Nidhin Harilal

Fifth-year PhD Student
Computer Science, CU Boulder

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Interests: AI/ML Robustness, GenAI, Multimodality, & Representation Learning.

I'm a final-year Ph.D. candidate at CU Boulder working broadly in machine learning, with a focus on self-supervised learning (SSL) for visual representations. My research explores how to better pre-train and understand vision systems, ranging from leveraging synthetic data and addressing catastrophic forgetting to developing label-free methods for data attribution in SSL models. Through industry internships, I've also worked with large vision (LVMs) and vision-language models (VLMs), focusing on improving efficiency, grounding, and reliability in real-world settings. I also enjoy applying these ideas to climate science, where my work has focused on enhancing the spatiotemporal resolution (downscaling) of climate data.

Education

University of Colorado, Boulder — *GPA - 4.0/4.0*
Ph.D & MS in CS advised by Dr. Claire Monteleoni — *Aug. 2021 - May 2026 (Expected)*

Indian Institute of Technology (IIT) Gandhinagar — *GPA - 8.51/10*
B.Tech. (with Honours) in CSE | Dean's List — *July 2017 - July 2021*

Experiences

Amazon Science — *Sept. 2025 - Dec. 2025*
Applied Scientist Intern (Team: Creators Science) — *Managers: Prince Grover, Dr. Tessa Childers-Day*

Samsung Semiconductor — *June. 2025 - Aug. 2025*
ML PhD Intern (Team: US R&D SDAL) — *Managers: Dr. Zhihong Pan, Dr. Kaushik Balakrishnan*

INRIA, Paris — *May. 2024 - Aug. 2024*
Research Intern (Team: ARCHES) — *Advisors: Dr. Anastase, Prof. Claire Monteleoni*

University of Colorado, Boulder — *Jan. 2022 - Present*
Research Assistant (Currently funded by NSF iHARP) — *Advisor: Prof. Claire Monteleoni*

Northeastern University — *Jul. 2020 - Dec. 2020*
Research Intern (SDS Lab) — *Advisor: Prof. Auroop R. Ganguly*

Indian Institute of Technology, Gandhinagar — *May. 2019 - Dec. 2019*
Undergraduate Research Assistant (MIR Lab, Vision & Graphics Lab) — *Advisors: Prof. Bhatia, Prof. Raman*

Capgemini Technology Services, Ahmedabad — *GJ, India*
ML Engineer Intern (Team ML Safety) — *Apr. 2019 - Jun. 2019*

Research Papers

* indicates equal contribution

Peer-reviewed

STint: Self-supervised Temporal Interpolation for Geospatial Data
Nidhin Harilal, B. M Hodge, Aneesh Subramanian and Claire Monteleoni.
Accepted at Climate Informatics 2026. Environmental Data Science.

MixDiff: Mixing Natural and Synthetic Images for Robust Self-Supervised Representations (PDF, Web)
Reza Akbarian*, Nidhin Harilal*, Claire Monteleoni and Maziar Raissi.
In *IEEE/CVF Winter Conference on Applications of Computer Vision* (WACV) 2025.

Influence Estimation for Self-Supervised Learning (PDF)
Reza Akbarian*, Nidhin Harilal*, Amit Rege*, and Claire Monteleoni.
In *NeurIPS 2024 - Self-supervised Learning: Theory and Practice*

Parameter Efficient Fine-tuning of Self-supervised ViTs without Catastrophic Forgetting (PDF)
Reza Akbarian*, Nidhin Harilal*, Claire Monteleoni, and Maziar Raissi.
In *CVPR 2024 - Efficient Large Vision Models (eLVM)*

EnhancedSD: Downscaling Solar Irradiance from Climate Model Projections. (**PDF**)
Nidhin Harilal, B. M Hodge, Claire Monteleoni, and Aneesh Subramanian.
In *NeurIPS 2022 -Tackling Climate Change with Machine Learning (Climate Change AI)*

Image Caption Generator using Siamese Graph Convolutional Networks and LSTM. (**PDF**)
Athul Kumar, Aarchi Agrawal, KS Ashin Shanly, Sudip Das, and Nidhin Harilal
In *5th Joint International Conference on Data Science & Management of Data* (9th ACM IKDD CODS and 27th COMAD) 2022

HDRVideo-GAN: Deep Generative HDR Video Reconstruction. (**PDF**)
Mrinal Anand*, Nidhin Harilal*, Chandan Kumar*, and Shanmuganathan Raman
In *Proceedings of 12th Indian Conference on Computer Vision, Graphics and Image Processing* (ICVGIP) 2021

Augmented ConvLSTMs for Generating High-Resolution Climate Change Projections. (**PDF**)
Nidhin Harilal, Mayank Singh, Udit Bhatia
In *IEEE Access, Volume 9.* 2021

CARO: An Empathetic Chatbot for People with Major Depression. (**PDF**)
Nidhin Harilal, Rushil Shah, Saumitra Sharma, and Vedanta Bhutani
In *ACM 7th IKDD CoDS and 25th COMAD* 2020

Preprints/Manuscripts

Where Did Your Model Learn That? Label-free Influence for Self-supervised Learning (**PDF**)
Nidhin Harilal*, Amit Kiran Rege*, Reza Akbarian, Maziar Raissi and Claire Monteleoni.
In submission.

Awards and Honors

Nov. 2024	**Bell Foundation Research Fellowship,** at CU Boulder.
Jul. 2024	**iHARP Polar Informatics Fellowship,** at CU Boulder.
Feb. 2022	**Early Career Professional Development Fellowship,** at CU Boulder.
Nov 2021	**Awtar and Teji Singh Graduate Fellowship,** at CU Boulder.
Nov. 2020	**Journal Publication Award,** at IIT Gandhinagar.
2018-19	**Dean's List for excellent academic performance,** at IIT Gandhinagar.
Aug. 2014	**National Winner for CBSE All India Science Exhibition,** at New Delhi.

Teaching & Services

Reviewer for ML conferences such as WACV (2021, 2022, 2023), NeurIPS (2023-25), ICLR (2024-25).

Teaching Assistant, CSCI 5622: Graduate Machine Learning (Spring 2024-26) at CU Boulder.

Teaching Assistant, ES 654: ML (Spring 2021) and ES 102: Intro to computing (Fall 2020) at IIT Gandhinagar.

Mentor for Academic Discussion Hours (Fall 2019-20) at IIT Gandhinagar, assisting freshmen with academic workload challenges.

Organizer of *HackRush*, IIT Gandhinagar's annual intra-college hackathon (2018, '19, '20, '21).

Relevant Skills

Programming	[Extensive] Python, Machine Learning (PyTorch & Tensorflow)
Workflow	High-Performance Computing (Slurm), Cloud Platforms (AWS, GCP), Containerization (Docker)
Design	LaTeX, Vector graphics (InkScape), Adobe Suite (Lightroom, Photoshop)