

# NINAD DAITHANKAR

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## RESEARCH INTERESTS

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**Foundational AI**, with a focus on **Self-Supervised Learning**, **Representation Learning**, **World Models**, **Multimodal learning**, and cognitive-inspired approaches to **Reasoning** and **Planning** (System 2 Thinking).

## EDUCATION

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**University of Illinois Urbana-Champaign**

*Master of Computer Science – GPA: 3.91/4*

Urbana, IL

*Aug 2024 – Dec 2025*

**Savitribai Phule Pune University**

*Bachelor of Engineering - Computer Science – GPA: 9.1/10*

Pune, India

*Aug 2017 – May 2021*

## PUBLICATIONS

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- [Manuscript in preparation] Alexi Gladstone\*, **Ninad Daithankar\***, Heng Ji. “What are the optimal assumptions for training a visual encoder?” **ICLR 2026**. \*Equal contribution.

## RESEARCH EXPERIENCE

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**Summer Research Intern – [Blender Lab](#)**

*Siebel School of Computing and Data Science - UIUC*

May 2025 – Present

Urbana, IL

- Exploring a new SSL paradigm that couples a ViT frame and difference encoder to learn high-quality representations from videos
- Stabilized motion encoders with EMA teachers and cross-frame attention, reducing feature drift on long sequences
- Pre-processed Ego4D dataset and upgraded dataloader to increase dataloading speed by 50x from 0.51 it/s to 26.3 it/s

**Research Assistant – [Prof. Heng Ji](#)**

*Siebel School of Computing and Data Science - UIUC*

Sept 2024 – May 2025

Urbana, IL

- Investigated ViT-based motion encoders that compress video by modeling temporal frame differences
- Reproduced results for V-JEPA's attentive probing accuracy and DinoV2, MAE's KNN accuracy using refactored PyTorch Lightning repository
- Built an HDF5 pipeline to store 40M+ frame features for SSV2/Ego4D enabling 4x faster training throughput on HPC clusters
- Studied existing literature on optical flow, motion vectors and SSL-based representation learning techniques like MAE, DinoV2, BYOL, iBOT, I-JEPA and V-JEPA

## INDUSTRY EXPERIENCE

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**Software Engineer – Data Virtualization**

*eQ Technologic Inc.*

Aug 2021 – July 2024

Pune, India

- Researched, designed, and implemented a new connector for Deltek OpenPlan (for data integration at a Fortune 100 aerospace customer) as a Java + Python system, leveraging its OLE APIs using pywin32 and pywinauto
- Designed and implemented ‘XSD metadata parsing’ and ‘embedded objects support’ for generalizing Java and REST API based Costpoint connector from initial 10 modules to over 100+ modules in Deltek Costpoint
- Designed and implemented ‘returning attributes’ feature for the generic JDBC connector to reduce latency of consecutive ‘write + read’ operations by 50pct for databases like Oracle, Teradata and MySQL
- Implemented functionality for Java based Bitbucket connector to support Bitbucket Datacenter REST APIs

**Software Development Engineer – Intern**

*Edgelytics*

Jan 2020 – Apr 2020

Pune, India

- Developed a web-app using React and Bootstrap for digitization of Standard Operating Procedures (SOP) for a Fortune 500 pharmaceutical client
- Redesigned the front-end using React and Bootstrap for a Django based Cloud IoT device dashboard

## ACADEMIC EXPERIENCE

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### Course Assistant – CS 222: Software Design Lab

Siebel School of Computing and Data Science - UIUC

Sept 2024 – May 2025

Urbana, IL

- Assisted Prof. Michael Woodley by mentoring students and grading weekly quizzes for 44 students each week
- Mentored 4 teams (total 16 CS undergraduate students) in developing their team projects for the lab
- For Fall 24, team 'WhereAmI' developed a computer vision web-app with ResNet50 backbone for recognizing buildings on UIUC campus and team 'Shmoney' worked on stock market prediction using LSTMs and yfinance APIs
- For Spring 25, team 'SmartRide' developed a smart bicycle navigation system with health metric tracking and team 'GuessQuest' developed an interactive guessing game website

## TECHNICAL SKILLS

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**Deep Learning:** PyTorch, PyTorch Lightning, Hugging Face, TensorFlow, JupyterLab/Colab, Wandb.ai, Scikit Learn, NumPy, Matplotlib

**Languages:** Python, Java, Javascript, C/C++, SQL, HTML, CSS, Go

**Frameworks:** React, Node.js, Django, JDBC, JUnit

**Developer Tools:** Git, Docker, Slurm, VS Code, PyCharm, IntelliJ, Subversion, Bitbucket, Jenkins, Linux

**Databases:** Oracle, MySQL, Teradata, MongoDB, SQLite, Neo4j

**HPC Platforms:** UIUC Research Computing (NCSA Delta, NCSA Delta AI)

## RELEVANT PROJECTS

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### Immunization against Diffusion-Based Image Editing | PyTorch, PyTorch Lightning, Wandb.ai

- Implemented immunization approaches from the papers *Distraction is All You Need: Memory-Efficient Image Immunization against Diffusion-Based Image Editing* and *Optimization-Free Image Immunization Against Diffusion-Based Editing*
- Implemented stable diffusion pipeline, timestep universal gradient and immunizer networks for adding subtle perturbations

### Video-sync by visual indexing using CLIP embeddings | PyTorch, NumPy, Django

- Used OpenAI's CLIP embeddings to develop a visual indexing system to match frames from a target video to multiple source videos and make a new video from it
- Created a synced video of the same environment on UIUC campus but in different seasons (sunny, rain, snow)

### Object insertion using Gradient-Domain Fusion | NumPy, OpenCV, Scikit Learn

- Implemented object insertion where an object is extracted from one image and placed in another
- Used Poisson Blending to enforce smoothness and seamlessly blend the object from source image into target image

### Improving System-2 Thinking in Energy Based Transformers | PyTorch, PyTorch Lightning, Wandb.ai

- Investigated MCMC-step ramp-up strategies in Energy-Based Transformers, designing linear / exponential schedulers that stabilize long "System-2" reasoning chains without harming validation perplexity

### Energy-Based Dense Re-Ranking | PyTorch, PyTorch Lightning, Wandb.ai

- Experimented with a 2-layer MLP energy head that boosts BERT-DPR MRR@10 from 0.340 → 0.371 with minimal extra latency

## VOLUNTEER SERVICE

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### Graphic Designer – Cybertimes

CS Department - Sinhgad College of Engineering

Aug 2019 – Jan 2020

Pune, India

- Designed six articles using Adobe Photoshop and Lightroom for the Computer Science Departments annual technology magazine

### Web Developer – TIME Quiz

St. Teresa's Convent Higher Sec. School

Aug 2018 – Jan 2020

Jalgaon, India

- Designed and developed a web-app using React and custom CSS for years 2018, 2019 & 2020 iterations of the annual state-level interschool quiz contest held by my former school

### **Graduate Coursework (UIUC)**

- BCOG 458: Advances in Brain & Cognitive Science by Prof. John Hummel
- CS 598: Deep Generative Models by Prof. Arindam Banerjee
- CS 510: Advanced Information Retrieval by Prof. ChengXiang Zhai
- CS 444: Deep Learning for Computer Vision by Prof. Saurabh Gupta
- CS 447: Natural Language Processing by Prof. Julia Hockenheimer
- CS 445: Computational Photography by Prof. Yuxiong Wang

### **Relevant Undergraduate Coursework (SPPU)**

- CS 201: Data Structures
- CS 202: Database Management System
- CS 203: Object-Oriented Programming
- CS 206: Algorithm Design and Analysis
- CS 304: Artificial Intelligence
- CS 404: Data Warehousing and Data Mining
- CS 414: Big Data Analytics

### **Online Courses & Certifications**

- Deep Learning Specialization (by Andrew Ng)
  - \* Neural Networks and Deep Learning
  - \* Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization
  - \* Structuring Machine Learning Projects
  - \* Convolutional Neural Networks
  - \* Sequence Models
- Machine Learning - Stanford University (CS229 Lectures by Andrew Ng)
- Reinforcement Learning - Google Deepmind (by David Silver)