

# Shamika Likhite

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## EDUCATION

Northwestern University, Evanston, IL, USA

Master of Science in Computer Engineering (Artificial Intelligence specialization)

September 2022 - December 2023

GPA: 3.62/4.0

Visvesvaraya National Institute of Technology, Nagpur, India (NIT Nagpur)

Bachelor of Technology in Electrical Engineering

July 2018 - May 2022

GPA: 8.06/10

## PUBLICATIONS

- **Likhite, S.**, Tapia-Lopez, S., Katsaggelos, K. A. (2025). "Physics-Informed Image Restoration via Progressive PDE Integration" [Pre-print](#).
- Mohapatra, P.\*, **Likhite, S.\***, Biswas, S., Islam, B., & Zhu, Q. (2024). "Missingness-resilient video-enhanced multimodal disfluency detection", [Interspeech 2024](#).
- **Likhite, S.**, Mohapatra, P. "[Audio-Video Speech Disfluency Dataset](#)", Interspeech 2024
- **Likhite, S.** (2024). video-audio-recorder – [PyPi package](#) for simultaneous video and audio recording.
- **Likhite, S.**, Lambat, N., Kavalekar, V., et al. (2021). "RFID-based embedded security system", [Pre-print](#).
- **Likhite, S.**, Tapia-Lopez, S., Katsaggelos, K. A. (2026). "Resource-Efficient Video Deblurring by Keyframe Enhancement using a PDE-based global layer" In preparation.

(\* – equal contribution)

## EXPERIENCE

Machine Learning Engineer: SpeechAce, LLC

Mentor: Ahmed El-Shimi

October 2024 – Present

- **Pioneered SpeechAce's shift into a new modality: text** by developing an [AI writing assessment tool](#) using advanced NLP techniques to evaluate and offer feedback on written language proficiency.
- The writing assessment suite is used by K-12 educators, corporate trainers, publishers, and universities in 20+ countries.
- Fine-tuned GPT-3.5 & GPT-4 on 8,000+ texts, improving evaluation rubric alignment and cutting scoring variance by 35%.
- Implemented a feedback pipeline that performs atomic token edit extraction on text pairs to identify minimal, meaningful changes and appended these edits to the sentence pair for additional context.
- Deployed LLMs with prompt engineering pipelines for automated error taxonomy classification and generation of feedback, utilizing few-shot learning and chain-of-thought reasoning on enriched embeddings.
- Optimized the scoring and feedback models using multi-threaded invocation and batch inference to deliver 10s latency.
- Embedded the scoring and feedback engine into a serverless REST API (AWS Lambda + API Gateway) for production.
- Built a quality assurance pipeline and a Retool interface to flag problematic annotations for relabeling, then retrain the model, improving data quality and system reliability through a streamlined feedback loop.

Research Assistant, Image & Video Deblurring: IVPL, Northwestern University

Mentor: Prof. Aggelos K. Katsaggelos

June 2024 – March 2025

- Modeled feature evolution in image restoration tasks as an advection-diffusion process
- Designed a global layer to implement PDE-based feature updation and integrated it within state-of-the-art (SOTA) image deblurring models
- Developed a novel progressive training strategy that maintains constant PDE integration time while incrementally increasing PDE iterations, successfully mitigating gradient vanishing and enabling stable training.
- SOTA image deblurring models with the integrated global layer outperformed corresponding base architectures with less than 1% increase in computational overhead.
- Published our findings, "[Physics-Informed Image Restoration via Progressive PDE Integration](#)".
- Architected a light-weight variant of the [VRT](#) (Video Restoration Transformer) architecture as a resource-conservative baseline for video deblurring model.
- Developed a video deblurring technique that restores keyframes using the developed PDE-based global layer, and propagates learned features to enhance subsequent frames while ensuring temporal consistency.
- Benchmarked the model against the baselines, comparing resolution enhancement, temporal consistency and computational efficiency.
- Our manuscript, "Resource-Efficient Video Deblurring by Keyframe Enhancement using a PDE-based Global Layer" is currently **in preparation**.

## Research Scientist, Multimodal Learning for Speech Disfluency Detection: Ideas Lab June 2023 – September 2024

Mentor: Prof. Qi Zhu

- Built the **first** 'Missingness'-Resilient Speech Disfluency Detection & Emotion Recognition multimodal model using **clinical audio samples and video episodes** from the [Apple Stuttering Event Dataset](#).
- The transformer-based model uses a **novel** weight-sharing encoder for feature fusion which ensures high performance even with up to 50% missing video samples (**SOTA**), outperforming audio-only models.
- Curated **the first annotated audio-visual dataset** of atypical speech from clinical episodes for speech disfluency analysis.
- Utilized pre-trained NLP models for audio (wav2vec and HuBERT) and video (Auto-AVSR) feature extraction.
- Empirically demonstrated that unified fusion outperforms early and late fusion on classifying atypical speech.
- Benchmarked the multimodal model, showing improved performance over audio-only, video-only and audio-text baselines.
- Experimentally demonstrated that restricting videos to the lip-ROI degrades disfluency classification accuracy, contrary to prevalent hypotheses based on ASR techniques.
- Developed a **PyPi package** for streamlined, synchronized recording of multimodal (audio & video) data.
- Developed an inference pipeline for real-time on-device learning on Nvidia Jetson-Tx2 to analyze disfluencies.
- Performed **ablation studies** on the deployed model to benchmark the impact of video quality on inference.
- **Published** our work on missingness-resilient multimodal learning in [Interspeech 2024](#).

## Research Project, Human-AI Interaction in Organizational Networks: Sonic Lab

June 2023 – Dec 2023

Mentor: Prof. Noshir Contractor

- Analyzed Human-AI teams (HATs) (**HAT**) by mining longitudinal data of organizational interactions pre- and post-AI chatbot implementation, to identify effects on organizational ties, for better AI integration at the workplace.
- Developed knowledge graphs from unstructured data to represent organizational interactions within surveyed HATs.
- Implemented **Logistic Regression (GLMs) & Stochastic Actor-Oriented Models (SAOM)** in R for predictive analytics.
- Used **statistical modeling & hypothesis testing** to examine the impact of AI on social ties during the surveyed period.
- Predicted future effects of AI on organizational dynamics, providing data-driven recommendations for optimal HAT design.
- Benchmarked SAOMs against GLMs, showing SAOMs were 25% more accurate in predicting AI adoption effects.

## Machine Learning Engineer Intern: Ugam Solutions, A Merkle Company

May 2021 – July 2021

Mentor: Mr. Abhishek Sharma

- Developed a Generative Adversarial Network (GAN) for image super-resolution and packaged it as an end-to-end application for data pre-processing for image processing tasks on Ugam's Cognitive Computing platform.
- Improved the accuracy of the platform on computer vision tasks from **74% to 80%**.
- Designed a **custom GAN generator** using a U-Net architecture with a ResNet-34 backbone.
- Implemented 'minibatch discrimination' to mitigate mode collapse and enhance feature generation quality.
- Designed a decaying learning rate scheduler and augmented training data to ensure stable GAN training & smooth convergence.
- Benchmarked the model against pre-trained Enhanced Deep Residual Networks and Fast Residual CNN, with the SRGAN producing images with better PSNR and SSIM.
- Developed a RestAPI for super-resolution using Flask for ease of beta-testing, showcasing model performance on input images.

## TECHNICAL SKILLS

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- **Programming:** Python, R, C, C++, HTML, JavaScript, Scala, Linux, CSS, Flask, Git
- **Database Management & Querying Tools:** SQL, PostgreSQL
- **Python & R Libraries:** Numpy, Scipy, scikit-learn, Pandas, Spacy, Pillow, OpenCV, NLTK, tidyverse, dplyr
- **Machine Learning Frameworks:** PyTorch, TensorFlow, HuggingFace, Keras
- **Data Visualization:** Tableau, R-Shiny, ggplot2, plotly, seaborn
- **ETL Pipelines and workflows:** Docker, Airflow, Kubernetes
- **Cloud Computing:** AWS, Azure

## MENTORSHIP & LEADERSHIP

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- Research Mentor, Ideas Lab (2024): Mentored a master's student for on-device deployment of a keyword identification model.
- Technical Secretary, IvLabs, VNIT (2020-2022): During my work at IvLabs (Robotics), trained incoming team members in computer vision, manual robotics, and hardware for the smooth functioning of the lab.
- Student Mentor, NIT Nagpur (2020-2022): Helped acquaint new students with policies and provided academic guidance.