Geet Khatri

Email: gkhatri@ncsu.edu
Website: geetkhatri.github.io
LinkedIn: geetkhatri

Education

North Carolina State University — Raleigh, NC
Ph.D. in Electrical Engineering · GPA: 4.00/4.00 — Fall 2021–Present

Delhi Technological University — New Delhi, India
B.Tech. in Electronics and Communication Engineering · CGPA: 8.45/10.00 — 2014–2018

Experience

Active Robotic Sensing (ARoS) Lab, NC State University — Raleigh, NC
Graduate Research Assistant — August 2023–Present

- Applying speech and language models, such as self-supervised speech representation models and large language models (LLMs), to multimodal dementia detection
- Developing machine learning and optimization algorithms for a wearable biosensor for detecting circulating histones in blood

Department of Electrical and Computer Engineering, NC State University — Raleigh, NC
Graduate Teaching Assistant — August 2022–August 2023

- "ECE 516: Systems Control Engineering" in Summer 2023
- "ECE 542: Neural Networks" in Spring 2023
- "ECE 308: Elements of Control Systems" in Fall 2022

Advanced Diagnosis, Automation, and Control (ADAC) Lab, NC State University — Raleigh, NC
Research Assistant — August 2021–August 2022

- Applied signal processing and machine learning algorithms to ultrasonic fault detection for nuclear reactor shells as part of a research project for the Department of Energy's Nuclear Energy Enabling Technologies (NEET) program
- Modeled the open-circuit voltage of batteries with neural networks

UBS — Pune, India
Software Engineer — 2018–2021

- Worked on data visualization, identification of trends in data, and predictive modeling
- Developed tools for enforcement and tracking of organizational controls

Academic Projects

- **Parkinson's Disease Detection from Speech Data**
  The classification algorithm detects signs of Parkinson's disease based on features extracted from speech. The algorithm is based on k nearest neighbors (kNN).
- **Trigger Word Detection**
  The trigger word detection model comprises a recurrent neural network (RNN). The STFT of an audio is fed to the network, and the model triggers an action when it detects the trigger word in the audio.
- **Speech Enhancement Using Wiener Filtering and Pitch-Synchronous STFT Phase Reconstruction** *(Undergraduate Thesis)*
  The algorithm reconstructs the phase spectrum of the pitch-synchronous STFT of the speech signal. Certain properties of the pitch-synchronous STFT of harmonic signals make estimation of the phase spectrum faster and more robust to noise compared to phase reconstruction of constant–window size STFT. The magnitude spectrum is estimated using Wiener filtering.
- **Speech Enhancement Based on Maximization of Mutual Information**
  This method of speech enhancement involves maximization of the mutual information between the message spoken by the speaker at the far-end and the message perceived by the listener at the near-end.
- **Lossy Audio Compression Using a Statistical Sub-Band Model of Quantization Noise**
  The algorithm, which is based on MPEG AAC, minimizes the perceived distortion due to compression. This distortion is related to the quantization noise over frequency sub-bands. A key step in the algorithm is computation of the optimal sub-band scalefactors using a statistical model of quantization noise.

Skills and Coursework

- **Languages:** Python, MATLAB, R, C, Bash, SQL, HTML, CSS
- **Software/Frameworks:** MATLAB/Octave, Torch, TensorFlow, Git, Tableau, Excel, LaTeX
- **Relevant Coursework:** Deep Learning, Pattern Recognition, Data Science, Optimization, Digital Signal Processing, Audio Signal Processing, Probability & Random Processes, Statistics, Bayesian Analysis, Detection & Estimation Theory, Information Theory & Coding, Image Processing, Computer Vision, Control Systems, Optimal Control, Functional Analysis, Harmonic Analysis