Zunayeed Bin Zahir

Department of Electrical and Computer Engineering
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EDUCATION

Doctor of Philosophy, Electrical and Computer Engineering   **Expected Apr 2027**
The State University of New York at Albany
Signals and Networks Lab

Master of Science, Electrical Engineering   **June 2016**
The State University of New York at Buffalo
Major: Signals, Communication and Networking

Bachelor of Science, Electrical and Electronics Engineering   **Apr 2014**
North South University (Bangladesh)
Major Concentration: Communications Engineering
Undergraduate Thesis: Intrusion Detection in Cloud Network by means of Hidden Markov Model using Viterbi and Baum-Welch Algorithm
Honors: Magna Cum Laude

RESEARCH INTERESTS

Wireless Communication, Reconfigurable Intelligent Surface, Joint Communication and Sensing, Machine learning/Deep Learning Optimization

PUBLICATIONS

Scopus-indexed Journal Publications
1. S.K. Biswas, Arfin, R., Habib, A. B., Amir, S. B., **Zahir, Z. B.,** Islam, M. R., & Hussain, M. "A Modified Design of a Hexagonal Circular Photonic Crystal Fiber with Large Negative Dispersion Properties and Ultrahigh Birefringence for Optical Broadband Communication. Photonics **6**(1), MDPI (2019). [Journal]

Scopus-indexed Conference Proceedings
1. Biswas, S. K., Arfin, R., **Zahir, Z. B.**, Habib, A. B., Khan, R., Islam, M. R., ... & Alam, A. U. (2021, April). Ultrahigh negative dispersion compensating Hexagonal photonic crystal fiber with large nonlinearity. In Micro-structured and Specialty Optical Fibres VII (Vol. 11773, p. 1177318). International Society for Optics and Photonics.
2. Amir, S. A. B., **Zahir, Z. B.**, Hussain, M. S., & Palit, R. (2020). An Analysis of Multi-organ Segmentation Performance of CNNs on Abdominal Organs with an Emphasis on Kidney. In Medical Imaging and Computer-Aided Diagnosis: Proceeding of 2020 International Conference on Medical Imaging and Computer-Aided Diagnosis (MICAD 2020) (Vol. 633, p. 229). Springer Nature.
3. Habib, A. B., Akhter, M. E., Sultaan, R., **Zahir, Z. B.**, Arfin, R., Haque, F., & Palit, R. (2020, January). Performance Analysis of Different 2D and 3D CNN Model for Liver Semantic Segmentation: A Review. In International Conference on Medical Imaging and Computer-Aided Diagnosis (pp. 166-174). Springer, Singapore.
4. Islam, M. M., Hossain, M. J., & **Zahir, Z. B.** (2019, December). Content-Based Health Recommender System for ICU Patients. In Multi-disciplinary Trends in Artificial Intelligence: 13th International

Conference, MIWAI 2019, Kuala Lumpur, Malaysia, November 17–19, 2019, Proceedings (Vol. 11909, p. 229). Springer Nature.

5. M. B. Pranto, M. M. Rahman and Zunayeed-Bin-Zahir, "Vehicle Fuel Monitoring and Management using RFID authentication and Telematics Notification: An automated petrol refueling & notifying system," 2019 International Conference on Advanced Computer Science and Information Systems (ICACSIS), Bali, Indonesia, 2019, pp. 477-482, DOI: 10.1109/ICACSIS47736.2019.8979711.

Book/Book Chapters Publication

1. Neloy A.A., Shafayat Oshman M., Islam M.M., Hossain M.J., **Zahir Z.B**. (2019) Content-Based Health Recommender System for ICU Patient. In: Chamchong R., Wong K. (eds) Multi-disciplinary Trends in Artificial Intelligence. MIWAI 2019. Lecture Notes in Computer Science, vol 11909. Springer, Cham http://doi-org-443.webvpn.fjmu.edu.cn/10.1007/978-3-030-33709-4_20 **[Short Chapter/Lecture Notes**]

PAST RESEARCH PROJECTS

1. **Simulation of a MIMO system to demonstrate channel gain of a Rayleigh fading channel (using MATLAB):** Designed and analyzed a simulated 2x2 MIMO system experiencing Rayleigh fading by Jakes' fading simulator and noise characterized by complex Gaussian with zero mean and variance one; compared symbol error rate versus SNR level for a different combination of receiving antennas considering differential space-time (ST) modulation-demodulation scheme. *(Jan 15-May 15).*

2. **Simulation of a communication system with optimum receiver detection over an AWGN channel (using MATLAB):** Designed and analyzed a simulated communication system for each modulation-demodulation pair schemes (Binary-PAM, 4PAM, QAM) to get the optimum detection by the receiver by taking into consideration the outcomes of the BER v SNR MATLAB plots; in terms of error probability, Binary-Pulse Amplitude Modulation technique proved to be the best among the three schemes *(Sept 15-Dec 15)*

3. **Simulation of optimal beamformer design for varied direction-of-arrival angles:** Designed and compared MUSIC, Min-Norm and Linear Prediction DOA estimators with a data record of change in the size and angle of separation to observe efficiency in terms of resolution ability and optimal detection in terms of SNR; result suggests MUSIC provides the most narrow and focused main-lobes and smaller side lobes. *(Jan 15-May 15)*

4. **Quantum Communication in Terahertz Frequency Band:** Analyzed and demonstrated quantum entanglement to model channel parameters appropriate to conduct in the quantum domain, explored the communication mechanism and the security paradigms like Quantum Key Distribution (QKD), Quantum Digital Signature (QDS) and investigated the latest advancements that can be incorporated to use this mode of communication in Terahertz Band communication. *(Jan 16-Apr 16)*

5. **Undergraduate Thesis:** "Intrusion Detection in Cloud Network by means of Hidden Markov Model using Viterbi and Baum-Welch Algorithm" - Proposed a data-driven probabilistic model based on Hidden Markov Model to detect, analyze, and prevent intrusion in a cloud network, the proposed model has been demonstrated to detect and analyze intrusions on virtual Cloud with simulation result accuracy of **82**%. *(Jan 14-Dec 14)*

CURRENT PROJECTS

1. Evaluate and explore multi-objective optimization of 5G cellular network paradigms: massive MIMO, small cells, beamforming.
2. Analyze sensing, learning, and adapting ability of cognitive radio and its importance for Connected Autonomous Vehicles.

PROFESSIONAL EXPERIENCE

- **Teaching Assistant**   **Aug 21 – Current**
  Department of Electrical and Computer Engineering
  The State University of New York at Albany
  Albany, NY, USA
- **Lecturer**   **May 17 – Aug 21**
  Department of Electrical and Computer Engineering

North South University, Dhaka, Bangladesh

- **Graduate Student Assistant**   Mar 15 – May 16
  The State University of New York at Buffalo
  Buffalo, NY, USA
- **Undergraduate Teaching Assistant**   May 12 – Dec 13
  Department of Electrical and Computer Engineering
  North South University, Dhaka, Bangladesh
- **Software Quality Assurance Engineer**   Oct 16 – Dec 16
  Society for Worldwide Interbank Financial Telecommunication (SWIFT)
  Manassas, VA, USA

PROFESSIONAL ACTIVITIES

- **Assistant Proctor**   Nov 18 – June 20
  North South University, Dhaka, Bangladesh
- **Faculty Advisor**   Oct 18 – Aug 21
  Computer Engineering Club, North South University, Dhaka, Bangladesh
- **Faculty Sponsor**   Feb 18 – Oct 18
  NSU ACM Student Chapter, Association of Computing Machinery (ACM)
  Membership: Professional Member, ACM
- **Mentor:**
  Supervised more than 200 students at North South University over the past 3.5 years; following are some significant ones:
  - Md. Shafayat Oshman   May 18 – Dec 19
    Current: GRA at Carleton Computer Security Lab
  - Mostafa Didar   Feb 18 – Dec 18
    Research Assistant at SPARRSO – Bangladesh Space Research and Remote Sensing Organization
  - Asif Ahmed Neloy   Feb 18 – Dec 19
    Current: GRA, Department of ECE, University of Manitoba
  - Aziz Arman   Feb 18 – Dec 18
    CEO, Jatri (Digital Platform for Bus Tracking Company headquartered in Dhaka, Bangladesh)

COURSES

Teaching:
Signals and Systems, AC Circuits, Introduction to Communication Systems, Junior Project Design, Senior Project Design.

Coursework in BS/MS includes:
Mobile Communication System, MIMO Wireless Communication Systems, Principles of Modern Digital Communication, Smart Antennas, Probability and Stochastic Processes for Engineers, *(Graduate Level);* Linear Algebra, Signals and Systems, Introduction to Communication Systems, Digital Signal Processing, Engineering Mathematics, Fiber Optic Communication, Programming Language (C, Python, Assembly Language) *(Undergraduate Level)*

TECHNICAL SKILLS

Operating Systems: Windows, Linux (Ubuntu), Unix
Languages: MATLAB, Python, C/C++, SQL, Assembly Language
Tools: Wireshark, Cisco Packet Tracer, NS-3, Pycharm (IDE), Multisim, Logisim, Emu 8086

AWARDS AND HONORS

- Magna Cum Laude for Bachelor of Science in Electrical & Electronic Engineering, North South University (2014-15)
- Awarded scholarship (Twice: **50**%, Jan'12-Dec'13; **25**%, May'11-Dec'11) for exceptional academic excellence
- "Daily Star Award" for **3A**s in Advanced Level, GCE London Examinations
- "Daily Star Award" for **7A**s in Ordinary Level, GCE London Examinations