Pulok Tarafder

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Google Scholar   in LinkedIn   R⁶ ResearchGate

Research Interests

UAV, Digital Twin, THz, Massive MIMO, Deep Reinforcement Learning, Wireless Networks

Professional Experience

Graduate Teaching Assistant

Dept. of EECS, Howard University, Washington, DC, USA   (Aug. 2024 - Present)

- 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)

Graduate Research Assistant at Wireless Communications Systems (WiCS)

Dept. of EECS, Howard University, Washington, DC, USA   (Jan. 2023 - Present)

- Research topics: Artifial intelligence driven communications for THz-band communication network, applications of deep reinforcement learning and machine learning in the physical layer design of wireless communication, performing research on Digital Twin aided UAV networks, USRP based THz band and Cell Free communication system testbed development to perform channel sounding tasks.
- Conference reviewer: 2024 IEEE ICC Workshop and conference, 2023 IEEE Globecom Workshops, 2023 European Conference on Networks and Communications & 6G Summit, 2023 IEEE MILCOM Workshop, 2023 Biennial Symposium on Communications (BSC 2023).

Data Scientist Intern at Amazon.com, Inc.

Amazon Transportation, Bellevue, Washington, USA   (May 2023 - Aug. 2023)

- Activities: 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.

Graduate Research Assistant at Smart Networking Lab

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

Research Assistant at Control & Applications Research Centre

Dept. of Electrical and Electronic Engineering, Brac University, Bangladesh   (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 – Present)

- Research Area: Development and optimization of next-generation wireless communication systems leveraging advanced reinforcement learning and deep learning methodologies for enhanced performance and efficiency
- 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. 2023)
- 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
- Supervisor: Dr. Wooyeol Choi

Brac University, Dhaka, Bangladesh

- Bachelor of Science in Electrical and Electronic Engineering, Grade 3.07/4.0   (May 2013 - Apr. 2019)
- Senior thesis: Comprehensive mathematical analysis and simulation design of a microwave wireless power transmission system, highest honors

PUBLICATIONS

Journals

J4. **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]

J3. 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]

J2. **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]

J1. **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]

Conference Proceedings

C3. **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) IoT Workshop*, Oct. 2024. [Paper]

C2. **Pulok Tarafder**, Moonsoo Kang and Wooyeol Choi, "A comparative study on centralized MAC protocols for 60 GHz mmWave communications", *International Conference on Information and Communication Technology Convergence (ICTC)*, Jeju, Republic of Korea, October 20-22, 2021 [Paper]

C1. Afrin Sultana Meem, Henry Bukenya, Abrar Faisal, **Pulok Tarafder**, A.K. M Abdul Malek Azad, "A qualitative study of current trends in microwave wireless power transmission including current advancements and challenges", *2019 IEEE Region 10 Symposium (TENSYMP)*, Kolkata, India, June 07-09, 2019 [Paper]

SKILLS

- **Software**: Python (TensorFlow, Keras, PyTorch, OpenAI Gym, NumPy, Sionna), Matlab, Linux, LaTeX, GNU Radio, Git, Java, Ansys Electronics (HFSS), Proteus, PSpice, Microwind (layout), DSCH2, Arduino

- **Hardware**: USRP, Advance Circuits, Arduino-based Hardware, Microcontroller/Microprocessor-based IoT Devices

ACHIEVEMENTS

- Fellowship at NSF CyberPowder Fellows Program, University of Utah (Jan. 2025 - Apr. 2025)

- Doctoral Fellowship, College of Engineering and Architecture, Howard University (Aug. 2024 - Present)

- 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

- 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)