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 Selection
- 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 **May 2025 – Aug 2025**
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

Projects

CSI-Based Sign Language Recognition Using CNN-GRU Architecture Enhanced with Attention | *WiFi CSI, Deep Sequential Models, Attention Mechanisms, Self-Supervised Learning* *GitHub*

- Designed a camera-free WiFi CSI–based sign language recognition system using CNN for spatial feature extraction across subcarriers and antennas, Bi-GRU with attention for temporal modeling, and self-supervised contrastive pretraining with extensive CSI augmentation, achieving up to 99% accuracy and validated through ablation studies and Grad-CAM interpretability.

Neural Networks: Investigating Effects of Layer Depth, Neuron Count, and Activation Functions | *Python, Feedforward Neural Networks, Backpropagation, Optimization* *GitHub*

- Implemented and evaluated feedforward neural networks from scratch, systematically analyzing the impact of layer depth, neuron count, and activation functions on classification performance, generalization, and computational efficiency across standard datasets to build intuition about data transformations through learned weights and activations.

Comparative Analysis of Ada-Hessian and First-Order Optimizers for CSI-Based Sign Language Recognition | *Second-Order Optimization, Ada-Hessian, Stochastic Estimation, Deep Learning* *GitHub*

- Conducted a comparative study of the Ada-Hessian second-order optimizer against first-order methods (SGD, Adam, AdamW, Adamax, Nadam, RMSprop) for WiFi CSI–based sign language recognition, demonstrating faster convergence ($\approx$ 50 vs. 150+ epochs), superior validation accuracy (99.31% on Lab dataset), and strong robustness to learning-rate variations despite higher per-iteration computational cost.

Social Distance Monitoring in COVID-19 Situation | *Matlab, CNN, YOLOv2, Image Processing* *GitHub*

- Developed a real-time social distance monitoring system using CNN and YOLOv2 to detect individuals in images/videos and visualize proximity compliance with color-coded bounding boxes.

TDM-PCM System Development in Proteus | *Proteus, ADC0804, 74HC595, DAC0808* GitHub

- Designed and simulated a complete TDM–PCM communication system including multiplexing, quantization, decoding, and multi-stage low-pass filtering for signal reconstruction.

IoT Based Environment Monitor System | *Arduino, NodeMCU, MQ135, DHT11, SIM800L, LCD* GitHub

- Built a solar-powered IoT system to monitor temperature, humidity, and air quality with cloud logging and GSM-based alert notifications upon threshold violations.

IoT Based Remote Heart Rate Monitoring System | *Arduino, ESP8266, AD8232* GitHub

- Implemented an IoT-enabled ECG monitoring system with on-device heart rate analysis, abnormal signal detection, and automated email-based data storage.

Undergraduate Thesis

Implementation-Friendly Convolution Neural Network for Sign Language Recognition Using WiFi CSI Data | *Matlab, Python, CNN, Signal Processing* GitHub **April 2022 – May 2023**

- Developed a WiFi CSI–based sign language recognition system using signal processing and CNN models, leveraging MATLAB for data preprocessing and Python for model implementation.
- Achieved accuracy comparable to existing methods with reduced model complexity and simplified preprocessing, demonstrating an efficient and implementation-friendly approach.

Technical Skills

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

Publications

- Lamia Hossain, Ilma Hossain, Md. Shahidul Salim, S.M. Taslim Uddin Raju, **Joy Saha**. *"A Novel Technique for Classification of Motor Imagery EEG Signal Based on Deep Learning Approaches."* International Conference on Big Data, IOT and Machine Learning (BIM 2023).

Relevant Coursework

- Probabilistic Machine Learning
- Deep Learning
- Probability and Statistics
- Optimization Methods and Non-Linear Programming
- Digital Signal Processing
- Machine Learning
- Probability and Random Processes
- Computer Networks

Volunteer Work

Buet Rover Scout **Oct 2018**

Volunteer During Covid Pandemic **April 2020 – Aug 2020**

Organizer EEE Day **Feb 2023**

Awards and Scholarships

Excellence in Teaching **Mar 2025**

- Awarded Best Graduate Teaching Assistant 2024, 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
NY, United States
✉ dzois.albany.edu
☎ On Request

Dr. Hafiz Imtaiz
Professor, Department of Electrical & Electronic Engineering
Bangladesh University of Engineering and Technology, Dhaka, Bangladesh
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☎ On Request