

MEGHNA ROY CHOWDHURY

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EDUCATION

PhD in Electrical and Computer Engineering, Purdue University, USA

Fall'26 (expected)

Efficient ML for Real-World Domains: Health AI, Circuits, Wearables

B.Tech in Electronics and Communication Engineering, Vellore Institute of Technology, India

July 2020

GPA: 9.24/10 (Top 4% in batch)

TECHNICAL SKILLS

Programming Languages: Python, Embedded C, MicroPython, MATLAB, Verilog, Java, C++, HTML, CSS, JS
Libraries: Tensorflow, Scikit-learn, Numpy, Pandas, opencv, Pytorch, Matplotlib, Seaborn, Spacy
Tools: MATLAB, Ansys HFSS, GNURadio

RELEVANT COURSES

Machine Learning, Artificial Intelligence, ML in Bioinformatics & Healthcare, ML in Cloud Computing, Linear Algebra, Probability & Random Variables, Digital Signal Processing, Embedded Systems, Advanced IoT Design.

WORK EXPERIENCE

ML Intern, Qualcomm, California

May 2025 - Aug 2025

- Developed end-to-end ML solutions for circuit optimization, from problem formulation to scalable software implementation.
- Designed and implemented two novel ML architectures that advanced state-of-the-art (patent filed, under review).
- Collaborated with cross-functional teams to build reproducible ML pipelines for circuit design.
- Software/Library: Python (PyTorch, scikit-learn, etc.)

Graduate Research Assistant, Purdue University, USA

Sept 2021-present

1. ENHANCING INTERNET OF BODIES BY HARNESSING LOW POWER WEARABLES THROUGH DISTRIBUTION OF NEURAL NETWORKS (DistNN)
 - Developed DistNN, a framework for energy-efficient neural network inference, distributing computations between wearable nodes and resource-rich hubs to optimize performance and power efficiency.
 - Designed custom hardware leveraging low-precision fixed-point arithmetic, achieving ultra-low power inference while maintaining real-time processing.
 - Achieved 1000× energy efficiency over GPUs and 11× lower power consumption than ML ASICs, making edge AI scalable for real-world applications.
 - Optimized autoencoders and CNNs for image reconstruction and denoising, achieving SSIM scores of 0.9.
2. ENHANCEMENT OF EEG SENSING & PROCESSING
 - Conducted experiments to identify and characterize precise noise sources in EEG signals.
 - Applied signal processing techniques with ML models to achieve significantly lower SNR, improving overall EEG data quality.
 - Utilized Self-Supervised Learning (SSL) to effectively handle real-world unlabeled and noisy EEG data.
 - Integrated Squeeze-and-Excitation Networks (SE-Nets) into SSL models, boosting prediction accuracy by 15% without increasing computational overhead.
 - Software/Tools: Python (TensorFlow, scikit-learn); MATLAB (Signal Processing Toolbox, DSP System Toolbox)
3. MACHINE LEARNING FOR MENTAL HEALTH AND DIGITAL WELL-BEING
 - Developed a novel hierarchical machine learning model integrating feature reduction, personalization, and interpretability, significantly improving mental health prediction on real-world dataset.
 - Reduced computational cost by mapping 35-dimensional input to a compact 5-dimensional representation, leveraging personalized feature importance with decision trees, with no loss in accuracy.
 - Implemented neural networks for mental health prediction, achieving 91% accuracy—outperforming baseline models by 30% while enhancing model efficiency and explainability.
 - Software/Library: Python (Tensorflow, pandas, numpy, scikit-learn, shap);

4. IMPROVING DETECTION AND ANALYSIS OF FREQUENCY EMANATION WITH CNN

- Created a dataset and analyzed rogue frequency emanations from unintended sources like USB/HDMI&Power Cables/Monitors/SDRs.
- Detected leaky emanations using CNN and Signal Processing with an accuracy of 95%.
- Improved range of emanation detection of HDMI up to 22.5m through signal processing and CNN.
- Main Tools: GNU Radio, USRP B210.

5. ROBUST ECG SENSING & INFERENCE USING HUMAN BODY COMMUNICATION

- Developed a flexible ECG patch for low-power communication through the body (HBC).
- Developed code for transmitting and decoding ECG signals via HBC, achieving power consumption as low as 20uW.
- Formulated and conducted experiments with multiple human subjects to ensure system robustness.
- Optimized system power consumption, achieving 4x lower power usage compared to state-of-the-art solutions.
- Main hardware: PSoC, PicoScope, Keysight U2741A ; Software/Tools: MATLAB, Python, PSoC Creator

Research Intern, Yuan Ze University, Taiwan (Remote)

May 2020 - Aug 2020

DEEP LEARNING VIA ECG AND PPG SIGNALS TO PREDICT THE DEPTH OF ANAESTHESIA

- Conducted DSP techniques like FFT to generate heatmaps as a part of data preprocessing.
- Achieved 86% accuracy with a custom 10-convolution layered model.
- Evaluated the model using 10-fold cross validation and LOOCV.
- Software: MATLAB and Python

Tata Consultancy Services, Mumbai, India

Jan 2020 - Aug 2021

Research & Innovation Engineer

- Developed an automated prediction system for structured data, streamlining data augmentation, model selection, and adaptation using GAN, AutoML, and Adaptive ML technologies.
- Leveraged graph neural networks to analyze relationships and patterns in emissions data, optimizing model accuracy and interpretability, showcasing advanced data analysis and model comparison skills to develop a predictive framework to assess carbon footprints using knowledge trees.
- Collaborated with Life Science Team to build ML-based solutions for automating information extraction from unstructured data, leveraging NLP with Spacy and ML models.
- Utilized Python, HTML/CSS for development and integrated MLOps with Airflow for workflow automation.

ML Intern - Transportation and Logistics optimization using IoT and ML

- Developed a system for & achieved 95% accuracy in the prediction of the lifetime of Li-ion batteries used in Electric Vehicles using various machine learning models.
- Proposed a recommendation system based on existing battery lifetime, different terrains, charging time.
- Language used: Python

SELECTED PUBLICATIONS

(Refer to [Google Scholar](#) for more publications)

- **Chowdhury M.R.**, Y.Ding., & Sen. S (2025). 'SSL-SE-EEG: A Framework for Robust Learning from Unlabeled EEG Data with Self-Supervised Learning and Squeeze-Excitation Networks'(EMBC) - *accepted*
- **Chowdhury M.R.**, et al. (2025). 'Predicting and Understanding College Student Mental Health with Interpretable Machine Learning'(CHASE) [\[Link\]](#)
- **Chowdhury M.R.**, & Sen. S (2025). 'Measurement and Analysis of System Parameter Effects on Noise in EEG Systems'(ISCAS) [\[Link\]](#)
- **Chowdhury M.R.**, Ghosh A., Bari M.F., & Sen. S (2024). 'Leveraging Ultra-Low-Power Wearables Using Distributed Neural Networks'(BSN) [\[Link\]](#)
- Bari, M. F., **Chowdhury, M. R.**, & Sen, S. (2023) 'Long Range Detection of Emanation from HDMI Cables Using CNN and Transfer Learning' in Design, Automation & Test in Europe Conference & Exhibition (DATE) [\[Link\]](#)
- **Chowdhury, M. R.**, Madanu, R., Abbod, M. F., Fan, S. Z., & Shieh, J. S. (2021), 'Deep learning via ECG and PPG signals for prediction of depth of anesthesia' in Biomedical Signal Processing and Control (BSPC). [\[Link\]](#).

LEADERSHIP ROLES

- Vice Chair, Community Team, Purdue Graduate School Government Aug 2025 - Present
- Director of Mental Health Awareness Week, Purdue Graduate School Government Aug 2024 - Aug 2025
- Member, Community Team of Purdue Graduate School Council Aug 2022- Aug 2024
- Head of Photography, Vellore Institute of Technology July 2018-July 2019