Md Sadman Siraj

Graduate Research Associate, Performance and Resource Optimization (PROTON) Laboratory, Arizona State University

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Professional Summary

• 4 years of research experience in conducting simulation-based experiments with Python for Ph.D. research, focusing on developing distributed decision-making algorithms using Game Theory and/or Reinforcement Learning (RL) for alternative localizations, resource management in wireless networks and cybersecurity with trust in dynamic networks
• Built an ML pipeline to detect malicious modifications in wireless packets for Goaltender research project (U.S. DOE), gaining expertise in machine learning and deep learning
• Designed and deployed a wireless testbed enabling multi-node wireless networking experiments for HELIOCOMM research project (U.S. DOE), developing skills in wireless communications and embedded systems
• Developed contract-theory-based trust models and evaluated them on 20 FPGA ZYBO-Z7-10 boards with PUFs for CBDC research project (Bank of Canada), advancing expertise in cybersecurity and hardware trust
• 3 years of experience in using High-Performance Computing (HPC) systems
• Strong and consistent record of publications throughout the Ph.D. program

Education

• Arizona State University, USA **Spring 2026 (Expected)**
Ph.D., School of Electrical, Computer and Energy Engineering

Research Interests: Applied artificial intelligence including supervised, unsupervised, reinforcement and federated learning, alternative localizations, wireless communications, networks and systems, and distributed energy resources (DERs)
Relevant Coursework: Probability and Random Processes, AI-based Decision-making in Dynamic Systems

• University of New Mexico, USA **December 2023**
M.Sc., Computer Engineering (with Distinction) *GPA 4.21/4.00*

Relevant Coursework: Network Economics, Machine Learning, Foundations of Computing, Advanced Networking, Hardware-oriented Security and Trust, and Reinforcement Learning

Technical Skills

• **Programming Languages**: Python, MATLAB, C, C++, SQL
• **Hardware Programming**: nRF7002, nRF5340 System-on-Chips (SoCs), FPGA ZYBO Z7-10, ADALM-Pluto SDR
• **Software Libraries and Tools**: Scikit-learn, Tensorflow, PyTorch, Pandas, SciPy, HPC, DSP in MATLAB, Linux, SLURM, Git, Docker, RF, WiFi-6, Zigbee, BLE, Nordic Semiconductor's ESB wireless protocols
• **Software Development Tools**: nRF SDK, NS3, Android Studio, GNU Radio, Eclipse
• **Other skills**: Research and open data aggregation, data cleaning and processing, parallel processing, excellent visualizations, collaborative project management, advanced presentation skills

Professional Experience

• Graduate Research Associate **January 2025 – Present**
Performance and Resource Optimization in Networks Laboratory (PROTON Lab) *Arizona State University*

Research Projects:

1. **HELIOCOMM**: A Resilient Wireless Heliostats Communication System (funded by U. S. Department of Energy)
   - Modeling a resilient wireless communication system for heliostat fields using wireless technologies and protocols such as RF, WiFi-6, Zigbee, BLE, Nordic Semiconductor's ESB and reinforcement learning
   - Simulation and emulation using Python coding and wireless emulators including OMNET++ and/or NS3
   - Testing of the developed system in large scale for available direct normal irradiation and heliostats mirror orientation dataset in high-performance computing (HPC) environments
   - **Technical Skills/Tools: Python, Reinforcement Learning, HPC, IEEE 802.11/802.15.4 protocols**
2. **GOALTENDER**: Cloud-Based Defense and Response Tools for the DER Ecosystem (funded by U. S. Department of Energy)
   - Developed autoencoder-based malicious user behavior in electric vehicle charging networks with 97.9%, 80.84% and 94% F1 score for detecting stealthy under-billing, over-billing, and spoofing state of charge attacks, respectively

- Continuing on ML and DL models exploration for detection of different classes of anomalies in EV charging networks including malicious user behavior. Explored models include supervised learning, e.g. Random Forest, XGBoost and unsupervised learning, e.g., Isolation Forest, One-Class SVM, and deep learning, e.g., Autoencoders
- Preprocessing of large-scale dataset and investigation of dimensionality reduction techniques to reduce overfitting risks and enhance model efficiency
- **Technical Skills/Tools: ChargePoint OCPP Simulator, SQL, Scikit-Learn, Tensorflow, Docker**

3. **CBDC**: Central Bank Digital Currency (funded by Bank of Canada)
   - Developed an Android application incorporated with Physical Unclonable Function (PUF)-based authentication database
   - Integrated the software-based PUF authentication with PeerTrust protocol and explored reinforcement learning approaches for in-field use
   - Developed a PUF-based authentication incorporated with software-based instances of PeerTrust protocol packaged in an Android application
   - **Technical Skills/Tools: C, Android Studio, Contract Theory, Linux, FPGA ZYBO Z7**

• Graduate Research Assistant **January 2022 – December 2024**
Performance and Resource Optimization in Networks Laboratory (PROTON Lab) *University of New Mexico*

- Conducted research on alternative localization methods for GPS-denial scenarios, resource management and optimization in wireless networks, and demand response management in smart-grid systems
- Conducted research under the two U.S. DOE-funded projects **HELIOCOMM**, **GOALTENDER**, and one Bank of Canada-funded project **CBDC** (listed above, all projects moved to ASU starting 2025 where I am continuing my Ph.D. research)

Notable Publications (Google Scholar) and Presentations

Technical Papers

- **M. S. Siraj**, J. R. Atencio, and E. E. Tsiropoulou, "PANTHER: A Power-Optimized and Accurate Positioning, Navigation, and Timing with High Efficiency and Reliability," IEEE Open Journal of the Communications Society, 2025
- **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**, A. B. Rahman, C. Minwalla, E. E. Tsiropoulou and J. Plusquellic, "Sourcing Trust From Peers with Physical Unclonable Functions," in 2025 IEEE International Symposium on Hardware Oriented Security and Trust (HOST), San Jose, CA, USA, 2025, pp. 268-278

Technical Reports

- Tsiropoulou, Eirini Eleni, Aisha B. Rahman, and **Md Sadman Siraj**. 2024. HELIOCOMM: Wireless Controls State-of-the-Art Report. Golden, CO: National Renewable Energy Laboratory. NREL/SR-5K00-88431. https://www.nrel.gov/docs/fy24osti/88431.pdf.

Oral Presentations

- Conference paper presentations at the 2022 IEEE GIIS, 2024 IEEE ICC and 2025 IEEE HOST
- Presentation on progress and updates during biweekly and quarterly meetings with National Renewable Energy Laboratory and Sandia National Laboratories for DOE-funded projects

Professional Services

- Chapter Chair, IEEE Albuquerque Section ComSoc and CS Joint Chapter (2023-2024)
- Technical Program Committee (TPC) Member, IEEE International Conference on High Performance Switching and Routing, 5-7 June 2023, Albuquerque, USA
- Peer Reviewed 21 technical articles including journal papers, conference papers, posters and demonstrations (verified by Web of Science)

Honors and Awards

University Graduate Fellowship **2025**
Arizona State University *Tempe, AZ, USA*

IEEE Service Award 2024 **2024**
IEEE Albuquerque Section *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*