Ramanan Sekar, Robotics Grad. Student

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Interests: Deep Learning, Reinforcement Learning, Robotics

Education

- **University of Pennsylvania** Philadelphia, PA
  Masters in Robotics; GPA: 4.00 *Aug 2018-May 2020 (Exp)*
  Relevant Courses: Computer Vision, Machine Perception, Machine Learning, Learning in Robotics, Integrated Intelligence with Robotics, Master's Thesis

- **Anna University** Chennai, India
  Bachelor of Electrical Engineering; GPA: 3.9 (8.89/10.0 - top 1% of Graduating Class) *Aug 2014 - May 2018*
  Relevant Courses: Advanced Control Systems, System Identification and Adaptive Control

Skills Summary

- **Languages**: Python, C++, C, MATLAB
- **Machine Learning Tools**: Tensorflow, PyTorch, Keras, Scikit-Learn
- **Tools**: Git, Docker, OpenCV, NumPy, ROS, Matplotlib, LaTeX

Experience

- **Qualcomm** Bridgewater, NJ
  Deep Learning Intern, Qualcomm R&D *May 2019 - August 2019*
  - **Denoising with Recurrent Neural Networks**:
    - Designed large, custom recurrent neural networks for optimally denoising signals at the Shannon decoding limit, by decoding signals on graphs
    - Implemented and refactored vectorized Tensorflow code and a modular,scalable codebase for high frequency design iterations. Produced a reproducible codebase by attacking non-determinism problems in GPU processing
    - Scaled performance to real-time, full scale models and achieved significant performance boosts with the developed method

- **GRASP Lab, University of Pennsylvania** Philadelphia, PA
  Research Assistant *- Prof. Kostas Daniilidis' Group* *Nov. 2018 - Present*
  - **Master's Thesis**: Working on a self-supervised reinforcement learning agent to quickly solve new tasks at test time, without having access to them in training time, with a model-based approach on high-dimensional continuous control tasks
  - **Intrinsic Curiosity with Distribution-based Rewards**: Contributed to developing a C-VAE based perception module for future prediction. Used this module to give robots intrinsic motivation to explore environments, running on PPO. Integrated 3D simulations of the Baxter robot for testing. Published work in RSS 2018

- **University of Pennsylvania** Philadelphia, PA
  Teaching Assistant *- Machine Learning* *Spring 2019, Fall 2019, Spring 2020*
  - **TA for CIS 520: Machine Learning, CIS 519: Applied Machine Learning**: Teaching Assistant for graduate level machine learning courses focusing on both theory and applications. In charge of designing homeworks, conducting office hours, grading and project feedbacks.

- **Indian Institute of Technology** Madras, India
  Robotics Research Intern *Dec 2016 - April 2018*
  - **New Kalman Filter Algorithm for efficient Localization**: Developed a novel KF algorithm using correlations between measurements, proved superiority to original EKF, and validated on a Mobile Robot using SONARs. Achieved Faster and accurate convergence
  - **New Sensor Fusion Algorithm**: Developed a new efficient sensor fusion algorithm using Maximum likelihood estimators and measurement noise correlations. Achieved an error reduction of 70% compared to existing methods

Projects

- **Qualcomm's Hackathon: Unsupervised Depth Estimation**: Integrated a real-time unsupervised monocular depth estimation system, coupled with an off-the-shelf object detection module, for vision based navigation guidance for visually impaired people, in Tensorflow
- **Multi-Robot Vision based Collaboration**: Designed an Aerial and Ground mobile robot collaboration with SIFT based aerial imagery stitching and object detection for ground robot motion planning with Probabilistic Roadmaps
- **3D Reconstructions with Structure from Motion**: Developed an SfM pipeline from two views with the 8 point RANSAC algorithm
- **Deep Fakes**: Developed a pipeline in Python for swapping faces between videos. Used DLib Library to detect faces and generate features. Used a KLT Tracker to track features in both source and target video, and used Delaunay Triangulation and Affine Transforms to swap faces with Seamless Blending