# ISHAN RAJENDRAKUMAR DAVE (PH.D. STUDENT)

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**Research Interests**: Video Representation Learning, Self-supervised learning, Privacy-Preserving Computer Vision

## Education

**Ph.D. in Computer Science** University of Central Florida, USA **Aug 2019 – Aug 2024 (Expected)**
Advisor: Dr. Mubarak Shah

**B.Tech in Electronics and Communication** S.V. National Institute of Technology, India **2013 – 2017**

## Work Experience

**Adobe Inc., San Jose, USA** *Research Scientist Intern* **May 2023 – Present**
↪ Dr. Simon Jenni
- Working on Temporal alignment for videos.

**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).

## Publications

1. **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.
2. **Ishan Dave**, Chen Chen, and Mubarak Shah. SPAct: Self-supervised Privacy Preservation for Action Recognition, Conference IEEE Computer Vision and Pattern Recognition (**CVPR**), 2022.
3. **Ishan Dave**, Rohit Gupta, Mamshad Nayeem Rizve, and Mubarak Shah. TCLR: Temporal Contrastive Learning for Video Representation, Computer Vision and Image Understanding (**CVIU**), 2022. **[100+ citations!]**
4. 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)
5. Joseph Fioresi, **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.
6. 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.
7. **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.
8. 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]**

## Major Research Projects

**Self-supervised Video Representation Learning** **May 2020 – present**
- *TCLR Framework*[3] (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*[1] (Aug 2022 - Jan 2023): Studied two complementary self-supervised video representations: (1) Temporally-Invariant (2) Temporally-Distinctive. Proposed a dual teacher-based framework to perform well in semi-supervised action recognition.
- *Mitigating Shortcuts in temporal self-supervision* (May 2022- Jan 2023): Internship work at Adobe.

**Privacy Preserving Video Understanding** **June 2021 – present**
- *Privacy Preserving Action Recognition*[2] (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*[5] (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.

## 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. [8], [7]
- 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

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| **2nd place,** ActivityNet ActEV Challenge (**CVPR**) | **2022** |
| **2nd place** TRECVID ActEV: Activities in Extended Video | **2021** |
| **1st place & Jury Prize,** VI-Priors Action Recognition Challenge (**ICCV**) | **2021** |
| **1st place,** PMiss@0.02tfa, ActivityNet ActEV SDL (**CVPR**) | **2021** |
| **1st place,** VI-Priors Action Recognition Challenge (**ECCV**) | **2020** |
| **1st place,** PMiss and nAUDC, ActivityNet ActEV SDL (**CVPR**) | **2020** |
| **2nd place,** TRECVID ActEV: Activities in Extended Video | **2020** |
| **ORCGS Doctoral Fellowship,** | **2019-2020** |
| **Top 0.5%,** Joint Engineering Entrance-Mains exam, India | **2013** |

## Skills

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| **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

- 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

Available upon request