

Anshul Shah

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Education

Johns Hopkins University <i>Ph.D in Computer Science</i> Advisor : Prof. Rama Chellappa Transferred from UMD College Park	2020–2023(Expected)
University of Maryland, College Park <i>M.S. in Computer Science</i> Advisor : Prof. Rama Chellappa	2018–2020 4.0/4.0
Indian Institute of Technology Madras <i>B.Tech.(with Honors) & M.Tech. in Electrical Engineering</i> Minor in Robotics Advisor : Prof. A.N. Rajagopalan Semester Abroad : Czech Technical University in Prague (Fall'17)	2013–2018 9.39/10

Research Interests

Multimodal Video Understanding, Self-Supervised Learning, Body & face generative models, Contrastive Learning, Pose-based Action Recognition, Sequence modeling, IMU-based gesture recognition, Synthetic data for ML, ML for Health

Research Internships

Apple (Machine Learning Research) <i>Mentors : Raviteja Vemulapalli, Karren Yang, Anurag Ranjan, Gierad Laput, Oncel Tuzel</i> Working on synthetic IMU data generation and using it for gesture recognition.	Mar'23-Sep'23 ML for IMUs
Microsoft Research (Mixed Reality) <i>Mentors : Harpreet Sawhney, Benjamin Lundell</i> Developed an analysis-by-synthesis approach to drive realistic face avatars from novel multi-sensor inputs. Submitted a patent application with a plan to submit the research to an upcoming graphics conference.	Jun'22-Aug'22 Multimodal Face Avatar Tracking
Microsoft Research (Mixed Reality) <i>Mentors : Harpreet Sawhney, Bugra Tekin, Amol Ambardekar, Benjamin Lundell</i> An SSL-based approach to learn representations for procedural videos with access to multiple on-device and vision derived modalities. Problem motivated by the usecase of automatic AR guide creation for HoloLens. Work presented at ICCV'23.	Jun'21-Aug'21 Self-supervised Procedure Learning
Mitsubishi Electric Research Laboratories (MERL) <i>Mentor : Anoop Cherian</i> Proposed a contrastive learning objective motivated by SVMs which inherently tackles false and hard negatives leading to faster convergence. Shown to be beneficial in many SSL-representation learning tasks including image, video, graph and skeleton. Paper presented at AAAI-22.	Jun'20-Aug'20 Contrastive Learning & Video Representation Learning
IBM Research, India <i>Mentors : Pratyush Kumar, Ashok Ponkumar, Amith Singhee</i> Developed algorithms to detect key-feature in a frontal image to enable plausible placement of a jewelry item. Part of an effort to enable virtual try-on to improvise jewelry buying experience for various big retailers. Patent was filed and approved.	May'16-Jul'16 Virtual Cognitive Mirror
Matrix ComSec R&D, India <i>Mentor : Kaushal Kansara</i> Implemented various algorithms on the Texas Instruments DM38x media processor for IP camera video enhancement	May'15-Jul'15 Surveillance Camera Video Enhancement

Peer-reviewed Publications

STEPs: Self-Supervised Key Step Extraction from Unlabeled Procedural Videos (ICCV 2023)

Anshul Shah, Benjamin Lundell, Harpreet Sawhney, Rama Chellappa

HaLP: Hallucinating Latent Positives for Skeleton-based Self-Supervised Learning of Actions (CVPR 2023)

Anshul Shah, Aniket Roy[†], Ketul Shah[†], Shlok Mishra, David Jacobs, Anoop Cherian, Rama Chellappa

Max-Margin Contrastive Learning (AAAI 2022)

Anshul Shah[†], Suvrit Sra, Rama Chellappa, Anoop Cherian[†]

Pose and Joint-Aware Action Recognition (WACV 2022)

Anshul Shah, Shlok Mishra, Ankan Bansal, Jun-Cheng Chen, Rama Chellappa, Abhinav Shrivastava

Few shot Learning with hard Mixup (NeurIPS 2022)

Aniket Roy, Anshul Shah, Ketul Shah, Prithviraj Dhar, Anoop Cherian, Rama Chellappa

Object-Aware Cropping for Self-Supervised Learning (TMLR 2022, CoLLA 2023)

Shlok Mishra, **Anshul Shah**, Ankan Bansal, Abhyuday Jagannatha, Abhishek Sharma, David Jacobs, Dilip Krishnan

Bringing Alive Blurred Moments (CVPR 2019 Oral)

Kuldeep Purohit, **Anshul Shah**, A N Rajagopalan

Learning Visual Representations for Transfer Learning by Suppressing Texture (BMVC 2022)

Shlok Mishra, **Anshul Shah**, Ankan Bansal, Abhinav Shrivastava, Abhishek Sharma, David Jacobs

Multi-View Action Recognition using Contrastive Learning (WACV 2023)

Ketul Shah, **Anshul Shah**, Chun Pong Lau, Celso de Melo, Rama Chellappa

Learning Based Single Image Blur Detection and Segmentation (ICIP 2018)

Kuldeep Purohit, **Anshul Shah**, A N Rajagopalan

Attention Driven Vehicle Re-identification and Unsupervised Anomaly Detection for Traffic Understanding (CVPRW 2019)

Pirazh Khorramshahi, Neehar Peri, Amit Kumar, **Anshul Shah** and Rama Chellappa

† Equal Contribution

Works under preparation/ submission

Video Understanding for Early Diagnosis of Autism Spectrum Disorder

A. Shah, S. Ray, J. Stenum, B. Hicks, J. Morrel, R. Roemmich, R. Reetzke, R. Landa, R. Chellappa

- Leading the action recognition effort in a multi-disciplinary team involving vision researchers, speech pathologists and movement scientists.
- Preliminary findings were presented at INSAR (International Society of Autism Research) 2023 held in Stockholm.

Temporal Max-Margin Contrastive Learning

Anshul Shah, Anoop Cherian, Rama Chellappa

- Derived a temporal extension to MMCL which can simultaneously optimize for contrastive learning and temporal ordering.

Margin-based Pooling for Video Representation Learning

Anshul Shah, Shlok Mishra, Rama Chellappa, Anoop Cherian

- A plug-and-play spatio-temporal pooling module to improve complex action recognition.

Cap2Aug: Caption guided Image data Augmentation

Aniket Roy, **Anshul Shah**[†], Ketul Shah[†], Anirban Roy, Rama Chellappa

- Leverage pre-trained generative models to augment training data for various learning tasks.

Ground-to-Air Generalization for Action Recognition via Synthesis

Ketul Shah, **Anshul Shah**, Arun Reddy, Aniket Roy, Arushi Sinha, Celso de Melo, Rama Chellappa

- An approach to generate and use synthetic data for action recognition from aerial viewpoints.

DiffNat: Fine-tuning text-to-image diffusion model with natural image statistics

Aniket Roy, Maitreya Suin, **Anshul Shah**, Prithviraj Dhar, Ketul Shah, Rama Chellappa

- Proposed an image kurtosis loss to improve training of text-to-image diffusion models.

Dual Prompt Tuning for Domain-Aware Federated Learning

Guoyizhe Wei, Feng Wang, **Anshul Shah**, Rama Chellappa

- Explored federated learning under domain shift amongst clients by prompt tuning on foundation models.

Selected Achievements

- Recipient of **Amazon Fellowship** (2022-23) as a part of JHU + Amazon initiative for Interactive AI.
- Selected as a member of **ICCV 2023 Doctoral Consortium** to be held in Paris.
- Proposal on SSL co-written with PI Rama Chellappa was awarded **Amazon Research award** (2023-24).
- Invited to give a talk on STEPs work at **CV for Metaverse Workshop** to be held at ICCV'23.
- Was named a **Highlighted reviewer for ICLR'22**.
- Awarded Kolluri Memorial Prize for **best Academic record** in Electrical Engineering at IIT Madras (2015-16).

Patents

Hybrid virtual and physical jewelry shopping experience, US10810647B2

Mohit Jain, Pratyush Kumar, Megha Nawhal, Ashok Pon Kumar, Anshul Shah, Gyanendra Sharma, Amith Singhee

Multimodal three-dimensional face modeling and tracking for generating expressive avatars, Patent Filed

H. Sawhney, B. Lundell, A. Shah, C. Hewitt, T. Baltrusaitis, M. Radojevic, K. Grujcic, I. Stojiljkovic, P. McIlroy, J. Jadidian, C. Cristian

Teaching Experience

- Machine Perception, JHU, Aug'22-Dec'22; Image Signal Processing & Physics I, IIT Madras, Jun'17-May'18

Reviewing

ICLR'[23,22], AAAI'[23,21,20], NeurIPS'[23,22,21,20], WACV'[23,22], ICML'[23,22,21], CVPR'23, ICCV'23, ECCV'20, TMLR[23,22]