Akshay Sharma

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Work Experience

Isee, Inc.
Boston, MA

Perception Engineer
Sep'21 - Present

- Developed a high fidelity learning based **object detection** and **6dof pose estimation** system for tractor-trailer autocoupling to achieve **mm level accuracy**
- Designed and implemented the end-to-end pipeline, including data collection, **3D-reconstruction** based automated data annotation, **PyTorch** based model training and **ROS** integration
- Mentored two summer interns towards successful completion of **NeRF based 3D reconstruction** projects

Oculii Corp
Beavercreek

Software Engineer
Apr'21 - Sep'21

- Part of the application team responsible for a software package in **C++** and **C#**, for handling radar data
- Working as part of the SLAM team focused on using in-house **radar sensors for SLAM**
- Extended existing **python** SDK, used for communication with radars and parsing point cloud, to accommodate a new sensor

AART Lab, Robotics Institute, Carnegie Mellon University
Pittsburgh, PA

Research Assistant, Advisor: Prof. Katia Sycara
Oct'18 - Mar'21

- Worked on an autonomous agent with **detection, mapping, and dialog generation modules**, and integrating these modules to enable exploration of unknown environments
- Designed a **neural network** based observer policy capable of identifying confusing states for an RL agent capable of improving episode returns while reducing episode lengths [Report]

Computer Vision Lab, Indian Institute of Technology Madras
Chennai, India

Machine Learning Research Intern, Advisor: Prof. Anurag Mittal
May'18 - Jul'18

- Worked on a deep learning based Video Super Resolution model, capable of 4x super resolution, with no noticeable artifacts
- Designed a novel training method called **2-phase progressive-retrogressive training**, and a pre-processing technique called **dual motion warping** to account for various motion intensities [Paper]

Technical Skills

- **Programming Languages:** Python, C, C++, ROS, C#, MATLAB
- **Utilities**: AWS EC2, AWS MTurk, Databricks, Git
- **DL libraries:** PyTorch, Keras, TensorFlow, OpenAI Gym, NumPy, Scikit-Learn
- **OS:** GNU/Linux, Windows

Publications

Retrogressive Training towards High-Frequency Prediction for Video Super-Resolution, Winter Conference on Applications of Computer Vision (WACV) 2020. [Paper]

Education

Carnegie Mellon University
Pittsburgh, PA

M.S. in Mechanical Engineering (Specialization: Robotics & ML) (**GPA:** 3.94/4.0) *Aug'18 - May'20*

- **Courses:** Deep RL & Control | Convex Optimization | Computer Vision | Deep Learning for Engineers | AI & ML for Engineers | Statistical Techniques for Robotics | Engineering Optimization

Indian Institute of Technology Kanpur
Kanpur, India

B.Tech in Mechanical Engineering (**GPA:** 8.6/10.0) *Jul'14 - May'18*

- **Courses:** Intro to Natural Language Processing | DS and Algorithms | Introduction to Robotics | Robot Motion Planning

Projects

Analysis & Comparison of generative models for Optical Flow estimation [Report]
Dr. Amir Farimani | CMU | 2020

- Designed architectures for **GAN** and **VAE** based optical flow estimators with an **image pair conditioned generator**
- Compiled a comparative study of the above methods with the commonly used auto-encoder based optical flow estimators

Unsupervised Optical Flow Estimation with temporal smoothing
Dr. Amir Farimani | CMU | 2018

[Report]

- Designed an unsupervised version of the Flownet-C architecture for optical flow estimation
- Formulated a **temporal smoothing loss** term which penalizes large changes in consecutive optical flow maps
- Generated temporally smoother optical flow maps producing more temporally consistent warped images

Visual Question Answering [Report]
Dr. Harish Karnick | IIT Kanpur | 2018

- Designed an open-ended visual Q/A system capable of differentiating question types and choosing the correct answer
- The system used a **LSTM network** on top of the GloVe embeddings for question words, and **VGG16** features for images

Controllable Tennis Ball Launching Machine
Dr. Mohit Law | IIT Kanpur | 2017-18

- Designed and manufactured an economical and efficient tennis ball launching machine completely from scratch
- Designed a control system which allowed variable yaw and pitch, along with both backspin and topspin