Md Sadman Siraj

Graduate Research Assistant

505-464-5155 mdsadmansiraj96@unm.edu sadman-siraj.github.io sadman-siraj

Education

University of New Mexico, USA **January 2022 – May 2026 (Expected)**

Ph.D., Department of Electrical and Computer Engineering

- **Laboratory**: Performance and Resource Optimization Lab (PROTON Lab)
- **Research Interest**: Alternative Positioning, Navigation and Timing, Wireless Communication and Networks, Network Economics, Resource Allocation and Management

University of New Mexico, USA **January 2022 – December 2023**

M.Sc., Computer Engineering

- **Laboratory**: Performance and Resource Optimization Lab (PROTON Lab)
- **Research Interest**: Symbiotic Positioning, Navigation and Timing, Game Theory, Reinforcement Learning
- **Thesis**: A Bio-inspired Alternative Positioning, Navigation, and Timing Approach based on a Potential Game-theoretic Model

University of Dhaka, Bangladesh **January 2016 – March 2020**

B.Sc., Electrical and Electronic Engineering

- **Research Interest**: Human Activity Recognition, Machine Learning, Deep Learning

Projects

Research Assistant **April 2023 – Present**

HELIOCOMM *University of New Mexico*

A joint project by the Department of Energy, National Renewable Energy Laboratory and Sandia National Laboratories

- Modelling a resilient wireless communication system for heliostat fields.
- Primary components including principles of integrated access and backhaul (IAB) technology, AI-based clustering, 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: Solar power, as opposed to its counterpart renewable energy sources, is clean and does not produce greenhouse gases during the process of power generation. Hence, several research focusing on Concentrated Solar Plants (CSP) are being funded by the Department of Energy aiming on developing newer and more improved solar thermal facilities. The project HELIOCOMM is focused on designing a resilient wireless communication system for heliostat fields in order to take the first ever step in replacing the expensive dedicated wired communication medium within the field of tens or hundreds of thousands of heliostats.

Research Assistant **December 2023 – Present**

Goaltender *University of New Mexico*

A joint project by the Sandia National Laboratories and University of New Mexico

- 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 capable of distinguishing between malicious and benign data samples while reducing the risk of overfitting and enhancing the overall model performance. To achieve this, research efforts are made to support and facilitate the development of an advanced machine learning system for malware detection in the context of IEEE 2030.5 XML and OCPP 2.0.1 JSON payloads.

Research Assistant **December 2023 – Present**

Central Bank Digital Currency (CBDC) *University of New Mexico*

A joint project by the Bank of Canada and University of New Mexico

- Conversion of an existing PUF into a Soft-PUF.
- Integration of the Soft-PUF with PeerTrust protocol.
- Exploring reinforcement learning approaches for in-field use.
- Development of a mobile Android application containing an instance of a software PUF and capable of participating in PeerTrust protocol.

Project Description: The Soft-PUF concept originates from the ability to separate the entropy source from the algorithmic processing steps. Given a hardware instantiation of the PUF, source entropy outputs, configuration parameters, characterization data for a given set of challenges can be generated apriori and recorded in a data structure. This dataset, coupled with the processing software, can now be deployed on a smartphone, embedded device, or an IoT module, and can perform authentication functions in a manner identical to a traditional hardware PUF instance.

Work Experience

Research Assistant **June 2022 – Present**

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

- Alternative Positioning, Navigation and Timing
- Wireless Communication and Networks
- Resource Allocation and Management through Network Economics
- Online Social Networks
- Integrated Sensing and Communication

Teaching Assistant **January 2022 – May 2022**

Department of Electrical and Computer Engineering *University of New Mexico*

- ECE-314L Signals and Systems
- ECE-360 Electromagnetic Fields and Waves
- ECE-381 Introduction to Power Systems

Online Course Instructor **June 2020 – December 2021**

Upskill *Bangladesh*

- Python Programming Fundamentals: Variables, Expressions, Conditionals, Loops, Functions
- Data Structures: Strings, Files, Lists, Dictionaries, Tuples
- Web Data in Python: Regular Expressions, Sockets, URLlibs, HTTP, XML, JSON
- Database in Python: Tables, DBMS, Relations, SQL, SQLite, RDBMS

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 Experience

Chapter Chair **December 2023 – Present**

IEEE Albuquerque Section Communications Society and Computer Society Joint Chapter

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

Chair **August 2019 – August 2021**

IEEE Student Branch University of Dhaka

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

Technical Program Committee (TPC) Member

IEEE Conferences

- IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids, 31 October-3 November 2023, Glasgow, Scotland.
- IEEE International Conference on High Performance Switching and Routing, 5-7 June 2023, Albuquerque, USA.
- International Conference on Informatics, Electronics & Vision, 25-29 June 2018, Kitakyushu, Japan.

Peer Reviewer

IEEE Conferences

- 4 Papers - IEEE International Conference on Communications, 9-13 June 2024, Denver, USA.
- 3 Papers - IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids, 31 October-3 November 2023, Glasgow, Scotland.
- 1 Poster, 1 Demo - IEEE Symposium on Computers and Communications, 9-12 July 2023, Tunis, Tunisia.
- 1 Paper - IEEE Global Communications Conference, 4-8 December 2022, Rio de Janeiro, Brazil.
- 3 Posters - IEEE Symposium on Computers and Communications, 30 June-3 July 2022, Rhodes, Greece.

Technical Skills

Languages: Python, MATLAB, C, C++, SQL, PHP
Software/Tools: Deep Learning with Tensorflow and Scikit-learn, Reinforcement Learning in Python, Unix/Linux, Network Simulation in OMNET++ and NS3
Other skills: Research and open data aggregation, Data cleaning and processing, Excellent visualizations, Collaborative project management, Advanced presentation skills

Publications — Google Scholar

Journal Publications

- **M. S. Siraj**, A. B. Rahman, M. Diamanti, E. E. Tsiropoulou, and S. Papavassiliou, "Alternative positioning, navigation, and timing enabled by games in satisfaction form and reconfigurable intelligent surfaces," IEEE Systems Journal, vol. 17, no. 3, pp. 5035–5046, 2023.
- **M. S. Siraj**, E. E. Tsiropoulou, S. Pavassiliou, and J. Plusquellic, "Positioning, navigation, and timing through the prism of symbiosis based on game theory and reinforcement learning", IEEE Transactions on Vehicular Technology. (Under Review)
- N. Kemp, **M. S. Siraj**, and E. E. Tsiropoulou, "Coalitional demand response management in community energy management systems," Energies, vol. 16, no. 17, 2023.

Conference publications

- **M. S. Siraj**, E. E. Tsiropoulou, S. Papavassiliou, and J. Plusquellic, "SAFE: Secure symbiotic positioning, navigation, and timing," in GLOBECOM 2023 - 2023 IEEE Global Communications Conference, 2023.
- N. Kemp, **M. S. Siraj**, E. E. Tsiropoulou, and S. Papavassiliou, "Community-based load balancing and prosumers incentivization in smart grid systems," in GLOBECOM 2023 - 2023 IEEE Global Communications Conference, 2023.
- A. Adesokan, **M. S. Siraj**, A. S. Penafiel, E. E. Tsiropoulou, and S. Papavassiliou, "GAIA: A dynamic crowdmapping framework based on hedonic coalition formation games", in GLOBECOM 2023 - 2023 IEEE Global Communications Conference, 2023.
- **M. S. Siraj**, A. B. Rahman, P. Charatsaris, E. E. Tsiropoulou, and S. Papavassiliou, "Positioning, navigation, and timing on the air," in 2023 19th International Conference on Distributed Computing in Smart Systems and the Internet of Things (DCOSS-IoT), pp. 661–668, 2023.
- A. B. Rahman, P. Charatsaris, **M. S. Siraj**, and E. E. Tsiropoulou, "Symbiotic content caching in next-generation information-centric networking," in 2023 19th International Conference on Distributed Computing in Smart Systems and the Internet of Things (DCOSS-IoT), pp. 414–421, 2023.
- **M. S. Siraj**, A. B. Rahman, E. E. Tsiropoulou, S. Papavassiliou, and J. Plusquellic, "Symbiotic positioning, navigation, and timing," in 2023 19th International Conference on Distributed Computing in Smart Systems and the Internet of Things (DCOSS-IoT), pp. 261–268, 2023.
- A. B. Rahman, **M. S. Siraj**, E. E. Tsiropoulou, and S. Pavassiliou, "Mutualistic compute continuum: A network economics analysis," in ICC Workshops 2023 - 2023 IEEE International Conference on Communications Workshops, 2023. (Accepted).
- A. Adesokan, **M. S. Siraj**, A. B. Rahman, E. E. Tsiropoulou, and S. Pavassiliou, "How to become an influencer in social networks", in ICC 2023 - 2023 IEEE International Conference on Communications, 2023.
- **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," in MILCOM 2022 - 2022 IEEE Military Communications Conference (MILCOM), pp. 148–153, 2022.
- **M. S. Siraj**, M. S. Hossain, R. Brown, E. E. Tsiropoulou, and S. Papavassiliou, "Incentives to learn: A location-based federated learning model," in 2022 Global Information Infrastructure and Networking Symposium (GIIS), pp. 40–45, 2022.
- A. B. Rahman, **M. S. Siraj**, N. Kubiak, E. E. Tsiropoulou, and S. Papavassiliou, "Network economics-based crowdsourcing in online social networks," in GLOBECOM 2022 - 2022 IEEE Global Communications Conference, pp. 4655–4660, 2022.

Honors and Awards

M.Sc. in Computer Engineering with Distinction **2023**
University of New Mexico *Albuquerque, NM, USA*

IEEE Outstanding Graduate Engineering Student Award 2023 **2023**
IEEE Albuquerque Section *Albuquerque, NM, USA*

ECE Outstanding Student Teaching Award 2023 **2023**
Department of Electrical and Computer Engineering, University of New Mexico *Albuquerque, NM, USA*

Nominated for Outstanding Graduate Award 2023 **2023**
Department of Electrical and Computer Engineering, University of New Mexico *Albuquerque, NM, USA*

Nominated as a Finalist for The LoboBITES competition **2022**
Department of Electrical and Computer Engineering, University of New Mexico *Albuquerque, NM, USA*

Science for Mankind Research Award **2019**
DUSS, University of Dhaka *Dhaka, Bangladesh*