

Dwip Dalal

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 GitHub  LinkedIn  Google Scholar  Website

Education

- **University of Illinois Urbana-Champaign (UIUC)** 2024 – Present
Ph.D., Electrical and Computer Engineering; Advisor: [Prof. Svetlana Lazebnik](#)
CGPA: 4.0/4.0 (A+: CS543 Computer Vision, CS444 Deep Learning for Computer Vision)
- **Indian Institute of Technology Gandhinagar (IIT-GN)** 2020 – 2024
B.Tech in Mechanical Engineering with Minor in Computer Science
[Institute Gold Medalist](#); Overall CGPA: 9.1/10; Minor CGPA: 10/10

Interest Areas

Multimodal Learning, VLMs, VLAs, LLMs, Agentic Systems, MLLM Reasoning, Test-Time Scaling

Awards & Achievements

- Recipient of the **Dilip and Sandhya Sarwate Graduate Fellowship** at UIUC 2024-2025, awarded to outstanding incoming graduate students in the area of signal processing.
- Awarded the [Institute Gold Medal](#) @ IIT Gandhinagar, for the highest CGPA in the discipline.
- 1st position out of 200 participants in a machine learning hackathon organized by **SmartSense Consulting Solutions Pvt. Ltd.**, earning a **job offer for the role of ML Engineer II** (declined).
- Institute nomination for **Pre-Doctoral Research Assistant Program** at **Microsoft Research, India**.
- 1st rank in [Undergraduate Research Showcase '23](#) @ IITGN for work on AI-enabled on-device drones.
- Selected for **Citibank's 2023 Summer Internship** for the **Analyst** role (declined).
- **10/10 GPA for two consecutive semesters** (6th & 7th), each comprising rigorous 26-credit course work.
- **MITACS Globalink Research Fellow** at **University of British Columbia**, mentored by Prof. Yankai Cao.
- Awarded **Shastri Indo-Canadian Institute Scholarship** for continuing my research at the University of British Columbia as a “promising researcher”.
- Received **Travel Award** from IIT Gandhinagar for attending **ACL 2023 conference** in Toronto.
- Achieved 1st rank in **Hackrush '22**, the flagship annual machine learning hackathon of IIT Gandhinagar.
- 1st rank in IITGN Summer Project 2021 for building the most efficient NLP classification model.
- Secured 1st rank in the competitive programming contest @ IITGN, participated by B.Tech, MTech, and Ph.D.
- Selected among the Top 3 teams for **Innovation-Driven Entrepreneurship (IDE) 4.0: The National Bootcamp** at Bangalore, based on the proposal of using AI for intelligent business planning and financial management.

Academic Research Positions

- **Research Assistant, University of Illinois Urbana-Champaign** (Aug '24 – Present)
Mentor: [Prof. Svetlana Lazebnik](#), [Prof. Unnat Jain](#), [Prof. Heng Ji](#)
Currently working on improving MLLMs for grounded decision-making and real-world action generation. Previously, improved visual grounding in MLLMs through self-correction, guided by internal cross-attention [1]; improved compositional reasoning of MLLMs via joint image–language decomposition [3]; authored a survey on agentic systems for automating data science workflows [8]; and improved model explainability by introducing spatial-awareness [10].
- **Research Assistant, IIT Gandhinagar** (Nov '21 – May '24)
Mentor: [Prof. Shanmuganathan Raman](#), [Prof. Anirban Dasgupta](#), [Prof. Mayank Singh](#), [Prof. Harish PM](#)
Worked on diffusion model for image-to-image generation tasks [5], reinforcement learning for control [13], video processing in low-resource constraints [16], self-supervised and cross-modal representation learning [4], normalizing flow for constrained geometry, density estimation and path-planning [9, 11], and multilingual topic modeling [12].

Research Internships

- **ML Research Intern, Microsoft Research Redmond** (May '25 – Present)
Mentor: [Dr. Nebojsa Jojic](#) ([Senior Principal Researcher](#))
Created a dataset to evaluate MLLMs on long-range, sparse, grounded sequential decision-making tasks. Demonstrated the inadequacy of reasoning methods (CoT, GEPA, Reflection, etc) in this context and introduced the Verbalization of Path (VoP) method, which elicits latent world knowledge from MLLMs to achieve state-of-the-art performance on instruction-free, goal-oriented outdoor navigation tasks within Street View environments [2].
- **ML Research Intern @ University of British Columbia (MITACS GRI)** (May '23 – Aug'23)
Mentor: [Prof. Yankai Cao](#)
Developed a joint representation learning framework for video and spike-train data using contrastive loss, enabling video generation from learned signal representations. The project focused on generating behavioral videos of mice conditioned on neural spike-train data.

- **NLP Research Intern @ AI Institute, University of South Carolina** (Aug '22 – Feb'24)
Mentor: Prof. Amit Sheth (Director of AIISC institute @ UoSC), Prof. Amitava Das, Dr. Aman Chadha
Worked on multimodal fact verification, paraphrase generation, semantic role labeling, QA generation, LLMs, [6, 7] and deception detection, multitask learning, language model merging [15]. Also, launched **DeHate** shared task, a challenge focused on the automatic blurring of offensive segments of hateful images, for the De-Factify 3.0 @AAAI'24.

Publications

Conference Papers

1. Constructive Distortion: Improving MLLMs with Attention-Aware Image Warping (Paper)(Project Page)
Dwip Dalal, G. Vashishtha, U. Mishra, J. Kim, M. Kanda, H. Ha, Svetlana Lazebnik, Heng Ji, Unnat Jain
International Conference on Learning Representation (ICLR 2026)
2. City Navigation in the Wild: Exploring Emergent Navigation from Web-Scale Knowledge in MLLMs (Paper)
Dwip Dalal*, Utkarsh Mishra*, Narendra Ahuja, Nebojsa Jojic (Project Page)
European Chapter of the Association for Computational Linguistics (EACL 2026) [ORAL PRESENTATION]
3. Compositional Reasoning via Joint Image and Language Decomposition (Paper)
Dwip Dalal*, Madhav Kanda*, Zhenhailong Wang, Heng Ji, Unnat Jain
European Chapter of the Association for Computational Linguistics (EACL 2026)
4. Learning Robust Deep Visual Representations from EEG Brain Recordings (Paper)
Prajwal Singh, **Dwip Dalal**, Gautam Vashishtha, Shanmuganathan Raman, Krishna Prasad Miyapuram
Winter Conference on Applications of Computer Vision (WACV 2024)
Featured in WACV Daily and Best of WACV 2024
5. Single Image LDR to HDR Conversion using Conditional Diffusion (Paper)
Dwip Dalal, Gautam Vashishtha, Prajwal Singh, Shanmuganathan Raman
International Conference on Image Processing (ICIP 2023) [ORAL PRESENTATION]
Also accepted at CVPR 2023 workshop - Computational Cameras and Display CCD
6. FACTIFY-5WQA: 5W Aspect-based Fact Verification through Question Answering (Paper)(Demo)
Anku Rani, SM Tonmoy, **Dwip Dalal**, Shreya Gautam, Megha C., Aman Chadha, Amit Sheth, Amitava Das
Association for Computational Linguistics (ACL 2023)
7. A Benchmark for Multimodal Fact Verification with Explainability through 5W Question-Answering (Paper)
M Chakraborty, K Pahwa, A Rani, S Chatterjee, **Dwip Dalal**, H Dave, ... A Chadha, Amit Sheth, Amitava Das
Empirical Methods in Natural Language Processing (EMNLP 2023)

Technical Reports

8. A Dataset-Centric Survey of LLM-Agents for Data Science (Paper)
Dwip Dalal*, Chuxuan Hu*, Xiaona Zhou*
9. Flow Symmetrization for Parameterized Constrained Diffeomorphisms (Paper)(Project Page)
Dwip Dalal*, Aalok Gangopadhyay*, Progyan Das*, Shanmuganathan Raman
10. Towards Spatially-Aware and Optimally Faithful Concept-Based Explanations (Paper)
Shubham Kumar, **Dwip Dalal**, Narendra Ahuja

Workshop Papers

11. ODESolvers are also Wayfinders: Neural ODEs for Multi-Agent Pathplanning (Paper)
Dwip Dalal*, Progyan Das*, Anirban Dasgupta
NeurIPS 2023 Workshop - Deep Learning and Differential Equations III
12. MMT: A Multilingual and Multi-Topic Indian Social Media Dataset (Paper)
Dwip Dalal, Vivek Srivastava, Mayank Singh
Proceedings of EACL 2023 workshop - Cross-Cultural Considerations in NLP
13. Comparative Analysis of Reinforcement Learning and Traditional Methods for Swirling Pendulum Control (Paper)
Dwip Dalal, Shubhankar Riswadkar, Harish J Palanthandalam-Madapusi
IEEE Indian Control Conference 2023
14. SEPSIS: I can catch your lies - A new paradigm for Deception Detection (Paper)
Anku Rani, **Dwip Dalal**, Shreya Gautam, Pankaj Gupta, Vinija Jain, Aman Chadha, Amit Sheth, Amitava Das
ACL 2025 workshop - Student Research Workshop
15. DeHate: A Stable Diffusion-based Multimodal Approach to Mitigate Hate Speech in Images (Paper)
Dwip Dalal*, Gautam Vashishtha*, ..., Vinija Jain, Aman Chadha, Amitava Das, Amit Sheth, Asif Ekbal
AAAI 2024 workshop - Defactify 3
16. VPTDrone: Video Processing Toolkit for Smart Surveillance Drone (Paper)
Dwip Dalal, Anirban Dasgupta
Joint International Conference on Data Science & Management of Data

Industrial Internships

- **ML Intern @ Physical Research Laboratory, ISRO** (Jan '23 – July '23)
Mentor: Prof. Dibyendu Chakrabarty (PI, ISRO Aditya-L1 Mission)
Implemented transformer-based pipeline with Bayesian inference on data from India's maiden solar probe, the Aditya-L1, to predict anomalous geomagnetic storms with uncertainty quantification.
- **ML Intern @ Tata Consultancy Services (TCS Research)** (Oct '22 – April '23)
Mentor: Dr. Manasi Patwardhan
Designed a transformer-based architecture for product copy generation, trained on the FACAD dataset. Fine-tuned BLOOM and ResNet models using the CLIP loss function to enable effective cross-modal learning.
- **AI Intern @ Defense Research and Development Organization (DRDO)** (Jan '22 – Aug '22)
Developed an RL framework using the actor-critic method in a PyBullet environment with simulated physics to learn drone swarm navigation. Designed effective policies via experimentation with simulation on Unity (with MLAgents).
- **Software Engineer Intern @ Eficens Systems** (May '22 – Aug '22)
Developed an intelligent network threat detection platform to red-flag anomalies with Sanjeev Kumar, CTO of DELL, and Prasad Malempati, Sr. Manager of Accenture, San Francisco.
- **Startup Contributions — built core AI systems** (Aug '21 – July '22)
Worked at 3 early stage teams to develop foundational architecture; 2 startups — Aivid Techvision and Necesario Innovations — and an enterprise team at JK Lakshmi Ltd. At Aivid, built end-to-end video anomaly detector. At Necesario, built models for image enhancement. At JK Lakshmi, built anomaly detection system for sensor data.

Projects

- **Open-source Contribution @ OpenVINO** ([Merged PR](#))
Implemented text generation demos using GPT-2 with OpenVINO, and age-gender recognition with OpenVINO; additionally, worked on fixing continuous integration issues with Dr. Adrian Boguszewski.
- **NeuralSight: Computer Vision Algorithm Library** ([Repository](#))
Integrated a suite of deep learning and classical image processing techniques.
- **JointGYM: Reinforcement Learning Algorithm Library** ([Repository](#))
A collection of reinforcement learning algorithms: actor-critic model, Q-learning techniques, PyBullet-based simulation environment, and inverse kinematics algorithms, providing robust solutions for complex control problems.
- **Jacobian Transpose Method for Controlling Robotic Manipulators (Prof. Chetan Pahlajani)** ([Code](#))
Performed path tracking on a two-arm robotic manipulator using the Jacobian transpose method. Built a simulation by implementing the FABRIK algorithm and modeling it in real-world scenarios.

Relevant Courses

- **UIUC: CS444 Deep Learning Computer Vision (A+); CS543 Computer Vision (A+); CS598 Topics in LLM Agents; CS546 Advanced Topics in NLP; CS 598 LLM Applications; ECE544 Pattern Recognition; ECE 598 Diffusion Model**
- **IITGN: Optimization for ML; LLMs; Digital Image Processing; Data Structures and Algorithms; Control Theory; Linear Algebra; Multivariable Calculus; Complex Analysis; Differential Equations; Probability; Numerical Methods**

Teaching Experience

- **Instructor, SC 336: Mathematics of Machine Learning | Fall, 2023** ([certificate](#))([Page 25](#))
 - Instructed IIT Gandhinagar's first student-led, fully accredited short course, with class size of 170 students.
- **Reviewer:** EMNLP'25, NeurIPS'25, ICCV'25, ACL'25, AISTATS'25, ICML'25, NeurIPS'24
- **Teaching Assistant, UIUC:** CS 444 Deep Learning Computer Vision (Fall'25), CS449 Artificial Intelligence (Spring'25)
- **Teaching Assistant, IIT Gandhinagar:** ES413 Deep Learning (Spring'24), CS328 Data Science (Spring'23)

Social Initiatives, Leadership & Innovation

- **President of Society for Machine Learning & Artificial Intelligence**, IIT Gandhinagar (Mar'22 - Mar'23)
- **Core Member of Algorithms and Competitive Coding Club**, IIT Gandhinagar (Jun'22 - Mar'23)
- **Core Member of Robotics Club (Mean Mechanics)**, IIT Gandhinagar (Jun'22 - Mar'23)
- Core Member Hackrush'23 & '24, Annual Machine Learning Hackathon, IIT Gandhinagar
- Represented IIT Gandhinagar in the Inter-IIT Tech Meet in 2021, 2022, 2023 (Leader).
- Selected among the top 30 semi-finalist teams out of 100K participants in Accenture Innovation Challenge AIC'22

Skill Summary

- **Platforms & Frameworks:** PyTorch^{**}, TensorFlow^{**}, OpenVINO^{**}, Unity, MATLAB, Google Cloud, ROS
- **Architectures:** LLMs^{**}, Multi-Agent^{**}, CLIP^{**}, Diffusion Model^{**}, Vision Transformers^{**}, Transformers^{**}, GANs^{**}, VAEs^{**}, CNN^{**}, LSTM^{**}, Neural ODE, Diffeomorphic flows

^{**} Very Proficient