SAI ANEESH SURYADEVARA

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Education

University of California San Diego **GPA: 3.9/4.0**
Master of Science in ECE, Intelligent Systems, Robotics, and Control *2023 - 2025*
- Key Coursework: Advanced Computer Vision, ML for Robotics, Sensing & Estimation in Robotics

Indian Institute of Technology Bombay **GPA: 9.02/10.0**
B.Tech (with Honors) in Mechanical Engg. and Minor Degree in AI and Data Science *2019 - 2023*
- Key Coursework: Machine Learning, DL for Computer Vision, Advanced Deep Learning, Robotics

Internships & Research Experience

Autonomous Mobile Manipulation using LLMs and NeRF *UC San Diego*
Graduate Student Researcher, Guide: Prof. Xiaolong Wang *Sep 2023 - Present*
- Developed a real-time scene representation via feature distillation from 2D **Vision Foundation Models** into 3D
- Employing LLMs for high-level path planning and a Deep RL policy for manipulation of queried objects

Continuum Robot Control using Reinforcement Learning *IIT Bombay*
*B.Tech Thesis, Guide: Prof. Abhishek Gupta, **[Project Report]*** *Aug 2022 - May 2023*
- Built a custom RL simulator in Python using **OpenAI Gym** for trajectory control of continuum robots
- Designed a curriculum learning framework for complex trajectory tracking while minimizing deformation energy
- Implemented **Soft-Actor Critic** achieving a 68% reduction in MAE with velocity-based reward function design

Deep Reinforcement Learning for Surgical Robot Manipulation *University of Toronto*
*Mitacs Research Internship, Guide: Prof. Lueder Kahrs, **[Paper]*** *May 2022 - Jul 2022*
- Implemented **Proximal Policy Optimization (PPO)** and Generative Adversarial **Imitation Learning** (GAIL) in Unity simulator with C#, achieving human-like manipulation skills with a surgical robot using only RGB input
- Engineered a 5-lesson curriculum learning architecture, employed domain randomization techniques minimizing the **sim2real** gap, resulting in a 96.3% success with the real dVRK robot and a publication in **IEEE RA-L**

Publications

1. R. Gondokaryono, M. Haiderbhai, **S. A. Suryadevara**, and L. A. Kahrs, "Learning Nonprehensile Dynamic Manipulation: Vision-based Policy Transfer with a Surgical Robot" *IEEE RA-L, Oct. 2023*

Projects

3D Object Detection & Tracking from LiDAR | Self-Driving Car | [Code]
- Built an environment perception stack, implementing a ResNet-based Keypoint **Feature Pyramid Network** in PyTorch, for 3D Object Detection from a 3-channel BEV map, achieving 1.00 precision and 0.77 recall
- Incorporated object tracking, using an Extended Kalman Filter, fusing the data from LiDAR and camera

6D Object Pose Estimation with Point Clouds | [Code]
- Devised a pipeline based on the **PointNet** architecture for predicting the 6D pose of objects from RGBD input
- Employed 3D point cloud processing techniques like farthest point sampling, Iterative closest point (ICP) algorithms as part of the pipeline and achieved an accuracy of 80% within the error range of 5 degrees and 1 cm

Autonomous Multi-Robot Package Sorting System | [Code]
Team Lead of 10 Membered team | National Semi-Finalists | Flipkart GRiD 3.0 - Robotics Challenge
- Developed a ROS & OpenCV-based navigation system, utilizing ArUco markers for precise bot pose tracking
- Engineered a multi-robot collision-free path planner employing the Conflict-Based Search (CBS) algorithm
- Achieved a throughput of 2.5 packages/min using 3 robots in a scaled-down model of the warehouse environment

Visual Inertial and LiDAR based SLAM for Autonomous Driving | [Report]
- Designed an Extended Kalman Filter algorithm for SLAM, leveraging IMU odometry and stereo camera data to accurately estimate the car's trajectory and construct a high-fidelity 3D point cloud map of the environment
- Implemented **ICP** algorithm to refine the map & performed **Factor-Graph** based loop closure for pose estimation

Skills

Programming C#, C, C++, Python, Bash, MATLAB
Software Tools PyTorch, TensorFlow, JAX, JIT, ROS/ROS2, Gazebo, OpenCV, OpenAI Gym, Isaac Gym, Unity 3D