Pulok Tarafder

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Research Interests

Machine Learning, Deep Reinforcement Learning, UAV, Digital Twin, Wireless Communications, Wireless Networks

Professional Experience

Dept. of EECS, Howard University   Washington, D.C.

Graduate Research Assistant at *Wireless Communications Systems (WiCS) Lab*   (Jan. 2023 - Present)

- Conducting research on the application of Machine Learning and Artificial Intelligence in wireless communication systems, with projects focusing on Digital Twin-enabled UAV networks and the development of USRP-based THz band, and Cell-Free communication system testbeds.
- Serving as a conference reviewer for: 2023 EuCNC, 2023 IEEE Globecom Workshops, 2023 IEEE MILCOM Workshop, 6G Summit 2023, and 2024 IEEE ICC.

Graduate Teaching Assistant   (Aug. 2024 - May 2025)

- Spring 2025: Computer Organization II (CSCI-202), Fundamentals of Circuit Theory (EECE-203), Fundamentals of Circuit Theory Lab (EECE-209)
- Fall 2024: Computer Organization I (CSCI-201)

Amazon.com, Inc.   Bellevue, WA

Data Scientist Intern   (May. 2023 - Aug. 2023)

- Developed a spatial entrance extraction algorithm for Amazon warehouses using raw GPS data archived by Amazon Freight Trucks by collaborating with team members. Also worked on Amazon Sagemaker studio to build and deploy the entrance finding algorithm.

Dept. of Computer Engineering, Chosun University   Gwangju, South Korea

Graduate Research Assistant at *Smart Networking Lab*   (Mar. 2021 - Dec. 2022)

- Performed research on application of machine learning in channel estimation, application of deep reinforcement learning in mmWave massive MIMO beamforming, and mmWave MAC protocols and published my research outcome in international journals and conferences.
- Conference reviewer: ICAIIC 2022

Brac University   Dhaka, Bangladesh

Research Assistant at *CARC Lab*   (May. 2019 - Feb. 2021)

- PSpice Instructor for EEE202 Lab
- Prepared project proposals, project reports, annual reports, reviewed domestic conference papers and worked on designing and developing a smart solar-powered electric wheelchair and stove.

Education

Howard University, Washington, DC, USA

- PhD in Electrical Engineering, Grade 4.0/4.0   (Jan. 2023 – Dec. 2026) (expected)
- Notable Coursework: Signal Processing, Advanced Topics in Artificial Intelligence, Communication Theory, Cybersecurity for CPS/IoT, Optimization Theory, Probability & Random Variables, Linear Algebra
- Supervisors: Dr. Imtiaz Ahmed, Dr. Danda B. Rawat

Chosun University, Gwangju, South Korea

- Masters in Computer Engineering, Grade 4.19/4.5 (96.28%)   (Mar. 2021 - Feb. 2022)
- Thesis: Deep Reinforcement Learning-Based Coordinated Beamforming for mmWave Massive MIMO Vehicular Networks
- Coursework: Application of Communication Systems, Computer Communication and Networks, Advanced Wireless Access Network, Advanced Artificial Intelligence, Ubiquitous Sensor Computing, Advanced Antenna Engineering, Microwave Theory, Computer Arithmetic

Brac University, Dhaka, Bangladesh
- Bachelor of Science in Electrical and Electronic Engineering, Grade 3.07/4.0 (Apr. 2019)
- Senior thesis: Comprehensive mathematical analysis and simulation design of a microwave wireless power transmission system, highest honors

PUBLICATIONS

p7. **Pulok Tarafder***, Imtiaz Ahmed, Danda B. Rawat, Md. Zoheb Hassan, "Deep Reinforcement Learning Based Digital-Twin Empowered Site-Specific Radio Resource Management in 5G Aerial Corridors", [In Preparation for IEEE Journal]

p6. **Pulok Tarafder***, Imtiaz Ahmed, Danda B. Rawat, Md. Zoheb Hassan, and Kamrul Hasan, "Digital-Twin Empowered Site-Specific Radio Resource Management in 5G Aerial Corridors", *2025 IEEE Military Communications Conference (MILCOM)*, Oct. 2025. [Paper]

p5. **Pulok Tarafder***, Imtiaz Ahmed, Danda B. Rawat, Ramesh Annavajjala, and Kumar Vijay Mishra, "Deep Learning Model-Based Channel Estimation for THz Band Massive MIMO with RF Impairments", *2024 IEEE Military Communications Conference (MILCOM)*, Oct. 2024. [Paper]

p4. **Pulok Tarafder**, Chanjun Chun, Arif Ullah, Yonggang Kim, and Wooyeol Choi*, "Channel Estimation in 5G-and-Beyond Wireless Communication: A Comprehensive Survey," *Electronics*, Special Issue 5G and 6G Wireless Systems: Challenges, Insights, and Opportunities, vol. 14, no. 4, article no. 750, February 2025. [Paper]

p3. Islam Helmy, **Pulok Tarafder** and Wooyeol Choi*, "LSTM-GRU Model-Based Channel Prediction for High Quantization Massive MIMO System", *IEEE Transactions on Vehicular Technology*, Early Access, March 2023 (IF: 6.8 / JCR 2022) [Paper]

p2. **Pulok Tarafder** and Wooyeol Choi*, "Deep Reinforcement Learning-Based Coordinated Beamforming for mmWave Massive MIMO Vehicular Networks", *Sensors*, special issue on *"Wireless Sensors and Wireless Sensor Networks for Engineering Applications"*, vol. 23, no. 5, article no. 2772, March 2023. (IF: 3.9 / JCR 2022) [Paper]

p1. **Pulok Tarafder** and Wooyeol Choi*, "MAC protocols for mmWave communication: A comparative survey," *Sensors*, special issue on *"Theory and Techniques for the Deployment of Future Wireless Sensor Networks in 5G and Beyond"*, vol. 22, no. 10, article no. 3853, May 2022. (IF: 3.9 / JCR 2022) [Paper]

[Paper]

SKILLS

- **Software**: Python (TensorFlow, Keras, PyTorch, OpenAI Gym, NumPy, Sionna), Matlab, Linux, LaTeX, GNU Radio, Git, Ansys Electronics (HFSS), Proteus, PSpice, Microwind (layout), DSCH2, Arduino
- **Hardware**: USRP, THz RF Components, Advance Circuits, Arduino, Microprocessor-based IoT Devices

ACHIEVEMENTS

- Travel Award for MILCOM 2025, Howard University
- Ernest E. Just-Percy L. Julian Graduate Fellowship, Howard University (Aug. 2025 - May 2026)
- Fellowship at NSF CyberPowder Fellows Program, University of Utah (Jan. 2025 - Apr. 2025)
- Doctoral Fellowship, College of Engineering and Architecture, Howard University (Aug. 2024 - May 2025)
- Full-ride Research Assistant Scholarship for masters at Chosun University, Gwangju, South Korea
- 1st runner-up at Automated Guided Vehicles (AGV) showcase competition, Techshopbd, Dhaka, Bangladesh (Nov. 2015)

ORGANIZATION AND OUTREACH ACTIVITIES

- Reviewer for IEEE Communications Letters (Sept. 2025)
- Visited Dr. Andreas F. Molisch's lab at the University of Southern California (Aug. 2024)
- Attended IEEE ICC, Seoul, South Korea (16–20 May 2022)
- IEEE Graduate Student Member (2021 - 2022, 2024 - Present)
- Event Organizer, Brac University Electrical and Electronic Club (Feb 2014 - Dec 2018)
- Creative Designer, Robotics Club of Brac University (Jan 2014 - Dec 2016)