Aisha B Rahman

Graduate Research Assistant

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Education

• University of New Mexico, USA **Jan. 2022 – Present**

Ph.D., Department of Electrical and Computer Engineering

Laboratory: Performance and Resource Optimization Lab (PROTON Lab)
Research Interest: Optimization and learning techniques including machine learning and reinforcement learning for resource allocation in wireless networks, cloud, fog and edge computing environments, and distributed energy resource systems.

Relevant Coursework: ECE 517 - Machine Learning, ECE 595 - Reinforcement Learning.

• University of New Mexico, USA **Jan. 2022 – Dec. 2023**

M.Sc, Computer Engineering (with Distinction)

Laboratory: Performance and Resource Optimization Lab (PROTON Lab)
Research Interest: Wireless netoworks, Information-centric networking, resource allocation and management, network economics

Thesis: A Symbiotic Content Caching Approach in Next-Generation Information-Centric Networks based on Game Theory

• University of Chittagong, Bangladesh **Jan. 2019 – Feb. 2021**

M.Sc, Electrical and Electronic Engineering

Laboratory: Wireless Emerging Technology Lab (WET LAB)
Research Interest: Wireless communication, Cooperative communication, simultaneous wireless information and power transmission, RF energy harvesting

Thesis: Best Relay Aided Energy Harvesting in a Multi-Relay Cooperative Network: A New Energy Harvesting Scheme

• University of Chittagong, Bangladesh **Jan. 2015 – Dec. 2018**

B.Sc., Department of Electrical and Electronic Engineering

Work Experience

Graduate Research Assistant **Jan 2022 – Present**

Performance and Resource Optimization Lab (PROTON Lab) *University of New Mexico*

***HELIOCOMM**: A Resilient Wireless Heliostats Communication System;* *Funded by U. S. Department of Energy*

- Modelling a resilient wireless communication system for heliostat fields.
- Primary components including principles of integrated access and backhaul (IAB) technology, entropy-based routing, dynamic spectrum management, and interference mitigation.
- Simulation and emulation using Python coding and wireless emulators including OMNET++ and/or NS3.

Project Description: The project HELIOCOMM is focused on designing a resilient wireless communication system for heliostat fields in order to take pioneering steps in replacing the expensive dedicated wired communication medium within the field of tens or hundreds of thousands of heliostats to enable closed-loop autocalibration which will maximize the performance of CSP for power generation. The project is in collaboration with National Renewable Energy Laboratory and Sandia National Laboratories.
Technical Skills: Languages– Python and C++, Tools– Optimization techniques and reinforcement learning.

***Goaltender**: Cloud-based Defense and Response Tools for DER Ecosystem;* *Funded by U. S. Department of Energy*

- Collection of large, labeled dataset of IEEE 2030.5 XML and OCPP 2.0.1 JSON payloads.
- Parsing and preprocessing of the collected dataset and creating a training dataset.
- Extraction of informative features from the collected payloads to distinguish between malicious and benign data samples.
- Investigating dimensionality reduction techniques to reduce the risk of overfitting and enhance classification model efficiency.

- Exploring and evaluating multiple machine learning models for malware detection, considering supervised learning methods.

  Project Description: The primary aim of the project is to create a robust and efficient malware detection solution to safeguard the grid from malicious attacks. The solution will be capable of distinguishing between malicious and benign data samples in the context of IEEE 2030.5 XML and OCPP 2.0.1 JSON payloads while reducing the risk of overfitting and enhancing the overall model performance.The project is in collaboration with Sandia National Laboratories.
  Technical Skills: Languages– Python, SQL, Tools– Supervised and unsupervised machine learning.

Teaching Assistant **Jan. 2022 – May 2022**
Department of Electrical and Computer Engineering *University of New Mexico*

- ECE-440 Introduction to Computer Networks

Research Assistant **May 2019 – Feb. 2021**
Wireless Emerging Technology Lab (WET LAB) *University of Chittagong*

- Wireless Cooperative Communication
- RF Energy Harvesting
- Simultaneous Wireless Information and Power Transmission.

Publications — Google Scholar

Journals

- E. E. Tsiropoulou, **A. B. Rahman**, M. S. Siraj, "HELIOCOMM: A Wireless Revolution in Concentrated Solar Power Systems", IEEE IT Professional, April 2024.
- M. S. Siraj, **A. B. Rahman**, M. Diamanti, E. E. Tsiropoulou, S. Papavassiliou, "Alternative Positioning, Navigation, and Timing in Satisfaction Form and Reconfigurable Intelligent Surfaces, in IEEE Systems Journal, doi: 10.1109/JSYST.2023.3268989.
- **A. B. Rahman**, M. F. Kader, "A new energy harvesting scheme for multi-relay cooperative networks", Digital Signal Processing, Volume 133, March 2023. doi: 10.1016/j.dsp.2022.103846
- P. Khan et al., Machine Learning and Deep Learning Approaches for Brain Disease Diagnosis: Principles and Recent Advances," in IEEE Access, vol. 9, pp. 37622-37655, 2021, doi: 10.1109/ACCESS.

Conferences

- **A. B. Rahman**, Y. S. Chen, E. E. Tsiropoulou, S. Papavassiliou, "SynergyWave: Bandwidth Splitting and Power Control in Integrated Access and Backhaul Networks", IEEE ICC 2024 (To appear).
- **A. B. Rahman**, P. Charatsaris, E. E. Tsiropoulou, S. Papavassiliou, "Information-Centric Networking Cache Memory Allocation: A Network Economics Approach", GLOBECOM 2023 - 2023 IEEE Global Communications Conference, Kuala Lumpur, Malaysia, 2023, pp. 1259-1264, doi: 10.1109/GLOBECOM54140.2023.10437315.
- **A. B. Rahman**, J. Patrizi, P. Charatsaris, E. E. Tsiropoulou, S. Papavassiliou, "Bioinspired Dynamic Spectrum Management in 3D Networks", 2023 19th International Conference on Distributed Computing in Smart Systems and the Internet of Things (DCOSS-IoT), Pafos, Cyprus, 2023, pp. 166-170, doi: 10.1109/DCOSS-IoT58021.2023.00038.
- M. S. Siraj, **A. B. Rahman**, P. Charatsaris, E. E. Tsiropoulou, S. Papavassiliou, "Positioning, Navigation, and Timing on the Air", 2023 19th International Conference on Distributed Computing in Smart Systems and the Internet of Things (DCOSS-IoT), Pafos, Cyprus, 2023, pp. 661-668, doi: 10.1109/DCOSS-IoT58021.2023.00105.
- **A. B. Rahman**, P. Charatsaris, M. S. Siraj, E. E. Tsiropoulou, "Symbiotic Content Caching in Next-Generation Information-Cantric Networking", 2023 19th International Conference on Distributed Computing in Smart Systems and the Internet of Things (DCOSS-IoT), Pafos, Cyprus, 2023, pp. 414-421, doi: 10.1109/DCOSS-IoT58021.2023.00072.
- **A. B. Rahman**, M. S. Siraj, E. E. Tsiropoulou, S. Papavassiliou, "Mutualistic Compute Continuum: A Network Economics Analysis", 2023 IEEE International Conference on Communications Workshops (ICC Workshops), Rome, Italy, 2023, pp. 1565-1570, doi: 10.1109/ICCWorkshops57953.2023.10283544.
- A. Adesokan, M. S. Siraj, **A. B. Rahman**, E. E. Tsiropoulou, S. Papavassiliou, "How to become an Influencer in Social Networks", ICC 2023 - IEEE International Conference on Communications, Rome, Italy, 2023, pp. 5570-5575, doi: 10.1109/ICC45041.2023.10279644.
- M. S. Siraj, **A. B. Rahman**, M. Diamanti, E. E. Tsiropoulou, S. Papavassiliou and J. Plusquellic, "Orchestration of Reconfigurable Intelligent Surfaces for Positioning, Navigation, and Timing," MILCOM 2022 - 2022 IEEE Military Communications Conference (MILCOM), Rockville, MD, USA, 2022, pp. 148-153, doi: 10.1109/MILCOM55135.2022.10017665.

- **A. B. Rahman**, M. S. Siraj, N. Kubiak, E. E. Tsiropoulou and S. Papavassiliou, "Network Economics-based Crowdsourcing in Online Social Networks," GLOBECOM 2022 - 2022 IEEE Global Communications Conference, Rio de Janeiro, Brazil, 2022, pp. 4655-4660, doi: 10.1109/GLOBECOM48099.2022.10001611.
- **A. B. Rahman** and M. F. Kader, "Best Relay Transmission Aided Energy Harvesting in a Multi Relay Cooperative Network," 2020 IEEE Region 10 Symposium (TENSYMP), Dhaka, Bangladesh, 2020, pp. 106-109, doi: 10.1109/TENSYMP50017.2020.9230985.
- **A. B. Rahman**, M. S. Kamal and A. Islam, "Bridge Strength Preservation by Automatic Traffic Density Control: an IoT Application," 2019 1st International Conference on Advances in Science, Engineering and Robotics Technology (ICASERT), Dhaka, Bangladesh, 2019, pp. 1-5, doi: 10.1109/ICASERT.2019.8934520.

Technical Reports

- E. E. Tsiropoulou, **A. B. Rahman**, and M. S. Siraj, "HELIOCOMM: Wireless Controls State-of-the-Art Report", 2024, Golden, CO: National Renewable Energy Laboratory. NREL/SR-5K00-88431.

Oral Presentations

- Poster presentation on "Information-centric Networking Cache Memory Allocation: A Network Economics Approach" at The LoboBITES Research Poster Presentation 2023, Shared Knowledge Conference, University of New Mexico, Albuquerque, New Mexico, USA.
- Conference presentation for the paper "Network Economics-based Crowdsourcing in Online Social Networks" at 2022 Global Communications Conference (GLOBECOM), Rio De Janeiro, Brazil.
- Presentation on progress and updates for biweekly and quarterly meetings with Sandia National Laboratories and National Renewable Energy Laboratory for the project HELIOCOMM: A Resilient Wireless Heliostats Communication System, funded by the U. S. Department of Energy.
- Presentation on progress and updates for biweekly meetings with Sandia National Laboratories and Distributed Energy Resources Security Corp for the project Goaltender: Cloud-Based Defense and Response Tools for DER Ecosystem, funded by the U. S. Department of Energy.

Patents

- E. E. Tsiropoulou, M. S. Siraj, and **A. B. Rahman**, "HELIOCOMM: A Resilient Wireless Heliostats Communication System", UNMI No: 2024-015-02, *Submitted to UNM Rainforest*.

Volunteering and Leadership Experience

Chair **Aug. 2022 – Present**

IEEE Women in Engineering Affinity Group Albuquerque Section

- Organizing and conducting monthly public talks, workshops, and other volunteering activities for promoting women engineers and scientists.
- Former Vice-chair from Feb. 2022 - Aug. 2022.

Chapter Vice-chair **Dec. 2023 – Present**

IEEE Albuquerque Section Communications Society and Computer Society Joint Chapter

- Organizing and conducting monthly public talks, workshops, and webinars.

Technical Program Committee (TPC) Member and Peer Reviewer

IEEE Conferences and Journals

- IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids 2023, Glasgow Scotland.
- IEEE GLOBECOM 2022 Green Communication Systems & Networks, Rio de Janeiro, Brazil.
- IEEE International Symposium on Computers and Communications 2022, Rhodes Island, Greece.
- IEEE Internet of Things Journal, July 2023.
- IEEE Access, December 2023.

Honors and Awards

IEEE Albuquerque Section Outstanding Graduate Student Award 2024 **2024**

IEEE Albuquerque Section *Albuquerque, NM, USA*

IEEE Albuquerque Section Service Award 2023 **2023**

IEEE Albuquerque Section *Albuquerque, NM, USA*

2022 Women in Technology Scholarship **2022**

Cadence Design Systems *California, USA*