

Rhitvik Sinha

+1 (760) 759-3197 | rhitviksinha@nyu.edu | [linkedin.com/in/rhitvik-sinha](https://www.linkedin.com/in/rhitvik-sinha) | rhitviksinha.github.io/

EDUCATION

Courant Institute of Mathematical Sciences, New York University <i>Master of Science in Computer Science</i> Courses: <i>Computer Vision, Machine Learning, Reinforcement Learning, Large Language & Vision Models, DL Systems</i>	New York, NY 2022 - 2024
Indian Institute of Technology, Kharagpur <i>Bachelor of Technology (Honours) in Electrical Engineering</i> Courses: <i>Deep Learning, Data Analytics, Transform Calculus, Probability & Stochastic Processes</i>	Kharagpur, India 2018 - 2022

TECHNICAL SKILLS

Languages: *Python, C/C++, CUDA, MATLAB, R, JavaScript, Scala, Java*
Python Tools: *NumPy, PyTorch, TensorFlow 2.x, OpenCV, Gym/Gymnasium/PettingZoo, multiprocessing, Z3, Pandas, GeoPandas*
Developer Tools: *Git, Docker, AWS, GCP, L^AT_EX, VS Code, Unity (ML-Agents)*

EXPERIENCE

Machine Learning Engineer <i>Axiado Corp., San Jose, CA</i> Part of the research team, introducing ML-driven solutions for Cybersecurity.	Present <i>Supervisor: Mr. Zhichao Zhang</i>
Systems and Applications Engineer <i>Cirrus360 Corp., Richardson, TX</i> <ul style="list-style-type: none">Improved compile time of Gabriel™ (a platform for RAN deployment described using a Domain Specific Language) by 20-30% (logarithmic speedup as CPU cores are increased) through parallelization strategies using Python's multiprocessing module.Developed a Flask-hosted Automatic Speech Recognition application utilizing OpenAI's Whisper and PyTorch's TorchAudio, improving transcription efficiency with 8-bit quantization.Created multiple Python utilities to automate testing, increasing productivity and reducing development time.Modified configuration files to simulate constrained hardware environments, ensuring robustness and adaptability of Gabriel™.	Summer 2023 <i>Supervisor: Dr. Alan Gatherer</i>

PROJECTS

Image Encoding Schemes for Vision Transformers Paper <i>Course Project (CSCI-GA 3033 Special Topics: Large Language & Vision Models), NYU</i> <ul style="list-style-type: none">Improved image classification performance by 7% on CIFAR-10 and 8% on CIFAR-100 using Mixed-Resolution Tokenization, leveraging a saliency scorer for adaptive patch sizes, outperforming baseline Vision Transformers.Achieved 85% accuracy with patch embeddings, demonstrating their robustness and efficiency despite low computational cost, validated through extensive experiments with varying patch sizes.Explored advanced tokenization techniques, including VQ-VAE and initial convolutions, identifying limitations in their application for classification tasks, and highlighting mixed-resolution tokenization as a promising direction for further research.	Fall 2023 <i>Guide: Prof. Saining Xie</i>
Adaptive SphereFormer: Dynamic Radial Windows for Better Sparse Learning Paper <i>Course Project (CSCI-GA 2271 Computer Vision), NYU</i> <ul style="list-style-type: none">Developed the Adaptive SphereFormer, improving the existing state-of-the-art SphereFormer's radial window self-attention with dynamic adjustments based on point distance, increasing overall mean Intersection over Union (mIoU) by 1%.Achieved efficient memory management and better segmentation accuracy by progressively expanding window sizes with distance from the origin, validated on the SemanticKITTI dataset.	Fall 2023 <i>Guide: Prof. Rob Fergus</i>
Optimizing Diffusion Models for Image De-Noising Paper <i>Course Project (CSCI-GA 2565 Machine Learning), NYU</i> <ul style="list-style-type: none">Modified and trained diffusion models for noisy image inputs, analyzing the impact of noise levels, diffusion steps, and cycles; implemented and trained a class-conditioned diffusion model.Developed a diffusion model to regenerate images with missing pixels, effectively functioning as a Masked Auto-Encoder.Conducted literature review on VAEs, GANs, and diffusion models, and reproduced benchmarks for Denoising Diffusion Probabilistic Models (DDPM).	Fall 2022 <i>Guide: Prof. Rajesh Ranganath</i>
Barenet: INT8 Quantized Transformers from Scratch Code <i>Course Project (CSCI-GA 3033 Special Topics: Big Data & Machine Learning Systems), NYU</i> Developed a fully functional Multi-Layer Neural Net with int8 quantization and attention mechanisms, with CUDA kernels for matrix operations to achieve efficient transformer inference and performance optimization, creating a limited-functionality PyTorch clone.	Spring 2024 <i>Guide: Prof. Jinyang Li</i>
Multi-Agent RL with Unity (SoccerTwos) <i>Course Project (DS-GA 3001 Special Topics: Reinforcement Learning), NYU</i> Developed a Multi-Agent RL system using Unity's ML-Agents PettingZoo Wrapper to train agents in the SoccerTwos environment, implementing and comparing PPO, SAC, and POCA policies; achieved agents that autonomously learned collaborative 'attack' and 'defense' strategies through self-play.	Spring 2023 <i>Guide: Prof. Jeremy Curiusu</i>
Deep Learning for Extreme Weather Forecasting <i>Undergraduate Research, IIT Kharagpur</i> Conducted research on extreme weather forecasting using Capsule Neural Networks and Analog Weather Forecasting techniques, demonstrating superior performance over CNNs and logistic regression in predicting heat/cold waves 1-5 days ahead using T2m and Z500 data from the NCAR CESM-LENS dataset.	Spring, Fall 2021 <i>Guide: Prof. Adway Mitra</i>