

# Akshay Sharma

☎ +1-412-425-0429 | ✉ akshaysh@andrew.cmu.edu | 🏠 akshay-sharma1995.github.io | 📱 akshay-sharma1995 | 📧 akshay-sharma-201709111

## Education

### Carnegie Mellon University

Pittsburgh, PA

MASTER OF SCIENCE IN MECHANICAL ENGINEERING (SPECIALIZATION: MACHINE LEARNING) (GPA: 3.94/4.0)

Aug'18 - May'20

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

### Indian Institute of Technology Kanpur

Kanpur, India

BACHELOR OF TECHNOLOGY 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

## Work Experience

### Advanced Agent Robotics Lab, Robotics Institute, Carnegie Mellon University

Pittsburgh

RESEARCH ASSOCIATE, ADVISOR: PROF. KATIA SYCARA

May'20-Present

- Building a simulated agent capable of exploring a disaster hit environment while having a dialog with a guiding human
- Working on the neural network architecture of the vision to dialog, vision to mapping module, synthetic data generation, and integrating these modules with a central simulator

### Advanced Agent Robotics Lab, Robotics Institute, Carnegie Mellon University [Report]

Pittsburgh

GRADUATE RESEARCH ASSISTANT, ADVISOR: PROF. KATIA SYCARA

Oct'18 - May'20

- Designed a neural network based observer policy capable of identifying states for which an RL agent is confused and facilitate efficient communication with an expert
- Resulting network cuts down on episode lengths and improves episode return while minimizing expert queries

### Computer Vision Lab, Indian Institute of Technology Madras [Paper]

Chennai, India

MACHINE LEARNING RESEARCH INTERN, ADVISOR: PROF. ANURAG MITTAL

May'18 - Jul'18

- Designed a novel **2-phase progressive-retrogressive** training, and a **dual motion warping** frame alignment techniques
- Designed a neural network for explicit **refinement and fusion of high-frequency details** of super resolved videos
- The system produced visually more appealing results than most SOTA methods with no noticeable temporal artifacts

## 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 [Report]

Dr. Amir Farimani | CMU | 2018

- 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

### Vision based Active Target Tracking [Report]

Dr. Mangal Kothari | IIT Kanpur | 2018

- Improved upon an existing Siamese neural network based object tracker by designing a **LSTM based memory network**
- This auxiliary system learnt a motion model of the tracked objects and improved tracking accuracy in cases of occlusion

### 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

## Technical Skills

- **Programming Languages & Utilites:** Python, C, C++, MATLAB, AWS EC2, AWS MTurk, Git
- **Python & DL libraries:** PyTorch, Keras, TensorFlow, OpenAI Gym, NumPy, Pandas, Matplotlib, SciPy, Scikit-Learn
- **OS:** GNU/Linux, Windows
- **ML & DL Techniques:** Regression, Naive Bayes, SVM, KNN, K-means, PCA, CNN, RNN, LSTM, GRU, Transformers

## Publications

Vikram Singh, Akshay Sharma, Sudharshann D., Dr.Anurag Mittal, **Retrogressive Training towards High-Frequency Prediction for Video Super-Resolution**, Winter Conference on Applications of Computer Vision (WACV) 2020. [Paper]