Mohseu Rashid Subah

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Education

- **Purdue University, West Lafayette, IN, USA**
  Ph.D. Candidate at the Weldon School of Biomedical Engineering (Fall 2023 - Present)
  American Association of University Women (AAUW) International Doctoral Degree Fellow (2025 - 2026)
  CGPA: **4.00**/4.00
- **Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh**
  Bachelor of Science in Electrical and Electronic Engineering (2017 - 2022)
  CGPA: **3.90**/4.00 (**Top 10%** among 189 students)

Technical Skills

- **Programming Languages:** C/C++, Python, MATLAB, R, Verilog, Assembly
- **Frameworks & Libraries:** PyTorch, TensorFlow, Scikit-learn, OpenCV, NumPy, Pandas, Matplotlib
- **Tools & Softwares:** CUDA, Jupyter, WSL, Simulink, LaTeX, Microsoft Office, Adobe Illustrator
- **Machine Learning & Deep Learning:** Supervised, Unsupervised, Self-supervised Learning, Classical ML Models (e.g., SVM, KNN, XGBoost), Deep Learning Architectures (CNNs, RNNs, Transformers)
- **Computer Vision & Signal Processing:** Image Segmentation & Classification, 1D Signal Classification, Object Detection, Object Tracking
- **Data Handling & Statistical Analysis:** Large-scale Medical Data Preprocessing, Feature Engineering, Hypothesis Testing, Regression

Research Experience

Graduate Research Assistant, Purdue University, USA (August 2023 - Present)

- **Automated Segmentation & Prediction of Osteoporosis from High Resolution CT Images:**
  - Developed the first fully automated segmentation pipeline for bone and soft tissue regions in **HR-pQCT** images using **SegFormer** and image processing, achieving an average F_1 score of 95.36%.
  - Extracted **radiomics** features and applied classical ML models for osteoporosis prediction.
  - Performed statistical analysis and benchmarked results against clinical features derived from **DXA**.
- **Microscale Robot Detection & Tracking from Ultrasound Videos:**
  - Developed a real-time detection and tracking system to analyze **ultrasound** videos of microscale robots navigating a rat colon using image processing methods and the **YOLOv8** architecture.
  - Addressed challenges of small robot size, imaging artifacts, and complex in vivo conditions.
- **Image Processing & Analysis of Novel MRI Sequence:**
  - Processed and analyzed ultrashort echo time **MRI** data in preclinical and clinical populations using a novel rosette k-space trajectory, with a 51.54% increase in SNR compared to the radial trajectory.
- **Mixed Domain Semi-Supervised Medical Image Segmentation:**
  - Investigating **foundation models** and **GANs** for semi-supervised medical image segmentation under domain shift.

Undergraduate Research Assistant, BUET, Bangladesh (April 2019 - May 2022)

- **Self-Supervised Learning for Automatic Sleep Stage Classification in EEG:**
  - Developed a **self-supervised contrastive learning** approach based on **SimCLR** for automatic sleep stage scoring from single-channel **EEG** data using a modified ResNet-50 backbone with an **attention-based temporal context encoder**. The model demonstrated less than a 4% accuracy loss with only 30% of the training data, addressing the challenge of scarce labeled EEG data.
- **Segmentation & Detection of COVID-19 from Chest CT Images:**
  - Combined supervised and unsupervised learning for the segmentation and detection of COVID-19 and pneumonia from **chest CT** scans, achieving an overall accuracy of 87.5%.

- **Heart Abnormality Detection from PCG Signals using MFCC Features:**
  - Designed an attention-based dual-stream deep neural network to detect heart abnormality utilizing raw **PCG** signals and **MFCC** features, with an overall accuracy of 87.11%.
- **Bangla Sign Language Recognition with Machine Learning:**
  - Built one of the first systems for Bangla sign language recognition, developing a feature-based **SVM** classifier to identify 10 letters. Collected and curated a dataset of 400 images for model development.

Selected Publications

Abstracts/Posters

- **M. R. Subah**, M. A. G. Zilani, T. L. Nickolas, M. R. Allen, S. J. Warden, R. K. Surowiec, "Automated Segmentation and Radiomic Analysis of Soft Tissue Features Distinguishes High Fragility Risk in Chronic Kidney Disease Using HR-pQCT", presented at the 2025 American Society for Bone and Mineral Research (ASBMR) Annual Meeting, Seattle, Washington, USA. HR-pQCT

Conference Papers

- F. Sadik, **M. R. Subah**, A. G. Dastider, S. A. Moon, S. S. Ahbab, S. A. Fattah, "Bangla Sign Language Recognition with Skin Segmentation and Binary Masking," 2019 IEEE International WIE Conference on Electrical and Computer Engineering (WIECON-ECE), 2019, pp. 1-5
  https://doi.org/10.1109/WIECON-ECE48653.2019.9019931
- A. G. Dastider, **M. R. Subah**, F. Sadik, T. Mahmud, S. A. Fattah, "ResCovNet: A Deep Learning-Based Architecture For COVID-19 Detection From Chest CT Scan Images," 2020 IEEE Region 10 Conference (TENCON), 2020, pp. 57-60
  https://doi.org/10.1109/TENCON50793.2020.9293887
- N. Rashid, S. Saha, **M. R. Subah**, R. A. Robin, S. M. H. Fahim, S. Ahmed, T. I. Mahmud, "Heart Abnormality Detection from Heart Sound Signals using MFCC Feature and Dual Stream Attention Based Network", arXiv preprint
  https://doi.org/10.48550/arXiv.2211.09751

Journals

- F.Sadik, A. G. Dastider, **M. R. Subah**, T. Mahmud, S. A. Fattah, "A dual-stage deep convolutional neural network for automatic diagnosis of COVID-19 and pneumonia from chest CT images", Computers in Biology and Medicine, Volume 149, 2022, 105806, ISSN 0010-4825
  https://doi.org/10.1016/j.compbiomed.2022.105806

Relevant Graduate Coursework

- ECE 60146: Deep Learning
- BME 59500: Medical Imaging & Diagnostic Technology
- BME 50100: Multivariate Analyses In Biostatistics
- ECE 57000: Artificial Intelligence
- ECE 63700: Digital Image Processing I
- MA 51900: Introduction To Probability

Honors & Awards

- Recipient, The American Association of University Women (AAUW) International Doctoral Degree Fellowship (2025-2026)
- Finalist, The Schlumberger Foundation Faculty for the Future (FFTF) Fellowship (2025-2026)
- Recipient, Purdue Graduate Student Government (PGSG) Travel Grant (2024, 2025)
- Co-Investigator, U.S. National Academy of Medicine (NAM) Catalyst Award (2025)

Professional Experience

- **Purdue University, West Lafayette, IN, USA.**
  - Graduate Research Assistant, BME (Fall 2023 - Fall 2024, Summer 2025 - Present)
  - Graduate Teaching Assistant, BME (Spring 2025)
    Courses: Bioinstrumentation and Circuit Theory
- **United International University, Dhaka, Bangladesh.**
  - Lecturer, Department of Computer Science and Engineering (October 2022 - May 2023)
    Courses: Digital Logic Design (Theory & Lab), Microprocessors and Microcontrollers (Theory & Lab)