

MUHAMMAD BAQER MOLLAH

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RESEARCH INTERESTS

My research leverages advanced techniques, such as cryptography, sensing, communications, deep learning, and generative AI, with an emphasis on addressing real-world challenges in cyber-physical systems through theoretical, numerical, and experimental ways. More specifically, my research interests include:

- **Applied Cryptography:** Public-Key Cryptography, Quantum-Safe Cryptography, Blockchain, and Smart Contract
- **Privacy-Preserving Technologies:** Secure Multi-Party Computation, Homomorphic Encryption, and Zero-Knowledge Proof
- **Sensing and Communications:** V2X, AI-Native Wireless, Beyond 5G/6G, RF/Non-RF Sensing, mmWave/Sub-THz/THz, ISAC, and Semantic Communications
- **Deep Learning:** Transformers, Multimodal Learning, and Mixture of Experts
- **Edge Intelligence:** On-Device/Edge AI, TinyML, and Federated Learning/Unlearning
- **Generative AI:** Foundation Model, LoRA, Agentic AI, One-Shot Learning, and Few-Shot Learning

CURRENT POSITION

University of Houston

September 2025 - Now

Dept. of Information Science Technology

Post-Doctoral Fellow

Project: USDOT Tier 1 UTC Transportation Cybersecurity Center for Advanced Research and Education (CYBER-CARE)

- Conducting research on ensuring in-vehicle network security by leveraging edge computing and access control encryption techniques
- Designing and evaluating a practical end-to-end security-aware mechanism for connected vehicles by implementing multi-level access control schemes
- Working closely with students to define research directions, plan project milestones, and oversee implementation and paper writing.

EDUCATION

University of Massachusetts Dartmouth

Fall 2022 - Summer 2025

PhD in Electrical and Computer Engineering

Advisor: Prof. Honggang Wang, IEEE Fellow

Dissertation: On Enabling Multi-Modal Sensing and Security Techniques for Connected Vehicles

Courses Taken (Selected): Network Security, Multimedia Communications, Advanced Computer Systems, and Dependable & Secure Computing

Jahangirnagar University, Dhaka, Bangladesh

2015 - 2016

MS in Computer Science

Research Project: Secure Data Sharing and Searching at the Edge of Cloud Connected Smart Devices
Advisor: Prof. Md. Abul Kalam Azad

Courses Taken (Selected): Artificial Neural Networks, Mobile & Wireless Communications, Information Theory & Coding System, Distributed Systems, and Cloud Computing

International Islamic University Chittagong, Chittagong, Bangladesh

2009 - 2014

BS in Electrical and Electronic Engineering

Final Year Project: E-Police System for Improved E-Government Services in Bangladesh

Advisor: Prof. Sikder Sunbeam Islam

PAST EXPERIENCES

University of Massachusetts Dartmouth Dept. of Electrical and Computer Engineering Research Assistant <i>Project:</i> Enabling Machine Learning based Cooperative Perception with mmWave Communication for Autonomous Vehicle Safety (NSF Funded)	September 2022 - August 2025
Teaching Assistant (Fall 2023) <i>Course:</i> Introduction to Engineering & Computing (Lab)	
Nanyang Technological University, Singapore School of Computer Science and Engineering Research Associate <i>Lab:</i> Computer Networks and Communications Lab <i>Topics:</i> AI and Blockchain application to Cyber-Physical Systems	March 2019 - May 2022
Jahangirnagar University, Dhaka, Bangladesh Dept. of Computer Science and Engineering Research Assistant <i>Topics:</i> IoT Communications and Security	September 2016 - December 2017
Bangladesh University of Engineering and Technology, Dhaka February 2015 - August 2015 Dept. of Electrical and Electronic Engineering Project Engineer <i>Project:</i> SCADA System Installation, Commissioning and Testing for Dhaka Power Distribution Company Limited 33/11KV Distributed Substations <i>Responsibilities:</i> Making the SCADA interface boards, preparing the data acquisition (DAQ) module interface for the substation remote terminal unit (RTU), SCADA interface boards installation & wiring in substation breaker panels and SCADA database.	

VISITING EXPERIENCE

Singapore University of Technology and Design, Singapore January 2018 to January 2019 Information System Technology and Design Pillar <i>Group:</i> Automated Systems Security Research Group <i>Project:</i> Testing and Monitoring Security of Industrial IoT <i>Host:</i> Prof. Sudipta Chattopadhyay

PUBLICATIONS

Google Scholar Profile: <https://scholar.google.com/citations?user=VijQVZYAAAAJ&hl=en>

Under Preparation

- [2] **M.B. Mollah**, K. Lee, Y. Zhang, “Practical End-to-End Security-Aware Mechanism for Connected Vehicles by Multi-Level Access Control”, Under Preparation, to be Submitted to IEEE Transactions, 2025.
- [1] **M.B. Mollah**, K. Lee, Y. Zhang, “Ensuring In-Vehicle Network Security with Edge Computing and Access Control Encryption”, Under Preparation, to be Submitted to IEEE Transactions, 2025.

Journals/Magazines

- [J5] **M.B. Mollah**, H. Wang, M.A. Karim, H. Fang, “Multi-Modal Sensing and Fusion in mmWave Beamforming for Connected Vehicles: A Transformer Based Framework”, pp. 1-12, Accepted with Major Revision, IEEE Transactions on Vehicular Technology, 2025.

- [J4] **M.B. Mollah**, H. Wang, M.A. Karim, H. Fang, “*Multi-Modality Sensing in mmWave Beamforming for Connected Vehicles Using Deep Learning*”, IEEE Transactions on Cognitive Communications and Networking, pp. 1-15, March 2025. Online: <https://doi.org/10.1109/TCCN.2025.3558026>
- [M2] **M.B. Mollah**, H. Wang, M.A. Karim, H. Fang, “*mmWave Enabled Connected Autonomous Vehicles: A Use Case with V2V Cooperative Perception*”, IEEE Network, vol. 38, no. 6, pp. 485-492, Nov. 2024. Online: <https://doi.org/10.1109/MNET.2023.3321520>
- [J3] **M.B. Mollah**, M.A.K. Azad, Y. Zhang, “*Secure Targeted Message Dissemination in IoT Using Blockchain Enabled Edge Computing*”, IEEE Transactions on Consumer Electronics, vol. 70, no. 3, pp. 5389-5400, Aug. 2024. Online: <https://doi.org/10.1109/TCE.2024.3436825>
- [J2] **M. B. Mollah**, J. Zhao, D. Niyato, Y. L. Guan, C. Yuen, S. Sun, K.-Y. Lam, and L. H. Koh, “*Blockchain for the Internet of Vehicles towards Intelligent Transportation Systems: A Survey*”, IEEE Internet of Things Journal, vol. 8, no. 6, pp. 4157-4185, March 2021. Online: <https://doi.org/10.1109/JIOT.2020.3028368>
- [J1] **M. B. Mollah**, J. Zhao, D. Niyato, K.-Y. Lam, X. Zhang, A. M.Y.M. Ghias, L. H. Koh, and L. Yang, “*Blockchain for Future Smart Grid: A Comprehensive Survey*”, IEEE Internet of Things Journal, vol. 8, no. 1, pp. 18-43, January 2021. Online: <https://doi.org/10.1109/JIOT.2020.2993601>
- [M1] **M.B. Mollah**, M.A.K. Azad, A. Vasilakos, “*Secure Data Sharing and Searching at the Edge of Cloud-Assisted Internet of Things*”, IEEE Cloud Computing, Vol. 4, No. 1, January-February 2017, pp. 34-42. Online: <https://doi.org/10.1109/MCC.2017.9>

Book Chapter

- [B1] **M.B. Mollah**, S. Zeadally, M.A.K. Azad, “*Emerging wireless technologies for Internet of Things applications: Opportunities and challenges*”, In Encyclopedia of Wireless Networks, Springer, 2020, pp. 390-400, Editors: Profs. Xuemin Shen, Xiaodong Lin, and Kuan Zhang. Online: https://doi.org/10.1007/978-3-319-32903-1_328-1

Conference Proceedings

- [C4] **M.B. Mollah**, H. Wang, H. Fang,, “*Evaluating Vulnerabilities of Connected Vehicles Under Cyber Attacks by Attack-Defense Tree*”, International Conference on Computing, Networking and Communication (ICNC), Maui, Hawaii, USA, 2026, pp. 1-6 (Submitted).
- [C3] **M.B. Mollah**, H. Wang, H. Fang, “*Multi-Modal Sensing Aided mmWave Beamforming for V2V Communications with Transformers*”, IEEE Global Communications Conference (GLOBECOM), Taipei, Taiwan, 2025, pp. 1-6. (Accepted) Online: <https://arxiv.org/abs/2509.11112>
- [C2] **M.B. Mollah**, H. Wang, H. Fang, “*Position Aware 60 GHz mmWave Beamforming for V2V Communications Utilizing Deep Learning*”, IEEE International Conference on Communications (ICC), Denver, CO, USA, 2024, pp. 4711-4716. Online: <https://doi.org/10.1109/ICC51166.2024.10622582>
- [C1] **M.B. Mollah**, K.R. Islam, S.S. Islam, “*E-Police System for Improved E-Government Services of Developing Countries*”, 25th IEEE Annual Canadian Conference on Electrical & Computer Engineering (CCECE), Montreal, Canada, April-May, 2012, pp. 1-6. Online: <https://doi.org/10.1109/CCECE.2012.6335057>

PROPOSAL WRITING EXPERIENCE

- **NSF - Collaborative Research:** CIF: Medium: Towards Fully Deep Learning-based mmWave Communications for Complex Mobile RF Environments, **PIs and Co-PIs:** Prof. Honngang Wang,

Prof. Hua Fang, Prof. Hamid Sharif, UNL, **Status:** Not funded, **My Contribution:** One research thrust out of three in total.

RELATED TRAINING

AraFest

Summer 2024 and 2025

ARA (Agriculture and Rural Communities) Annual Community Event

Iowa State University, Ames, Iowa, USA

Project: NSF Platforms for Advanced Wireless Research (PAWR) program.

AI Summer School

July 2019

AISingapore and National University of Singapore

Singapore.

SERVICES

Web of Science Public Profile: <https://www.webofscience.com/wos/author/record/T-4705-2019>

Reviewer for Journals/Magazines: IEEE Communications Magazine, IEEE Network, IEEE Wireless Communications Magazine, IEEE Transactions on Wireless Communications, IEEE Wireless Communications Letters, IEEE Journal on Selected Areas in Communications, IEEE Transactions on Mobile Computing, IEEE Transactions on Industrial Informatics, IEEE Transactions on Intelligent Transportation Systems, IEEE Transactions on Information Forensics and Security, IEEE Internet of Things Journal, IEEE Transactions on Network and Service Management, ACM Transactions on Computing for Healthcare, ACM Computing Surveys, Future Generation Computer Systems (Elsevier).

Volunteer: • Student Volunteer at IEEE PES International Conference on Innovative Smart Grid Technologies (ISGT Asia 2018), May 22-25 2018, Singapore.

MEMBERSHIP

Member of • IEEE • IEEE Communications Society • IEEE Vehicular Technology Society

REFERENCES

Dr. Honggang Wang, IEEE Fellow
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Dept. of Graduate Computer Science & Engg.
Katz School of Science and Health
Yeshiva University, Manhattan, NY 10016
Email: honggang.wang@yu.edu

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Dr. Mohammad Ataul Karim, IEEE Fellow
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Dr. Kyuin Lee
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