







K M Naimul Hassan

 k-m-naimul-hassan |  <http://naimulhassan.github.io> |  NaimulHassan
 hassan.491@osu.edu |  +1 (614) 556-9655 |  Columbus, Ohio

RESEARCH INTEREST

Brain-Computer-Interface, Neuro AI, Audio and Speech Signal Processing, Speech Perception, AI for Healthcare & Accessibility, Multimodal Learning

WORK EXPERIENCE

Graduate Research Associate, The Ohio State University

Aug. 2023 – Present

The ASPIRE Group @ OSU

Columbus, Ohio, USA

- Developing a reinforcement learning framework for real-time auditory attention decoding to control neuro-steered hearing aids.
- Collecting and analyzing synchronized multimodal brain and acoustic data to study neural correlates of speech attention.
- Developing a contrastive learning framework to align brain signals with speech stimuli.

Research Assistant, Bangladesh University of Engineering and Technology

July 2021 – July 2023

Department of Electrical and Electronic Engineering

Dhaka, Bangladesh

- Built a privacy-preserving cough detection pipeline using audio source separation techniques.
- Designed an efficient transformer-based model for medical sound event detection.

EDUCATION

The Ohio State University

Aug. 2023 – Present

Ph.D. in Computer Science and Engineering

Columbus, Ohio

Bangladesh University of Engineering and Technology

Feb. 2016 – July 2023

M.Sc. and B.Sc. both in Electrical and Electronic Engineering

Dhaka, Bangladesh

COURSES TAKEN

Seminar in Speech and Hearing Science, Introduction to Artificial Intelligence, Machine Learning and Pattern Recognition, Computer Vision for HCI, Deep Learning: Models, Theory and Applications, Biomedical Signal Processing, Digital Signal Processing







NOTABLE PUBLICATIONS

 [Google Scholar](#) 




NeuroAI

- **K. M. N. Hassan** and D. Williamson, "SCANS: Supervised Contrastive temporal Alignment of Neural response and Speech stimuli," under review at Interspeech 2026.
- **K. M. N. Hassan**, Seyed Ali Alavi and D. Williamson, "MAESTRO: A Multimodal Auditory-attention Egocentric Speech-TRacking Open corpus," submitted to IEEE Transactions on Audio, Speech, and Language Processing, 2026.

AI in Healthcare & Accessibility

- **K. M. N. Hassan** and M. A. Haque, "SS+CEDNet: A Speech Privacy Aware Cough Detection Pipeline by Separating Sources," 2022 IEEE 10th Region 10 Humanitarian Technology Conference (R10-HTC), 2022, pp. 32-37, doi: 10.1109/R10-HTC54060.2022.9929794.
 Repository  Paper
- **K. M. N. Hassan** et al., "ALSNet: A Dilated 1-D CNN for Identifying ALS from Raw EMG Signal," ICASSP 2022 - 2022 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2022, pp. 1181-1185, doi: 10.1109/ICASSP43922.2022.9747366.
 Repository  Paper
- **K. M. N. Hassan**, S. K. Biswas, M. S. Anwar, M. S. Iman Siam and C. Shahnaz, "A Dual-Purpose Refreshable Braille Display Based on Real Time Object Detection and Optical Character Recognition," 2019 IEEE International Conference on Signal Processing, Information, Communication & Systems (SPICSCON), 2019, pp. 78-81, doi: 10.1109/SPICSCON48833.2019.9065110.
 Repository  Paper

Audio and Speech Processing

- A. B. A. Qayyum, **K. M. N. Hassan**, A. Anika et al., "DOANet: a deep dilated convolutional neural network approach for search and rescue with drone-embedded sound source localization," J AUDIO SPEECH MUSIC PROC. 2020, 16 (2020). <https://doi.org/10.1186/s13636-020-00184-2>.
 Repository  Paper
- A. B. A. Qayyum, A. Anika, M. M. M. Miah, M. M. Rahman, **K. M. N. Hassan** et al., "Direction of Arrival Estimation through Noise Suppression: A Novel Approach using GSC Beamforming and Room Acoustic Simulation," 2019 IEEE International Conference on Signal Processing, Information, Communication & Systems (SPICSCON), 2019, pp. 104-108, doi: 10.1109/SPICSCON48833.2019.9065151.
 Paper

SKILLS SUMMARY

Programming Languages : Python, C, C++, MATLAB, PsychoPy, Shell Scripts, Assembly, JavaScript

ML-DL Frameworks : PyTorch, TensorFlow, Keras, scikit-learn, Pandas, OpenCV, Numpy

Hardware & IoT : AntNeuro EEG, Tobii Glasses, Arduino, Raspberry Pi, Microcontroller

Web Development : HTML, CSS

PROJECTS

Belief-State Reinforcement Learning for EEG-Based Auditory Attention Detection

Ph.D. Research

Developing a POMDP-based reinforcement learning system that decodes auditory attention from EEG brain signals to enable real-time, uncertainty-aware control of neuro-steered hearing aids.

Multimodal Dataset to Determine Neural and Physical Cues that Correlate with Speech Attention

Ph.D. Research

Collected and synchronized hundreds of hours of multimodal EEG, eye gaze, head motion, audio, and video data to identify neural and physical cues correlating with speech attention across varying acoustic conditions.

Temporal Alignment of Neural Response and Speech Stimulus

Ph.D. Research

Developed a supervised contrastive learning framework using dilated convolutions and cross-modal attention to temporally align EEG signals with speech stimuli in naturalistic listening conditions.

Privacy-Preserving Cough Detection from Audio Signals

M.Sc. Research

Built a privacy-preserving cough detection pipeline using Wave-U-Net for audio source separation, improving the detection accuracy while protecting speech privacy.

Efficient Medical Sound Event Detection

M.Sc. Research

Designed an attention-free transformer using FFT-based sublayers for medical sound event detection, achieving a significant relative improvement over Audio Spectrogram Transformer with fewer parameters.

Synthetic speech attribution

IEEE SP Cup 2022

Mentored a team which was able to develop a vector-to-vector similarity-based feature clustering network that processes Mel-spectrogram and x-vector audio features through convolutional and dense layers for speech attribute modeling.

Intelligent dialog management of social-bots

Amazon Alexa Prize SocialBot Grand Challenge 2022

Designed a modular social conversational agent with separate Natural Language Understanding, Dialog Management, and Response Generation components. Integrated intent/entity recognition, sentiment and emotion modeling, user persona embeddings, and neural response generation to enable engaging, context-aware conversations.

Unsupervised anomaly detection in multimodal autonomous systems

IEEE SP Cup 2020

Proposed two anomaly detection methods using IMU sensor data and video data, employing an LSTM autoencoder for sensor signals and a convolutional autoencoder on optical-flow features for video analysis, with a parametric anomaly score.

Search & rescue with drone-embedded sound source localization

IEEE SP Cup 2019

Designed a deep neural network for sound source localization that estimates direction of arrival from multi-channel audio signals. Utilized convolutional feature extraction to learn spatial relationships in microphone array recordings under noise.

Privacy protected office activity recognition from first-person-view body camera videos

IEEE VIP Cup 2019


Privacy-protected Activity recognition on body-camera videos - Employed CNN-based feature extraction with MLPs for classification, and used YOLOv3-based object detection with template matching and blurring for privacy protection.

Refreshable braille display based on real-time object detection and optical character recognition

Innovation Challenge, IEEE YESIST12 2019

Developed a dual-purpose assistive system for visually impaired users that performs real-time object detection and text recognition from camera input. Integrated CNN-based object detection and OCR with a refreshable Braille display to enable portable reading and environmental awareness.

HONORS AND AWARDS

- Center for Cognitive and Brain Sciences (CCBS) Summer Graduate Research Award (2025) 
- IEEE Signal Processing Society (SPS) Scholarship (2024) 
- CSE Scarlet and Gray Award (2023-Present)
- Post-graduate fellowship (M.Sc.) (2021-2023)
- Second runner-up, IEEE Signal Processing (SP) Cup (2020) 
- First runner-up, IEEE Video and Image Processing (VIP) Cup (2019) 
- World finalist & national champion, Innovation Challenge, IEEE YESIST12, 2019
- World ranked 10th, IEEE Signal Processing (SP) Cup (2019)