Akshay Sharma

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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

Technical Skills

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

Work Experience

Oculii Corp   *Beavercreek*
SOFTWARE ENGINEER   *Apr'21 - Present*
- Part of the application team responsible for a software package in **C++** and **C#**, for parsing and visualizing 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]

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

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]