Mohammed Tawshif Hossain

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About

I am Mohammed Tawshif Hossain, an undergraduate student in Electrical and Electronic Engineering at Chittagong University of Engineering and Technology (CUET). I am deeply passionate about biomedical science and engineering, with a particular focus on biomedical signal processing, photonics, and the emerging applications of quantum science and technology in healthcare.

Driven by curiosity and a strong research mindset, I enjoy exploring interdisciplinary domains and actively seek opportunities to collaborate on innovative projects. My core interests lie at the intersection of biomedical optics, quantum technologies, and signal analysis, especially in contexts that push the boundaries of modern healthcare solutions.

Outside of academics and research, I enjoy playing football and engaging in intellectually stimulating discussions.

Research Interest

- Biomedical Signal Processing
- Photonics
- Quantum Technologies
- Biomedical Optics
- Neuroengineering
- Computational Neuroscience

Education

Chittagong University of Engineering and Technology April 2021 – Present
B.Sc. in Electrical and Electronic Engineering

- GPA: 3.51 / 4.00

Chattogram College, Higher Secondary Certificate (HSC) June 2018 – January 2021

- GPA: 5.00 / 5.00

Chattogram Collegiate School, Secondary School Certificate (SSC) 2013 – 2018

- GPA: 5.00 / 5.00

RESEARCH EXPERIENCES

Fresh Graduate Member May 2022 – Ongoing
Solid-state Electronics and Photonics (SSEP) Research Group [Details]

- Generated a dataset of 8400 self-organized GaN nanowire arrays of different diameters & fill factors for machine learning.
- Explored ML models to determine resonant modes in disordered dielectric scatterers.
- Proposed an autoencoder-based model to predict localized resonant wavelengths—outperforming FDTD analysis.
- **Supervisor:** Dr. Md Zunaid Baten, Associate Professor, Dept. of EEE, BUET

Undergraduate Thesis Feb. 2021 – Ongoing
Finite Difference Time Domain (FDTD) based Analysis of Anderson Localization in Non-ideal Disordered Systems [Details]

- Investigated Anderson Localization in MBE-grown GaN nanowire arrays.
- Compared coalesced and non-coalesced cases in terms of localized wavelength and field distribution.
- Simulated nanostructures using MEEP, MPB, Lumerical FDTD Solver, etc.
- **Supervisor:** Dr. Md Zunaid Baten, Associate Professor, Dept. of EEE, BUET

Research Student May 2020 – Ongoing
Autoencoder & Transfer Learning-based COVID-19 Detection using Chest X-ray Images [Details]

- Developed a 3-class X-ray classifier using data augmentation & transfer learning (accuracy: 96.33%).
- Proposed a tree-structured autoencoder for 4-class classification with weight initialization.

- Published in conference and journal (10+ citations).
- **Supervisor:** Dr. Shaikh Anowarul Fattah, Professor, Dept. of EEE, BUET

Research Project July 2020 – Dec. 2021

Spectrogram-driven Emotion Detection from Electroencephalogram [Details]

- The Short-Time Fourier Transform (STFT) was employed to convert EEG signals into time-frequency spectrograms, which served as powerful input features for CNNs, enabling improved emotion recognition from non-stationary EEG data.
- The CNN model achieved an exceptional 99.80% accuracy in classifying emotions (positive, negative, neutral) using processed spectrograms derived from EEG signals, demonstrating the effectiveness of the preprocessing and time-frequency representation pipeline.
- A comparative experiment feeding both raw and processed spectrograms into the CNN yielded a lower accuracy of 66%, suggesting that processed spectrograms alone are more effective.
- **Supervisor:** Mr. Rajat Chakraborty, Assistant Professor, Dept. of EEE, BUET

Publications

3D Finite Element Analysis of No-Insulation Coils Jan 2004

Frodo Baggins, *John Doe*, Samwise Gamgee

10.1109/TASC.2023.3340648

Projects

Multi-User Drawing Tool github.com/name/repo

- Developed an electronic classroom where multiple users can simultaneously view and draw on a "chalkboard" with each person's edits synchronized
- Tools Used: C++, MFC

Synchronized Desktop Calendar github.com/name/repo

- Developed a desktop calendar with globally shared and synchronized calendars, allowing users to schedule meetings with other users
- Tools Used: C#, .NET, SQL, XML

Custom Operating System 2002

- Built a UNIX-style OS with a scheduler, file system, text editor, and calculator
- Tools Used: C

Technologies

Languages: C++, C, Java, Objective-C, C#, SQL, JavaScript

Technologies: .NET, Microsoft SQL Server, XCode, Interface Builder