

Rashedul Hasan

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EDUCATION

Chittagong University of Engineering and Technology (CUET)

Chittagong, Bangladesh

B.Sc. in Electrical and Electronic Engineering

February 2019 – June 2024

CGPA: 3.62/4.00 (3.81 in final year)

RESEARCH INTEREST

Machine Learning, Computer Vision, Human-Computer Interaction, Digital Signal Processing, Neuroscience, Speech Perception

RESEARCH EXPERIENCE

- **Optimizing Neural Network Performance for Short-Term Load Forecasting Using Time and Source Lag Features**

Supervisor: Dr. Nur Mohammad

April 2023- May 2024

Accurate short-term load forecasting is essential for efficient energy management and ensuring grid stability, as it helps optimize power distribution and prevent system overloads. To address this need, a Bidirectional Gated Recurrent Unit (Bi-GRU) model optimized by Particle Swarm Optimization (PSO) was developed to predict electricity load demand using hourly data from the Power Grid Company of Bangladesh (PGCB), spanning from January 2016 to March 2023. Advanced feature engineering, including time lag and source lag features, was applied to capture complex dependencies in the data. The PSO-tuned Bi-GRU model achieved a MAPE of 2.49, significantly outperforming traditional models.

Status: Thesis Book Link

- **Emo-Former: Text-Independent Speech Emotion Recognition using Hybrid Transformer-CNN Model.**

Supervisor: Dr. Nursadul Mamun

August 2024 - October 2024

Speech Emotion Recognition (SER) is a key area of research in Human-Computer Interaction (HCI), aimed at improving machine understanding of human emotions. This study introduces EmoFormer, a hybrid model combining Convolutional Neural Networks (CNNs) with Transformer encoders to enhance emotion recognition from speech, particularly in speaker-independent datasets. Trained and tested using the Expressive Anechoic Recordings of Speech (EARS) dataset by META, the model utilized MFCCs and x-vectors for feature extraction. EmoFormer achieved an accuracy of 90 percent in recognizing five emotions, and was successfully scaled to map emotions from 5 up to 23 categories, demonstrating the model's robustness across varying levels of complexity.

Status: Accepted at ICCIT 2024

- **A Comprehensive Review of Emotion Recognition Techniques: From Unimodal Approaches to Multimodal Fusion Paradigms."**

Supervisor: Dr. Nursadul Mamun

June 2024 - October 2024

Emotion recognition from diverse data sources such as audio, facial expressions, and EEG signals is a key challenge in affective computing. This study reviews both unimodal and multimodal approaches using datasets like RAVDESS, EMO-DB, CK+, FER-2013, JAFEE, SEED, and DEAP. It highlights the advantages of combining audio, visual, and physiological signals to improve emotion detection accuracy. The review also covers preprocessing techniques for each modality, including noise reduction for audio, face detection for images, and artifact removal for EEG. Findings suggest that while traditional models like SVM and Random Forest are useful, advanced deep learning models, including CNNs, RNNs, and multimodal networks, are essential for capturing complex emotional patterns and enhancing performance.

Status: Manuscript Ready

RELEVANT COURSEWORKS

Digital Signal Processing, Biomedical Engineering, VLSI Technology, Microprocessor and Interfacing, Telecommunication Engineering, Digital Electronics, Power Electronics, Electronic Communication, Control Systems, Electronics I& II, Microwave and Antenna Engineering

STANDARDIZED TEST SCORES

Graduate Record Examination (GRE)

25th September, 2024

Total	Quantitative	Verbal	Analytical
319	168	151	3.0

Test of English as a Foreign Language (TOEFL)

3 November, 2024

Total	Reading	Listening	Speaking	Writing
105	27	28	23	27

ACADEMIC PROJECTS

Complete Electrical System Design for a One-Storey Building

[GitHub Link](#)

- Created the electrical layout for a one-storey building, covering conduit systems, connections, and earthing. Also calculated the total energy consumption to improve efficiency and meet electrical standards.

Design and Implementation of Smoke Detector

[Video Link](#)

- Developed an efficient smoke detector circuit using a photoelectric sensor and a microcontroller to detect smoke particles and trigger an alarm, enhancing fire safety.

Design a distribution transformer for given specifications

[GitHub Link](#)

- A distribution transformer was designed according to the specifications, assuring dependability, effective energy transfer, and voltage regulation in power distribution systems.

Design and Implementation of Microcontroller-Based Water Level Detector

[Link](#)

- Created a digital water level detector using a PIC 16F877A microcontroller. The detector displays levels on an LCD screen and triggers an alarm when the tank is full.

Design and Implementation of Mosquito Repellent Device

[Video Link](#)

- Designed and implemented a 555 timer IC-based circuit to generate ultrasonic sounds (20-38 kHz) that repel mosquitoes, providing a low-cost, non-toxic solution tested in households.

TECHNICAL SKILLS

- **Programming Languages:** C++, Python
- **Frameworks:** TensorFlow, Keras, PyTorch, Scikit-learn
- **Libraries:** NumPy, OpenCV, Pandas, Seaborn, Matplotlib
- **Software:** MATLAB, NI Multisim, Advance Design System, Proteus, AutoCAD, GTKwave
- **Markup Languages:** HTML, LaTeX
- **Tools :** Jupyter Notebook, Kaggle, VS Code

ACADEMIC RECOGNITION

- University Technical Scholarship in 8 consecutive terms.
- Talentpool Scholarship (SSC/O level): 15th position in Dhaka District

TECHNICAL EXPERIENCE

Industrial Attachment at Neural Semiconductor Pvt.Limited (28th March, 2023 – 12th April, 2023)

- Engaged in intensive two-week training focusing on RTL writing and Testbench.
- Utilized GTKwave and Openroad for designing a simple FIR filter as a project