MUNTASIR MAHMUD

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EDUCATION

Ph.D. Candidate in Electrical Engineering   Expected: 2024
University of Maryland, Baltimore County (UMBC), USA

Master of Science in Electrical Engineering   CGPA: 3.75/4.0
University of Maryland, Baltimore County (UMBC), USA   08/2019 - 05/2022

Bachelor of Science in Electrical and Electronic Engineering   CGPA: 3.69/4.0
Islamic University of Technology (IUT), Bangladesh   12/2011 - 11/2015

TECHNICAL STRENGTHS

Programming Language:	MATLAB, Python, C++, Verilog, Arduino
Machine Learning Library:	Numpy, Pandas, Matplotlib, SciKit-Learn, Librosa
Deep Learning Framework:	Keras, Tensorflow, PyTorch
Software:	Pspice, Ltspice, Labview, Simulink, Proteus, Atoll, Wireshark, OrCAD, Xilinx
Instrument:	Laser, Hydrophone, Signal Generator, Spectrum Analyzer, Power Meter, Oscilloscope
Miscellaneous:	Power BI, Illustrator, Mathematica, MS Office

WORK EXPERIENCE

Graduate Research Assistant, **Embedded Systems and Networks (ESNet) Lab**   08/2020 - Present

- Designed novel wireless communication protocols (modulation and encoding) to increase data rate by 6 times and power efficiency by 137%.
- Developed advanced channel estimation and symbol detection using U-Net and ResNet machine learning models, reducing bit error rate by 23.6% in challenging multi-path environments.
- Boosted Demodulation accuracy by 15% by developing a Spiking Neural Network (SNN)-based demodulator.
- Designed Lab experiments, implemented communication schemes using Artix-7 FPGA, constructed datasets, filter design, signal processing and comprehensive data analysis.

Research Intern, **Lasarrus Clinic and Research Center**   06/2020 - 08/2020, 06/2021 - 08/2021

- Developed a wearable multi-modal body area sensor (WearME) to capture lung changes in real time and detect breathing anomalies for remote patient monitoring and health assessments at home.
- Developed UI software, integrated signal processing algorithms and Bluetooth connectivity for efficient data transmission.
- Organized events for healthy baseline data collection, conducted technical analysis to ensure device performance & reliability.

Graduate Teaching Assistant, **CSEE, UMBC**   08/2019 - 05/2020

- Courses: Principles of Digital Design, Introductory Circuit Theory.

RAN Engineer, **Nokia**   02/2019 - 07/2019

- Implemented SRAN solution, 2G/3G/4G radio nodes, performance analysis, acceptance testing; Deployed small cells to improve network quality.

Wireless Network Engineer, **Huawei**   12/2015 - 03/2018

- Deployed 4G/ LTE network for the first time in Bangladesh, commissioned and integrated 7 RNC and 10 BSC, upgraded RAN software versions and trained sub-conductor teams.
- Designed RF and BSS networks using planning tools, conducted network health checks and prepared KPI reports.
- Cross-team collaboration: 221 erlangs expansion of RAN-Core network, HLR migration and SGSN Pool configuration.

PROJECTS

- Analysis of IoT link layer protocols (Bluetooth, ZigBee, Z-Wave, LoRaWAN, Wifi, LTE and 5G)
- BER improvement using Error Correction codes (Hamming code, R-S code, Convolutional code, Turbo code)
- UrbanSound8k audio classification using ANN and CNN models ● Human activity recognition using LSTM model

FUNDED RESEARCH PROJECTS AND PUBLICATIONS

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1. Enabling Access and Topology Optimization of Underwater Networks through an Aerial Vehicle
(Funded by NSF)

This ongoing project aims to develop a suite of protocols enabling wireless communication between aerial mobile units (AMUs) and underwater acoustic networks (UANs) without the need of floating nodes. Then, extend the GPS in the underwater environment for localization.

Publications: (C- Conference Papers, J- Journals) (Google Scholar Account)

- **C1:** MMH Galib, **M. Mahmud**, M. Younis, G. Carter and F. -S. Choa, "Spiking Neural Network-based Demodulation Scheme for Optoacoustic Communications," accepted in ICC 2024 - IEEE International Conference on Communications, Colorado, USA, 2024.

- **C2: M. Mahmud**, M. Younis, M. S. Islam, F.-S. Choa, and G. Carter, "Vapor cloud delayed-DPPM modulation technique for nonlinear optoacoustic communication," in Proc. IEEE Global Communication Conference (GLOBECOM), pp. 819–824, Rio de Janeiro, Brazil, Dec. 2022.

- **C3:** M. S. Islam, M. Younis, **M. Mahmud** and F. -S. Choa, "An Efficient Pulse Position Modulation Scheme to Improve the Bit Rate of Photoacoustic Communication," 32nd Wireless and Optical Communications Conference (WOCC), pp. 1-6, Newark, NJ, USA, 2023.

- **C4: M. Mahmud**, M. Younis, G. Carter and F. -S. Choa, "Underwater Node Localization using Optoacoustic Signals," ICC 2022 - IEEE International Conference on Communications, pp. 4444-4449, Seoul, Korea, Republic of, 2022.

- **C5: M. Mahmud**, M. S. Islam, M. Younis, and G. Carter, "Optical focusing-based adaptive modulation for optoacoustic communication," in Proc. 30th Wireless and Optical Communications Conference (WOCC), pp. 272–276, Taipei, Taiwan, Oct. 2021.

- **C6:** M. S. Islam, M. Younis, **M. Mahmud** and J. B. Saif, "A Novel Encoding Scheme for Improving the Bandwidth Efficiency of DPPM," in Proc. ICC 2021 - IEEE International Conference on Communications, pp. 1-6, Montreal, QC, Canada, 2021.

- **J1: M. Mahmud**, M. Younis, F. -S. Choa and A. Ahmed, "Optical Focusing-Based Adaptive Modulation for Air-to-Underwater Optoacoustic Communication," in IEEE Sensors Journal, vol. 24, no. 6, pp. 8596-8614, 15 March, 2024.

- **J2: M. Mahmud**, M. S. Islam, A. Ahmed, M. Younis, and F.-S. Choa, "Cross-medium photoacoustic communications: Challenges, and state of the art," Sensors, vol. 22, no. 11, p. 4224, Jun. 2022.

- **J3:** M. S. Islam, M. Younis, **M. Mahmud**, G. Carter, and F.-S. Choa, "A peak detection based OOK photoacoustic modulation scheme for air to underwater communication," Optics Communications, vol. 529, Art. no. 129078, Feb. 2023.

- **J4: M. Mahmud**, M. Younis, M. Ahmed and F.-S. Choa, "Deep Learning-based Joint Channel Equalization and Symbol Detection for Air-water Optoacoustic Communications," submitted to IEEE Transactions on Cognitive Communications and Networking, 2024.

2. Smart IoT Wearable for Remote Monitoring and Assessment of COVID-19 Patients
(Funded by NSF)

Designing a low-cost wearable Internet-of-Things (IoT) device and necessary software algorithms to provide a tool for real-time remote patient monitoring and health assessment at home. The wearable IoT system consists of an array of interconnected smart miniaturized devices with sensors including digital stethoscope, EKG monitor, thermometer and goniometer.

- **J1:** L. Emokpae, R. Emokpae Jr., E. Bowry, J. B. Saif, **M. Mahmud**, W. Lalouani, M. Younis, and R. Joyner Jr. A wearable multi-modal acoustic system for breathing analysis, The Journal of the Acoustical Society of America, Vol. 151, No. 2, pp. 1033-1038, 2022.

AWARDS, CERTIFICATION & PROFESSIONAL ACTIVITIES

- Best Paper Award at Wireless and Optical Communications Conference (WOCC) 2021.
- GSA Professional Development Grant – UMBC. ● OIC Scholarship – IUT.
- 5G Introductory-Level Certification by Qualcomm Wireless Academy.
- Peer-reviewer in IEEE International Conference on Communications.
- Peer-reviewer in IEEE Transactions on Vehicular Technology.
- Peer-reviewer in IEEE Transactions on Mobile Computing.