

# ISHAN RAJENDRAKUMAR DAVE (PH.D. CANDIDATE)

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**Research Interests:** Self-supervised Video Representation Learning, Generative AI for Videos, Large Video-Language Foundational models, Video Understanding for Robotics, Privacy-Preserving Computer Vision

## Education

**Ph.D. in Computer Science** University of Central Florida, USA  
Advisor: Dr. Mubarak Shah

Aug 2019 – Dec 2024 (Expected)

**B.Tech in Electronics and Communication S.V.** National Institute of Technology, India

2013 – 2017

## Work Experience

**Apple Inc., Cupertino, USA** *PhD AI/ML Intern*

May 2024 – Current

↳ Video Engineering Group

- Exploring generative AI for videos

**Adobe Inc., San Jose, USA** *Research Scientist Intern*

May 2023 – Nov 2023

↳ Dr. Simon Jenni and Dr. Fabian Caba

- Worked on fine-grained video retrieval from large-scale (millions) of video gallery
- Filed Patent

**Adobe Inc., San Jose, USA** *Research Scientist Intern*

May 2022 – Nov 2022

↳ Dr. Simon Jenni

- Developed a novel self-supervised video representation framework by reformulating temporal self-supervision as frame-level recognition tasks and introducing an effective augmentation strategy to mitigate shortcuts.
- Achieved state-of-the-art performance on 10 video understanding benchmarks of linear classification (Kinetics400, HVU, SSv2, Charades), video retrieval (UCF101, HMDB51), and temporal correspondence (CASIA-B).
- Published paper at AAAI[2].

## Publications

1. **Ishan Dave**, Tristan de Blegiers, Chen Chen and Mubarak Shah. CodaMal: Contrastive Domain Adaptation for Malaria Detection in Low-Cost Microscopes, Accepted in 31st IEEE International Conference on Image Processing (**ICIP**), 2024.
2. **Ishan Dave**, Simon Jenni, and Mubarak Shah. No More Shortcuts: Realizing the Potential of Temporal Self-Supervision, AAAI Conference on Artificial Intelligence (**AAAI**), Main Technical Track, 2024.
3. **Ishan Dave**, Mamshad Nayeem Rizve, Chen Chen, and Mubarak Shah. TimeBalance: Temporally-Invariant and Temporally-Distinctive Video Representations for Semi-Supervised Action Recognition, Conference IEEE Computer Vision and Pattern Recognition (**CVPR**), 2023.
4. **Ishan Dave**, Chen Chen, and Mubarak Shah. SPAct: Self-supervised Privacy Preservation for Action Recognition, Conference IEEE Computer Vision and Pattern Recognition (**CVPR**), 2022.
5. **Ishan Dave**, Rohit Gupta, Mamshad Nayeem Rizve, and Mubarak Shah. TCLR: Temporal Contrastive Learning for Video Representation, Computer Vision and Image Understanding (**CVIU**), 2022. **[150+ citations!]**
6. Tristan de Blegiers\*, **Ishan Dave\***, Adeel Yousaf, and Mubarak Shah. EventTransAct: A video transformer-based framework for Event-camera based action recognition, IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), 2023. (\*= equal contribution)
7. Joseph Fiorese, **Ishan Dave**, and Mubarak Shah. TeD-SPAD: Temporal Distinctiveness for Self-supervised Privacy-preservation for video Anomaly Detection, IEEE/CVF International Conference on Computer Vision (**ICCV**), 2023.
8. Tushar Sangam, **Ishan Dave**, Waqas Sultani, and Mubarak Shah. TransVisDrone: Spatio-Temporal Transformer for Vision-based Drone-to-Drone Detection in Aerial Videos. IEEE International Conference on Robotics and Automation (**ICRA**), 2023.
9. **Ishan Dave**, Zacchaeus Scheffer, Akash Kumar, Sarah Shiraz, Yogesh Singh Rawat, Mubarak Shah. GabriellaV2: Towards better generalization in surveillance videos for Action Detection, 4th International Workshop on Human Activity Detection in multi-camera, Continuous, long-duration Video (HADCV'22), at the IEEE Winter Conf. on Applications of Computer Vision (**WACV**), 2022.
10. Mamshad Nayeem Rizve, Ugur Demir, Praveen Tirupattur, Aayush Jung Rana, Kevin Duarte, **Ishan Dave**, Yogesh Singh Rawat, and Mubarak Shah. Gabriella: An online system for real-time activity detection in untrimmed surveillance videos, 25th International Conference on Pattern Recognition (**ICPR**), 2020 **[Best Scientific Paper Award]**

This is a publicly available version of my CV, for articles under-review contact me

## Patent

1. Action Recognition System Preserves Privacy in Video Sharing. Researchers: **Ishan Dave**, Mubarak A Shah, Chen Chen. The University of Central Florida. Invention Track Code: 2023-019. (Status: Filed) TechSheet Link

## Major Research Projects

### Self-supervised Video Representation Learning

May 2020 – present

- *TCLR Framework*[5] (May 2020- June 2021): Proposed novel temporal contrastive losses to explicitly increase the temporal distinctiveness at two temporal aggregation steps in video tasks: (1) clip-level (2) feature level.
- *TimeBalance Framework*[3] (Aug 2022 - Jan 2023): Studied two complementary self-supervised video representations: (1) Temporally-Invariant (2) Temporally-Distinctive. Proposed a dual teacher-based framework for semi-supervised action recognition using a novel temporal-similarity based reweighting strategy.
- *Mitigating Shortcuts in temporal self-supervision* [2] (May 2022- Jan 2023): Internship work at Adobe.
- *Video Foundational models* (May 2023- Present): Working on improving the visual encoding of Large Video-Language model for the label-efficient Fine-grained Action recognition.

### Privacy Preserving Video Understanding

June 2021 – present

- *Privacy Preserving Action Recognition*[4] (June 2021- Jan 2022): Implemented a privacy-preserving action recognition framework that removes privacy attributes without labels, maintaining competitive performance and achieving best generalization across novel action and privacy attributes.
- *Privacy Preserving Video Anomaly Detection*[7] (Aug 2022- March 2023): Developed a privacy-aware video anomaly detection framework utilizing temporally-distinctive video representations, achieving state-of-the-art tradeoff between privacy protection and utility performance on three popular weakly supervised VAD datasets.
- *Action Fairness* (March 2023- Present): Studying the bias of private attributes (gender, skin color, clothing, etc.) in SOTA action recognition models.

### Video Understanding for Robotics

May 2022 – present

- *TransVisDrone Framework*[8] (May 2022- Jan 2023): Proposed an end-to-end drone detection framework to tackle various challenging real-world scenarios by learning spatio-temporal dependencies of drone motion.
- *EventTransAct Framework*[6] (Aug 2022 - March 2023): Proposed a video transformer-based framework for event-camera based action recognition, which leverages event-contrastive loss and augmentations to adapt the network to event data.
- *Egocentric Multimodal Action Recognition* (May 2023- Sept 2023): Proposed a framework for recognizing actions from egocentric RGB and Depth modalities in an industry-like environment.

## Funding Projects

### Deep Intermodal Video Analytics (DIVA) program by IARPA UCF Team Lead

Sept 2019 – Dec 2021

- Worked on various aspects of real-world action detection dataset: multi-label correlation, class-imbalance, generalization for unknown facility cameras, improving computational efficiency with knowledge distillation, dealing with noisy data with curriculum learning. [10], [9]
- Lead team UCF and secured first position for consecutive 2 years on target metric competing with other teams from CMU, JHU, UMD, Purdue, IBM, and MIT.

### Biometric Recognition and Identification at Altitude and Range (BRIAR) by IARPA

Aug 2022 – Present

- Worked on a person re-identification project using an adversarial training framework for cloth-change scenarios.

## Awards and Honors

Outstanding Reviewer	Ranked in the top 2% for review quality among 10,000 reviewers (CVPR)	2024
Nomination	The Order of Pegasus Award, University of Central Florida	2024
1 <sup>st</sup> place	Multi-modal Action Recognition challenge (ICIAP)	2023
2 <sup>nd</sup> place,	ActivityNet ActEV Challenge (CVPR)	2022
2 <sup>nd</sup> place	TRECVID ActEV: Activities in Extended Video	2021
1 <sup>st</sup> place & Jury Prize,	VI-Priors Action Recognition Challenge (ICCV)	2021
1 <sup>st</sup> place,	PMiss@0.02tfa, ActivityNet ActEV SDL (CVPR)	2021
1 <sup>st</sup> place,	VI-Priors Action Recognition Challenge (ECCV)	2020
1 <sup>st</sup> place,	PMiss and nAUDC, ActivityNet ActEV SDL (CVPR)	2020
2 <sup>nd</sup> place,	TRECVID ActEV: Activities in Extended Video	2020
ORCGS Doctoral Fellowship,		2019-2020
Top 0.5%,	Joint Engineering Entrance-Mains exam, India	2013

## Skills

**Programming Languages** Python,  
**Deep learning frameworks** PyTorch, Keras  
**Tools/Frameworks** OpenCV, SciKit, MATLAB

## Coursework

- Advance Computer Vision (CAP 6412)
- Advance Machine Learning (CAP 6614)
- Computer Vision Systems (CAP 6411)

## Professional Services

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- Mentored students of NSF Research Experience for Undergrad (REU) 2020, 2021 & 2022
- Reviewer of CVPR, ICCV, TPAMI, TIMM, CVIU, Pattern Recognition, TCSVT, IEEE Access, Multimedia Tools and Application, etc.

## Character Referees

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Available upon request