Sriram Priyadharshan

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Education

- **University of Michigan**, Ann Arbor, MI — Aug. 2022 - Dec 2023
  Master of Science in Robotics (specializing in perception and control) — ***GPA: 3.71/4.0***
- **SRM Institute of Science and Technology**, India — Jul. 2018 - May 2022
  Bachelor of Technology in Electronics and Communication Engineering, Instrumentation — ***GPA: 3.68/4.0***

Technical Skills

- **Languages**: Python (PyTorch, Pybullet, TensorFlow, Numpy, OpenCV), C, C++, Bash, MATLAB
- **Tools**: ROS, Gazebo, Git, Linux, AutoCAD, Scilab, Simulink, CoppeliaSim
- **Graduate Coursework** : Navigation and guidance: From perception to control, Deep learning for perception, Self-driving cars, Robot learning for planning and control, 3D robot perception

Experience

- **Biologically Inspired Robotics and Dynamical Systems Lab** — University of Michigan
  Research Assistant — May 2023 - Ongoing
  - Developed a perception pipeline using **Intel realsense L515** camera to detect, track and create a map of dandelions.
  - Utilized classical CV methods to detect and produce a semantic mask of round yellow dandelions on the high level and implemented a robust **LiDAR-based SLAM** technique optimizing feature residuals with Gauss-Newton for precise odometry and mapping on the low level.
- **Distributed Aerospace Systems and Control Laboratory** — University of Michigan
  Research Assistant — Jan 2023 - Apr 2023
  - Worked on the implementation of Self-triggered Control for Safety-Critical Systems using Control Barrier Functions
  - Devised a controller that overcomes the main limitations of traditional approaches based on periodic controllers, by introducing the notion of a safe period, which enforces a safety guarantee for implementing ZOH control.

Projects

- **Learning to grasp and re-grasp using vision and touch** — Feb 2023
  - Reproduced an end-to-end action-conditional model that learns re-grasping policies from raw visual-tactile data.
  - Predicted the outcome of a candidate grasp adjustment using a deep, multi-modal convolution neural network model and then executed a grasp by iteratively selecting the most promising actions.
  - Reduced the engineering effort required to obtain efficient grasping policies that required neither calibration of the tactile sensors nor any analytical modeling of contact forces.
- **Learning dynamics for robot planning and control using Neural ODE** — Mar 2023
  - Developed a pushing dynamic model to train a robot that was simulated using **Pybullet** to push an object to a goal pose. A list of state action trajectories was collected from the **OpenAI-GYM** environment.
  - Implemented Neural ODE's on Residual dynamics learning method to learn the system's dynamics, and studied the performance of the model on the planar pushing task using various fixed step and adaptive step solvers.
  - Modelled an **MPPI** (Model predictive path integral) algorithm controller to plan a sequence of actions for a robot arm to push the block to reach the goal configuration.
- **Mask R-CNN Backbone and Optimization** — Apr 2023
  - Improvised an in-depth implementation and assessment of the Mask R-CNN model utilizing **Pytorch**'s mask R-CNN and object detection framework for image instance segmentation
  - Trained, and tested the Mask R-CNN model on various balanced and diverse data-sets, including the COCO data-set, to assess its performance in terms of accuracy, speed, and adaptability
  - Explored various backbone architecture implementations, such as ResNet50 with a Feature Pyramid Network, MobileNetV2, VGG16, and AlexNet, in combination with different optimizers, to improve the model's performance.
- **Shakespeare GPT** — May 2023
  - Created a character level Generatively Pretrained Transformer-based language model using PyTorch to generate Shakespearean text using the tiny Shakespeare dataset
  - Utilized a decoder only transformer based multi-head self-attention, neural network architecture to generate text.

Publication

- **IoT-based interactive stroke rehabilitation monitoring system** — Nov 2021
  - Spearheaded the development of an **IoT**-based interface using a combination of **IMU** and **EEG** sensors to enhance the efficiency and safety of physiotherapy treatments for post-stroke patients.
  - Published in the Fifth International Conference on Electrical, Electronics, Communication, Computer Technologies, and Optimization Techniques (*ICEECCOT*). **Link**