning* Nov'22 – Present
- Implemented **Social LSTM**, **OLSTM** and **GRU** for pedestrians trajectory prediction *Report/Code*
- Implemented **Physics informed Neural Nets** and **MPC** for **motion planning**
- Used **Lifelong A*** and pedestrian's trajectory as dynamic obstacles for planning obstacles

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 from **video input** 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 *Code/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

SLAM projects
- Implemented **2-view** and **multiple view stereo** algorithms to convert multiple 2D viewpoints into 3D reconstruction *Code*
- Recovering 3D transformation between two views using **RANSAC**, Pose recovery and 3D reconstruction
- Augmented Reality with AprilTags using both **PnP and P3P algorithm** *Code*
- Implement **ES-EKF** to localize self driving car in simulation

Honors

Prof. Sudhir K. Leadership Award | *Leadership award* Apr'21
- Awarded for exceptional initiatives taken, leadership shown and contributions made towards student activity *Link*