# Sateesh Kumar

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## Research Interests

Robotics, Computer Vision

## Education

08/24– **University of Texas at Austin**,
*PhD student, Computer Science*, Austin, Texas,
Advisor(s): Prof. Roberto Martin-Martin & Prof. Georgios Pavlakos.

09/21–06/23 **University of California, San Diego**,
*Master of Science in Computer Science*, San Diego, California,
*GPA – 3.97/4.0*
Advisor(s): Prof. Xiaolong Wang.

08/15–05/19 **National University of Computer and Emerging Sciences**,
*Bachelor of Science in Computer Science*, Karachi, Pakistan,
*GPA – 3.91/4.0*.
**Bronze Medal – Ranked 3rd out of 332 students.**

## Peer-reviewed Publications and Patents

2023 **The Devil is in the Details: A Deep Dive into the Rabbit Hole of Data Filtering**,
*International Conference on Computer Vision (ICCV), Datacomp Workshop, 2023* ***(Ranked 1st at DataComp challenge)***.
Haichao Yu, Yu Tian, **Sateesh Kumar**, Linjie Yang, Heng Wang

2022 **Graph Inverse Reinforcement Learning from Diverse Videos**,
*Conference on Robot Learning (CoRL), 2022* ***(Oral, top 6.5 %)***.
**Sateesh Kumar**, Jonathan Zamora, Nicklas Hansen, Rishabh Janghir, Xiaolong Wang

2022 **Improving Explanations of Image Classifiers: Ensembles and Multitask Learning**,
*International Journal of Artificial Intelligence and Applications, 2022*.
Michael Pazzani, Severine Soltani, **Sateesh Kumar**, Kamran Alipour, Aadil Ahamed

2022 **Unsupervised Activity Segmentation by Joint Representation Learning and Online Clustering**,
*IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2022*.
**Sateesh Kumar***, Sanjay Haresh*, Awais Ahmed, Zeeshan Zia, Quoc-Huy Tran

2021 **Learning by Aligning Videos in Time**,
*IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2021*.
**Sateesh Kumar***, Sanjay Haresh*, Huseyin Coskun, Zeeshan Zia, Quoc-Huy Tran

2020 **Towards Anomaly Detection in Dashcam Videos**,
*IEEE Intelligent Vehicles Symposium*, 2020.
**Sateesh Kumar***, Sanjay Haresh*, Zeeshan Zia, Quoc-Huy Tran

2019 **Focused Anchor Loss: Cost-Sensitive learning of discriminative features for imbalanced classification**,
*Asian Conference on Machine Learning*, 2019.
**Sateesh Kumar***, Bahram Baloch*, Sanjay Haresh*, Tahir Syed

Patent 2024 **System and method for learning human activities from video demonstrations using video augmentation** ,
*USPTO Granted Patent*, 2024, Patent number: 11941080.
**Sateesh Kumar**, Quoc-huy Tran, Muhammad Zeeshan Zia, Andrey Konin, Sanjay Haresh

Patent 2022 **System and method for correlating video frames in a computing environment**,
*USPTO Granted Patent*, 2022, Patent number: 11368756.
**Sateesh Kumar**, Quoc-huy Tran, Muhammad Zeeshan Zia, Andrey Konin, Sanjay Haresh

Patent 2020 **System and Method for Building Computational Models of a Goal-Driven Task from Demonstration**,
*USPTO Granted Patent*, 2020, Patent number: 11017690.
**Sateesh Kumar**, Muhammad Zeeshan Zia, Quoc-Huy Tran, Andrey Konin, Sanjay Haresh

## Research Experience

08/24- **Graduate Researcher**, *University of Texas at Austin*, Advisors: Prof. Roberto Martin-Martin & Prof. Georgios Pavlakos.
- Researching Few-Shot Robot Imitation Learning.

07/23-08/24 **Research Engineer**, *ByteDance Inc.*, Advisor: Dr. Heng Wang.
- Worked on large-scale multi-modal data-filtering. Designed and implemented a novel three-stage data filtering pipeline. **Ranked 1st** at the **ICCV 2023 DataComp challenge**.
- Built a prompt processing pipeline for Text-to-Image generation application. Applied a Large Language Model (LLM) for user prompt expansion using instruction fine-tuning.
- Developed a character / ID consistency framework using Stable Diffusion XL models.
- Optimized SDXL and SD15 controlnet models, reduced diffusion inference time by 40%

06/22–12/22 **Software Engineer Intern**, *ByteDance Inc.*, Advisor: Dr. Heng Wang.
- Worked on multimodal deep representation learning from videos.
- Implemented a scalable and efficient framework for collecting multiple modalities of features for videos. 10x more efficient then existing system.
- Researched inducing motion information to Transformer based Masked Autoencoders.

10/21 – 03/22 **Graduate Student Researcher**, *University of California, San Diego*, Advisor: Prof. Micheal Pazzani.
- Researched gradient-based methods for explainable convolutional neural networks.
- Built an ensemble based approach for generating robust explanations of image classifiers.

06/19–07/21 **Research Engineer**, *Retrocausal*,
*backed by TechStars, NASA Human Research Program, PACCAR*.
*Advisors: Dr. Zeeshan Zia & Dr. Quoc-Huy Tran*
- Lead research projects on Unsupervised Action Segmentation and Self-Supervised Video Alignment. The projects led to publications at CVPR 2022 and CVPR 2021 respectively.
- Built a framework for automated human activity recognition for task guidance. The system was voted best demo at IEEE ISMAR 2020 (Flagship Augmented Reality Conference).

## Academic Service

2024 Reviewer, Conference on Robot Learning (CoRL)
2024 Reviewer, European Conference on Computer Vision (ECCV)
2024 Reviewer, IEEE Conference on Computer Vision and Pattern Recognition (CVPR)
2023 Reviewer, IEEE International Conference on Computer Vision (ICCV)
2023 Reviewer, IEEE Conference on Computer Vision and Pattern Recognition (CVPR)
2023 Reviewer, International Conference on Learning Representations (ICLR)
2023 Reviewer, IEEE Winter Conference on Applications of Computer Vision (WACV)
2022 Reviewer, IEEE Conference on Computer Vision and Pattern Recognition (CVPR)
2022 Reviewer, European Conference on Computer Vision (ECCV)
2022 Reviewer, Conference on Neural Information Processing Systems (NeurIPS) SSL Theory Practice Workshop

## Awards & Achievements

2023 **Ranked 1st at ICCV DataComp challenge.** Won a large-scale data filtering challenge at ICCV 2023 by proposing a novel data-filtering framework.
2020 **Best Demo Award IEEE ISMAR 2020**: Selected as the best demo among 19 accepted demonstrations at a flagship augmented reality conference.
2018-2019 Founder/Head - Artificial Intelligence and Machine Learning Club, ACM-NUCES.

## Invited Talks

2017 Convolutional Neural Networks, DHA Suffa University, Karachi [Slides]
2018 Introduction to Artificial Intelligence and Machine Learning, NUCES, Karachi [Slides]
2019 Introduction to Deep Learning and Pytorch, NUCES, Karachi [Code]
2020 Temporal Cycle Consistency, AIDL group [Slides]
2021 Convolutional Neural Networks, Institute of Business Administration, Karachi [Slides]
2022 Graph Inverse Reinforcement Learning, Stanford University, CA [Slides]

## Poster Presentations

2021 Learning by Aligning Videos in Time, Learning from Unlabelled Videos, CVPR, 2021
2022 Unsupervised Action Segmentation by Joint Representation Learning and Online Clustering, Baylearn, 2022
2022 Ensembles for Improved Explanation of Image Classification, Explainable Artificial Intelligence for Computer Vision, CVPR, 2022
2022 Graph Inverse Reinforcement Learning from Diverse Videos, Deep RL Workshop, NeurIPS, 2022

## Skills

**Programming Languages:** Python, C++, C, Java, MATLAB, R
**Frameworks:** Pytorch, Tensorflow, Keras, OpenCV, Scikit-Learn, OpenAI Gym
**Other Primitive:** AWS-EC2, GCP, Linux, Kubernetes

## References

**Prof. Roberto Martin-Martin**: Assistant Professor, UT Austin [contact]
**Prof. Georgios Pavlakos**: Assistant Professor, UT Austin [contact]
**Prof. Xiaolong Wang**: Assistant Professor, UCSD [contact]
**Dr. Heng Wang**: Research Lead, TikTok [contact]
**Dr. Zeeshan Zia**: CEO, Retrocausal, Inc [contact]
**Dr. Quoc-Huy Tran**: CTO, Retrocausal, Inc [contact]