Joy Saha

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Education

University At Albany, SUNY **Aug 2024 – Present**
PhD in Electrical and Computer Engineering *NY, United States*
Major in Signal Processing and Communications *CGPA: 4.00/4.00*
Advisor: Professor Daphney–Stavroula Zois

Bangladesh University of Engineering and Technology **Mar 2018 – May 2023**
Bachelor of Science in Electrical and Electronic Engineering *Dhaka, Bangladesh*
Major in Communication and Signal Processing *CGPA: 3.61/4.00*
Achieved an average CGPA of 3.75 across the last four terms.

Research Interests

- Feature Acquisition
- Machine Learning
- Statistical Signal Processing
- Sequential Decision Making
- Optimization
- Instant-wise Feature Grouping

Experience

Graduate Teaching Assistant **Aug 2024 – Present**
University at Albany, SUNY *NY, United States*
Department of Electrical and Computer Engineering

Research Project Assistant **Summer 2025, 2026**
The Research Foundation for SUNY *NY, United States*
Department of Electrical and Computer Engineering

Part-Time Lecturer **Jan 2024 – Aug 2024**
Presidency University *Dhaka, Bangladesh*
Department of Electrical and Electronic Engineering

Adjunct Lecturer **Feb 2024 – July 2024**
Bangladesh University of Textiles *Dhaka, Bangladesh*
Department of Textile Machinery Design and Maintenance

Publications

- **Joy Saha**, Daphney–Stavroula Zois. *"Adaptive Sequential Feature Grouping and Acquisition for Cost-Efficient Classification."* 34th European Signal Processing Conference (EUSIPCO), 2026. (Accepted)
- Lamia Hossain, Ilma Hossain, SM Taslim Uddin Raju, Md Shahidul Salim, and **Joy Saha**, "A Novel Technique for Classification of Motor Imagery EEG Signal Based on Deep Learning Approaches," *Intelligent Networks and Systems*, pp. 52–64, Chapman and Hall/CRC, 2025.

Projects

CSI-Based Sign Language Recognition Using CNN-GRU Architecture Enhanced with Attention | GitHub
- Designed a camera-free WiFi CSI–based sign language recognition system using CNN for spatial feature extraction across subcarriers and antennas.
- Developed a Bi-GRU with attention mechanism for temporal modeling, combined with self-supervised contrastive pretraining and extensive CSI augmentation.
- Achieved up to 99% accuracy, validated through ablation studies and Grad-CAM interpretability analysis using deep sequential models and attention mechanisms.

Neural Networks: Investigating Effects of Layer Depth, Neuron Count, and Activation Functions | GitHub
- Implemented feedforward neural networks from scratch in Python, systematically analyzing the impact of layer depth and neuron count on classification performance and generalization.

- Investigated the effect of various activation functions on computational efficiency across standard datasets using back-propagation and optimization techniques.
- Built intuition about data transformations through learned weights and activations, evaluating trade-offs between model complexity and performance.

Comparative Analysis of Ada-Hessian and First-Order Optimizers for CSI-Based Sign Language Recognition | GitHub

- Conducted a comparative study of the Ada-Hessian second-order optimizer against first-order methods including SGD, Adam, AdamW, Adamax, Nadam, and RMSprop using stochastic Hessian estimation.
- Demonstrated faster convergence (≈ 50 vs. 150+ epochs) and superior validation accuracy of 99.31% on the Lab dataset for WiFi CSI–based sign language recognition.
- Analyzed robustness to learning-rate variations and per-iteration computational cost trade-offs across all optimizers in a deep learning framework.

Social Distance Monitoring in COVID-19 Situation | GitHub

- Employed machine learning techniques using Matlab, CNN, and YOLOv2 to create a system that detects social distance compliance in images or videos.
- Trained models using annotated datasets to classify individuals and visually indicate their proximity to others with green and red bounding boxes.
- Implemented the system as a DSP lab project using image processing techniques, enabling real-time monitoring and visualization of social distancing.

Bayesian Hypothesis Testing on SeeClickFix Service Requests | GitHub

- Designed Bayes-optimal binary and 4-hypothesis tests using Bayes criterion and likelihood ratio testing to classify 529 citizen 311 service requests from the Albany County SeeClickFix dataset.
- Applied multi-variate Bernoulli and multinomial likelihood models with Laplace-smoothed maximum-likelihood estimates, evaluating performance metrics (P_F, P_D, P_M, P_ϵ) across a grid of Bayes cost tuples.
- Traced ROC curves achieving AUC up to 0.995 with test errors as low as 1.9%, demonstrating strong classification performance.

IoT Based Environment Monitor System | GitHub

- Developed an IoT-based environment monitoring system using Arduino, NodeMCU, MQ135, DHT11, SIM800L, and LCD in the Microprocessor and Embedded System sessional course, incorporating GSM technology for seamless connectivity.
- Utilized two sensors to measure temperature, humidity, and air quality, with the collected data uploaded to an online cloud system for real-time display and recording.
- Implemented a warning mechanism where users receive immediate notifications on their phones when the monitored parameters exceed predetermined thresholds.
- Powered the entire system using solar energy with battery backup, ensuring reliable operation and sustainability.

IoT Based Remote Heart Rate Monitoring System | GitHub

- Developed an IoT-based system using Arduino, ESP8266, and AD8232 for collecting ECG data from patients, utilizing a microcontroller for heart rate calculation and identification of abnormal ECG signals.
- Implemented email notifications and data uploading to Google Drive for further analysis, enabling efficient communication and storage of the collected ECG data.
- Designed the system to integrate IoT technology, microcontroller-based calculations, and data management functionalities for enhanced monitoring and analysis of ECG signals.

Undergraduate Thesis

Implementation-Friendly Convolution Neural Network for Sign Language Recognition Using WiFi CSI Data | GitHub

- Collaborated with Dr. Hafiz Imtiaz and Dr. Tahsina Farah Sanam to develop an innovative WiFi CSI–based sign language recognition system using Matlab and Python as an undergraduate thesis.
- Employed advanced machine learning algorithms and signal processing techniques to interpret sign language gestures captured through WiFi signals, aiming for accurate recognition.
- Utilized MATLAB for preprocessing the captured CSI data and Python for implementing machine learning models, demonstrating the versatility and effectiveness of the combined approach.
- Achieved comparable accuracy to existing methods while employing a less complex model and simpler preprocessing techniques, indicating the efficiency and effectiveness of the developed system.
- Contributed to the field of sign language recognition by offering a WiFi-based solution with the potential to improve communication and accessibility for individuals using sign language.

Technical Skills

Languages: Python, C, C++, Matlab, Verilog
Simulation Tools: PSpice, TinkerCad, PSAF, PSSE , AutoCad, Proteus
Others: Word, Excel, PowerPoint, Latex, PLC, PCB Design

Relevant Coursework

- Probabilistic Machine Learning
- Deep Learning
- Algorithms and Data Structures
- Optimization Methods and Non-Linear Programming
- Digital Signal Processing
- Probability and Random Processes
- Foundations of Statistical Inference

Standarized Test Scores

GRE General Test: Quant- 165/170 , Verbal 148/170, AWA-3.0/6.0 **Nov 07,2023**
TOEFL iBT Test: Reading- 28/30 , Listening- 25/30, Speaking- 22/30 , Writing- 27/30 **Dec 08,2023**

Volunteer Work

Buet Rover Scout **Oct 2018**
Volunteer During Covid Pandemic **April 2020 – Aug 2020**
Organizer EEE Day **Feb 2023**

Awards and Scholarships

CNSE Excellence in Teaching **2025, 2026**

- Awarded Best Graduate Teaching Assistant , Department of Electrical and Computer Engineering, UAlbany.

Dean's List **Feb 2021 - April 2022**

- Acknowledged for achieving an average CGPA of 3.75 or above across consecutive terms(3-1, 3-2).

References

Dr. Daphney–Stavroula Zois
Associate Professor, Department of
Electrical & Computer Engineering
University at Albany, SUNY
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☎ On Request

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Bangladesh University of Engineering and Technology, Dhaka, Bangladesh
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☎ On Request