Ayush Gupta

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https://ayush-00.github.io/
Google Scholar

Current Research Interest

Computer Vision, Multi-modal learning, LLMs, Foundational models, Scene Understanding, Domain Adaptation, Gait Recognition, Person Re-ID

Education

Johns Hopkins University — Baltimore, USA
Ph.D. in Computer Science (Advisor: Prof. Rama Chellappa) — *2022 – 2026 (expected)*
M.S.E in Computer Science (GPA: 4.0/4.0)

Birla Institute of Technology and Science, Pilani — Pilani, India
B.E. in Computer Science (GPA: 9.58/10) — *2018 – 2022*
Thesis: Temporal self-similarity for Unsupervised Gait Recognition.

Experience

Applied Scientist Intern — May 2025 – Sep. 2025
Amazon Ring Devices Team. Mentor: Dr. Srinivas Parthasarthy

Research Intern — May 2024 – April 2025
SRI International. Mentor: Dr. Anirban Roy, Dr. Ramneet Kaur

Research Assistant — May 2021 – June 2022
CRCV Lab, University of Central Florida, Mentor: Dr. Yogesh S Rawat

Research Intern — May 2020 – July 2020
Indian Space Research Organization (ISRO). Mentor: Dr. Rekha Anandrao

Teaching Assistant — Aug. 2023 – Dec. 2023
Machine Perception, JHU. Mentor: Prof. Rama Chellappa

Publications

- *Ayush Gupta*, Anirban Roy, Rama Chellappa, Nathaniel D. Bastian, Alvaro Velasquez, Susmit Jha. **"TOGA: Temporally Grounded Open-Ended Video QA with Weak Supervision"** ICCV 2025.
- *Ayush Gupta*, Ramneet Kaur, Anirban Roy, Adam D. Cobb, Rama Chellappa, Susmit Jha. **"Polysemantic Dropout: Conformal OOD Detection for Specialized LLMs"** EMNLP 2025 main.
- *Ayush Gupta*, Siyuan Huang, Rama Chellappa. **"Mind the Gap: Bridging Occlusion in Gait Recognition via Residual Gap Correction"** Oral Presentation, IEEE IJCB 2025.
- *Ayush Gupta*, Rama Chellappa **"MimicGait: A Model-Agnostic Approach for Occluded Gait Recognition using Correlational Knowledge Distillation"** WACV 2025.
- *Ayush Gupta*, Rama Chellappa **"You Can Run but not Hide: Improving Gait Recognition with Intrinsic Occlusion Type Awareness"**. Oral presentation, WACV 2024
- Yuxiang Guo, Anshul Shah, Jiang Liu, *Ayush Gupta*, Cheng Peng, Rama Chellappa **"GaitContour: Efficient Gait Recognition based on a Contour-Pose Representation"** WACV 2025.
- Vuong Nguyen, Samiha Mirza, Abdollah Zakeri, *Ayush Gupta*, Rahma Aloui, Khadija Khaldi, Pranav Mantini, Shishir Shah, Fatima Merchant **"Tackling Domain Shifts in Person Re-Identification: A Survey and Analysis"** CVPR 2024 Continual Learning Workshop.
- *Ayush Gupta*, Yan Li, Srinivas Parthasarthy, Jim Thomas **"Every Token Counts: A Self-Similarity based Model-Agnostic Framework for Query-Based Counting in VLMs"** under submission.

- *Ayush Gupta*, Alexander Matasa, Shruti Vyas, Yogesh S Rawat **"GaitZero: Temporal Self-similarity for Unsupervised Gait Recognition"** under submission.
- *Ayush Gupta**, Ashrya Agrawal*, Poonam Goyal, Navneet Goyal **"Visually Guided Knowledge selection for Video Captioning"** under submission.
- Basudha Pal, *Ayush Gupta*, Vishal Patel **"EchoSAM: Predicting Ejection Fraction using Segmentation Guided Vision Transformers"** under submission.
- Laura McDaniel, *Ayush Gupta*, Ime Essien, Ryan Roemmich, Peter Abadir, Rama Chellappa **"Transfer Learning for Frailty Classification in Older Adults"** under submission.

Projects

Fine-grained Understanding of Long Videos Amazon

- Developed a framework for fine grained analysis of hour long videos
- Improved the token merging techniques of open source VLMs through architectural improvements
- Enhanced multimodal LLM reasoning capabilities on video benchmarks like Video-MME and MVBench

Assured Neuro Symbolic Learning and Reasoning (ANSR) DARPA Program

- Developed a framework for open ended complex Video QA with temporal grounding
- Enhanced visual abductive reasoning in multimodal LLMs through reinforcement learning techniques.
- Worked on interpretability and out of distribution detection in specialized LLMs

Biometrics Recognition and Identification at Altitude and Range (BRIAR) IARPA program

- Implemented a multi-view gait recognition framework on turbulent data captured from upto 1000m
- Improved gait recognition under occlusion scenarios
- Fusing this approach with other modalities like face and body to identify subjects
- Algorithms integrated and deployed into IARPA system pipeline

Undergraduate Thesis: Vision Based Gait Recognition CRCV Lab, University of Central Florida

- Developed approaches for unsupervised gait recognition using RGB datasets like FVG and CASIA-B
- Utilized self-similarity matrices for capturing gait patterns using Transformers
- Implemented unsupervised contrastive learning losses to train the model

Natural Language Video Description Generation ADAPT Lab, BITS Pilani

- Designed a framework for generating natural language descriptions of videos of real scenes
- Utilized external object detectors to extract generalized nouns for the caption
- Used external knowledge bases to supplement the captioning model with specialized versions of the nouns.

CLARIN COVID-19 Disinformation Hackathon LT Group, Universität Hamburg

- Developed models for automatic fact-checking
- Used news crawling APIs and existing datasets like EUvsDisinfo and LIAR Plus to verify a claim.

Landcover Classification using Satellite Imaging ISRO

- Used Google Earth Engine to classify satellite image pixels into landcover categories
- Implemented the Spectral Angle Mapper, SVMs and K-Means learning algorithms

Transfer Learning in Semantic Segmentation for Autonomous Vehicles Course Project, Computer Vision

- Collected a dataset, JHUStreet, of street images from a car and pedestrian perspective around Baltimore.
- Trained and evaluated the DeepLabV3 model on the segmentation task on JHUStreet dataset.

Adversarial Attacks and Defences on CNNs Course Project, Machine Perception

- Implemented FGSM, Noise and Carlini Wagner attacks on CNNs
- Implemented Adversarial training to defend against these attacks.

Reviewing Experience

IEEE T-BIOM, ICCV 2025, CVPR 2025, WACV 2025, NeurIPS 2024

Awards and Honors

- Merit Scholarship for being in **top 2% of students at BITS Pilani** from Aug. 2018 - May 2022
- Recipient of **DAAD-WISE 2021 scholarship** for a summer project in Universität Hamburg, Germany
- Maharashtra State Rank 1 in National Science and Talent Search Examination (NSTSE) 2017

Technical Skills

Languages: Python, C, Matlab, Java.
Frameworks: PyTorch, Huggingface, Tensorflow, Keras.

Relevant courseworks

Computer Vision, Artificial Intelligence, Machine Perception, Machine Intelligence, Neural Networks and Fuzzy Logic, Digital Image Processing, Data Structures and Algorithms, Computer Programming, Probability and Statistics, Multi-Variable Calculus, Linear Algebra and Complex Analysis, Differential Equations, Database Systems, Object Oriented Programming

Volunteering

Project Lead: Participatory Community Development, Nirmaan Organization May 2019 - Dec. 2019

- Led a team of 10+ members for scouting infrastructural deficiencies in villages nearby Pilani
- Worked on building a rainwater harvesting system and a solar light in Baas Village, Pilani.