

# NILAY NAHARAS

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## EDUCATION

### University of California, Los Angeles (UCLA)

MS in Computer Science

Sep. 2023 – Dec 2024

### Indian Institute of Technology Jammu (IIT Jammu)

B.Tech. in Electrical Engineering with minors in Computer Science

2019 – 2023

## PUBLICATIONS

### Two-streams: Dark and Light Networks with Graph Convolution for Action Recognition from Dark Videos

Nilay Naharas, Saurabh Suman, Badri N Subudhi and Vinit Jakhetiya

AAAI-2023

### QCA Technology based 8-bit TRNG Design for Cryptography

Prateek Sinha, Aniket Sharma, Nilay Naharas, Syed Farah Naz and Ambika Prasad Shah

VDAT-2022

### CR-AT: Chaos Reduction-based Adversarial Training for Robustness Enhancement of Deep Learning Models

Siddharth Gupta, Nilay Naharas, Salim Ullah, Akash Kumar

## WORK AND RESEARCH EXPERIENCE

### PLUS lab, University of California Los Angeles, (UCLA)

February 2024 – Present

Research Assistant

Los Angeles, California

- Working on improving **Vision Language Concept (VLC)** understanding and compositional reasoning in the **Vision Language (VL)** models.
- Developed a customized version of **ControlNet** and using contrasting prompts to generate images highlighting these contrastive features using these images to fine-tune the VL model using **LORA** adapters and **PPO**.

### ScAI Lab, University of California Los Angeles, (UCLA)

January 2024 - Present

Research Assistant

Los Angeles, California

- EHR Time Series Prediction**
  - Experimenting with time-series Language Models (LMs) like **LLAMA**, **BERT**, etc. to classify diseases based on Electronic health record data.
  - Using ICD codes to classify the disease. Evaluating results using metrics: **prediction accuracy** and **AUC**.
- Glaucoma Diagnosis**
  - Testing hypothesis that newly developed shape measures using optical coherence tomography (**OCT**) macular volume scans can discriminate patients with perimetric glaucoma from healthy subjects.
  - Experimenting with vision models like **ResNeXt**, **ViT** (Vision Transformer) and **SEResNet**.

### Technical University of Dresden

June 2022 – September 2023

Research Intern | Advisor: Prof. Akash Kumar

Dresden, Germany

- Examining the constraints under which the neural networks can be made robust and efficient against attacks like AutoAttack, PGD, CW, and FGSM.
- Experimented with **Knowledge Distillation**, **Quantization**, and **ensemble techniques** using **orthogonal neural networks**
- Developed a **novel method** combining concepts from Chaos Theory and Adversarial Training called **CR-AT** (Chaos Reduction-based Adversarial Training).

### University of New South Wales, Sydney

September 2022 - January 2023

Research Intern | Advisor: Prof. Rohitash Chandra

Sydney, Australia

- Analyzed drill core to build the models that capture physical variability in the ore body.
- Used **Autoencoders**, **PCA**, and **K-Means** for analyzing drill cores in order to provide summary statistics for drill-core evaluation/comparison.

### Schneider Electric

June 2022 – August 2022

Business Intelligence & Analytics Intern

Gurugram, India

- Applied **Neural Network Inversion** to predict the optimal ranges for the input parameters for predicting the solder joint reliability for the manufactured PCBs.
- Trained an XGBoost model in Sklearn and applied K-fold cross-validation and SMOTE technique for handling the class imbalance problem. Achieved an accuracy of **87%** on the test set and **79%** on the real-time data.
- My work is now being augmented being **scaled** up to be applied in other plants around the **world**.

## WorldQuant

May 2022 - June 2022

Quantitative Research Intern

Mumbai, India

- Acquired knowledge about the methodologies for **developing alphas** with Price & Volume data of portfolios.
- Worked on alphas and developed an understanding of **technical indicators** and used them for analysis of alphas.
- Used WorldQuant's proprietary simulators to simulate and understand alpha performance.

## Indian Institute of Technology Jammu (IIT Jammu)

June 2021 - July 2022

Undergraduate Research Intern | Advisor: Dr. Ambika Prasad Shah

Jammu, India

- Synthesized a **novel structure** for an 8-bit True Random Number Generator (**TRNG**) using Quantum Cellular Automata (**QCA**) technology.
- Implemented it using the **QCADesigner**, simulated various temperature conditions and analyzed the heat map for power dissipation in **QCAPro**.
- Used **Cadence tools**: Incisive, Innovus, and Genus for design layout, synthesis, and timing analysis of circuits.

## Steath Startup

November 2021 - March 2022

Machine Learning Intern | Voice Cloning Project

- Performed speaker **fine-tuning** and used **transfer learning** to generate the target voice.
- Prepared data by downloading podcasts from YouTube, removed noise, and performed **forced alignment** between transcripts and audio files using **Aeneas**.
- Used TTS (Text-To-Speech), **Tacotron 2** and Vocoder modules for producing a similar target voice.

## PROJECTS

DiverseDermDiff | Foundation Models for Autonomous Agents Course Project

April 2024 - June 2024

- Evaluated the diversity in **HAM10k** and **DDI** datasets by formulating it as the performance of a classifier.
- Generated 600 samples using **InstructPix2Pix** and verified those generations through **LLaVa**.
- Fine-tuned a pre-trained ResNet-18 and achieved accuracy gains by **21.21%**.

Persona Chatbots | NLP Course Project

April 2024 - June 2024

- Created a pipeline for evaluating and developing **Persona injection in chatbots**, using **Mistral 7B** model as baseline.
- Evaluated model using **perplexity**, **MMLU** and **GPTEval** (**GPT3.5 turbo**, **GPT4**, **Mistral**, **Llama 3**, **Phi-3**) and **HDS Score**

SEC Filings Analyzer for SAAS Companies | Inter IIT Tech Meet 10.0

February 2022 - March 2022

- Created a dashboard to measure growth and profitability for investors.
- **Finetuned** word embeddings generated using a pre-trained **BERT** model from **Huggingface**
- **Scraped SEC Filings** from 10-K, 10-Q and 8-K forms for 292 companies using **BeautifulSoup**.

SAE eBAJA 2022 | Head of the Powertrain department IIT Jammu

July 2021 - July 2022

- **Designed and implemented** the Electric Powertrain of the All-Terrain Vehicle (**E-ATV**).
- Used a 4kW 48V PMSM motor, 48V 150A PMSM controller and 110 Ah 48V Li-ion Battery.
- Installed a motor controller to regulate the speed and torque of the motor, a DC to DC converter to power auxiliary units and integrated hall sensors.
- Secured **AIR 8** among 82 teams nationwide in eBAJA design competition.

## SCHOLASTIC ACHIEVEMENTS

- Ranked in the **top 5%** in the department of Electrical Engineering.
- **Secured All India Rank (AIR) 8** among 82 teams in nationwide eBAJA design competition, **SAE eBAJA 2022**.
- **Volunteered** and **presented** work in the poster presentation at **AAAI-23** and **VDAT-2022**.

## TECHNICAL SKILLS

Languages: Python, C/C++, VHDL, Verilog, Java

Libraries/Frameworks: PyTorch, TensorFlow, Keras, JAX, Scikit-learn, Huggingface, NumPy, OpenCV, Git, L<sup>A</sup>T<sub>E</sub>X

## POSITIONS OF RESPONSIBILITY

Co-Head of Powertrain Department |Team Kinesis |(2021-2022)

Head Coordinator |Football Club |IIT Jammu |(2021-2022)

Captain |College Football Team |(2021-2022)

Organizer for Football Events |Pravaah, Inter Branch Sports Fest |IIT Jammu |(2020)

Organizer for Football Events |Prarambh, Inter Year Sports Fest |IIT Jammu |(2021)