

## EDUCATION

### University of Southern California

Doctor of Philosophy (PhD), Electrical Engineering Advisor – C.-C. Jay Kuo

*Research interests – 3D point cloud analysis and compression*

Aug. 2020–May 2023

*Los Angeles, CA*

### University of Southern California

Master of Science (Honors), Electrical Engineering GPA – 3.91

*Relevant coursework – Multimedia Compression, Computer Vision, Machine Learning, Deep Learning*

Aug. 2018–May 2020

*Los Angeles, CA*

### Savitribai Phule Pune University

Bachelor of Engineering, Electronics and Telecommunication GPA – 3.90

Aug. 2014–May 2018

*Pune, India*

## RESEARCH EXPERIENCE

### Sony

Aug. 2022–present

Applied Research Intern

*San Jose, CA*

- Developed a sparse convolution based predictor network for inter-prediction in dynamic dense point cloud compression.
- Achieved rate control in deep learning based point cloud compression methods using rate conditional convolutions.
- Proposed unified neural network architecture and joint training strategy for I- and P-frame compression.

### InterDigital

May 2022–Aug. 2022

Research Intern

*New York, NY*

- Designed intra-/inter-mode decision module for dynamic point cloud compression.
- Proposed training of scene flow estimation methods with unsupervised RD loss for dynamic point cloud compression.
- Improved performance of conventional G-PCC method for dynamic LiDAR compression using deep learning techniques.

### USC Media Communications Lab

May 2019–May 2022

Research Assistant

*Los Angeles, CA*

- Collaborated in research and development of unsupervised and feedforward feature learning method for 3D point clouds.
- Proposed methods for scene flow estimation, LiDAR odometry, point cloud registration and pose estimation.

## PROJECTS

### Multimedia compression algorithms | C++

- Implemented compression algorithms like Shannon Fano, Huffman, Adaptive Huffman coding, Binary Arithmetic Coder, QM Coder and JPEG.
- Experimented with different motion estimation and rate control methods in H.264 video compression.

### Structure from Motion (SfM) for 3D reconstruction | Python, OpenCV

- Reconstructed 3D point clouds of historic structures from pairs of images.
- Performed keypoint matching using SIFT and kNN, pose estimation from essential matrix and SVD, and triangulation.

### Region based photorealistic image style transfer | Python, PyTorch

- Trained PSPNet on MIT ADE20K dataset for semantic segmentation of content and style images.
- Implemented segment-wise image stylization using Whitening and Coloring transform.

## TECHNICAL SKILLS

**Languages** – Python, C++, Matlab, LaTeX

**Libraries** – PyTorch, Open3D, Minkowski Engine, Open3D, Scikit-learn

**Certifications** – Deep Learning Specialization (Coursera)

## RECENT PUBLICATIONS

- PCRP: Unsupervised Point Cloud Object Retrieval and Pose Estimation. *IEEE International Conference on Image Processing (ICIP), 2022* [Paper]
- GreenPCO: An Unsupervised Lightweight Point Cloud Odometry Method. *IEEE International Workshop on Multimedia Signal Processing (MMSP), 2022* [Paper]
- R-PointHop: A Green, Accurate and Unsupervised Point Cloud Registration Method. *IEEE TIP, 2022* [Paper]
- 3D Point Cloud Analysis: Traditional, Deep Learning and Explainable Machine Learning Methods. *Springer* [Book]

## ACHIEVEMENTS AND SERVICE

**Awards** – Masters Honors Fellowship, Best Project in Deep Learning

**Teaching Assistant** – Digital Image Processing (Spring'22), Linear Algebra (Fall'21)

**Reviewer** – IEEE ICIP, Springer Nature, APSIPA TSIP, ISPRS Journal on Photogrammetry and Remote Sensing