

Dr. Sabidur Rahman

Email: krahman@ucdavis.edu

Phone: +1-210-843-5941

Summary

- 13+ years of top industry-academia R&D experience; including UC Davis and AT&T Labs
- Pioneer “AI/ML for network automation” researcher, with solid publication track record
- CS/AL/Data Science teaching and education expertise at UC Davis and SSU
- Extensive editorial experience as former professor, TPC member, and reviewer
- Areas of technical expertise: Network automation, applied artificial intelligence and Gen AI, data science for networks, telecommunication networks including 5G and 6G wireless networks, satellite networks, telco cloud/edge/O-RAN

Education

- **University of California, Davis (UC Davis)**
Ph.D. in Computer Science, Sep. 2015 - June 2020
Ph.D. Supervisor: Distinguished Professor Biswanath Mukherjee
Dissertation Title: Data-Driven Automation for Cost-Efficient Network Management
- **University of Texas at San Antonio (UTSA)**
MS in Computer Science, Aug. 2012 - May 2014

Research and Education Experience

- **AT&T Labs** Principal Member of Technical Staff (Feb. 2022-present)
Awards:
2024 - ATS Optimum Team Award: CTO level recognition
2023 - AT&T Connection Award: AVP nominated
2022 - AT&T Connection Award: Director nominated
Leading cutting-edge research using machine learning, artificial intelligence, Gen AI, and data analytics. Expert in 5G network user data, telco cloud/edge, and network API. Major projects:
 - Gen AI/LLM (\$100M aggregated impact): Leading and contributing to the Gen AI usecases inside AT&T. Key contributions includes: exploring and assessing long-term partnerships with emerging Gen AI platform vendors (Palantir, IBM, Amazon, Microsoft, etc.), contributing to specific usecases, evaluation of monetary impact, decisions on the best technical solution method, etc.
 - Open Network API (e.g., MVNx) is a key monetization effort for AT&T. Contributing to multiple projects as project stakeholder and individual contributor, based on TM Forum specifications and MuleSoft platform (iTrack/Jira/Agile Scrum)
 - AI Governance and API privacy: leading AI governance effort with CTO org. Ensuring privacy of our customer and network data when it comes to Gen AI and LLM. Multi-million dollar aggregated impact due to security and privacy impacts.
 - Stakeholder for AT&Ts 5G data analytics (application performance) based on Microsoft EDR data, proposed key methods application and user level insights, lead critical decision making efforts across AT&T organizations (marketing, video policy, operations, etc.) and MSFT.
 - Leading end-to-end performance monitoring efforts for markets and cell sites: combining live network data, end user experience data, and machine learning methods; user level statistical performance guarantee via development and data analysis.

- **Sonoma State University, CA, USA** Assistant Professor (Aug. 2020 - Jan. 2022)
As a tenure-track Assistant Professor at the Department of Computer Science at SSU, I was engaged in research and educational activities with the next generation of computer scientists and engineers. My research activities involved students and faculties from both inside and outside the CS department at a nationwide and global scale. **Research projects:** privacy preserving machine learning for network automation, network knowledge representation for intelligent systems, network failure localization using knowledge graphs and graph neural networks. **Courses taught:** Introduction to Data Science, Computer Networks and the Internet, Introduction to Programming (Python), Software Design and Development, Ethics in the Age of Technology and AI.
- **University of California, Davis** Doctoral Researcher (Sep. 2015 - June 2020)
Conducted NSF-funded innovative research under supervision of Distinguished Professor Biswanath Mukherjee, focusing on automation of communication networks using artificial intelligence (AI) and data-driven solutions. Expertise in identifying important research problems, applying cutting-edge solutions to the problem, with special focus on network function virtualization, edge computing, resource optimization, cost modeling, and cost efficiency for networks. **CS courses taught:** Intro. to Computer Networks.
- **AT&T Labs** Graduate Researcher (Summer 2016, 2017, 2019)
 - In Summer 2016, I worked on ‘software-node failure prediction method using supervised machine learning’, automating the AT&T Integrated Cloud (AIC) (AT&T’s Domain 2.0 Architecture and Design project). **Mentors:** Dr. Minh Huynh and Dr. Ashima Mangla. **Key technologies:** Python, MySQL, WEKA, machine learning, and statistical analysis of data (details in ‘Statement of Research’).
 - In Summer 2017, I worked on design and implementation of “AI system for automation of network services and designs”. **Mentors:** Dr. Michael Wang and Dr. Deva-Datta Sharma. **Key technologies:** TensorFlow, Machine Learning, NLP/nltk in R/Python, Neo4j, Flask Server.
 - In Summer 2019, I worked on design and implementation of a compute-data service platform called “Jupyter Notebook as a Service (JNaaS)” for data scientists/engineers/analysts. **Mentors:** Dr. Ravi Doejode and Dr. Zhi Li. **Key technologies:** Jupyter Notebook, JupyterHub, Airflow, Papermill, Kong API Gateway, Python.
- **Samsung R&D, Bangladesh** Software Engineer (Mar. 2011 - Jul. 2012)
Successfully designed and developed cutting-edge technology with HQ R&D. Major projects include: Remote Management System Architecture Specification, Software and Device driver development for WiGiG, Customized Network Packet Analyzer, Hi-speed Wi-Fi module driver development.

Selected Publications

Google scholar: <https://scholar.google.com/citations?user=sk7J-0wAAAAJ&hl=en>

• Journal Papers

- S. Rahman, et. al., ”Multi-Criteria Decision Approach for Lightpath Restoration After Resource Crunch,” *IEEE Transactions on Network and Service Management*, 2024.
- S. Rahman, et. al., ”A Data-Driven Decision-Making Framework for Optical Fronthaul Slices Resizing in 6G Networks,” *Journal of Optical Communications and Networking*, 2024.
- S. Rahman, et. al., “DeepVRM: Deep Learning Based Virtual Resource Management for Energy Efficiency,” *Journal of Network Systems and Management*, vol. 31, no. 66, July 2023.
- S. Rahman, et. al., “Load-balancing routing algorithms for service congestion avoidance in LEO optical satellite networks,” *Journal of Optical Communications and Networking*, vol. 15, no. 12, 2023.
- S. Rahman, et. al., “Energy-efficient routing based on a genetic algorithm for satellite laser communication,” *Optics Express*, vol. 31, no. 5, 2023.
- S. Rahman, et. al., “Latency-aware scheduling scheme for deterministic signaling in F5G,” *Journal of Lightwave Technology*, vol. 41, no. 9, 2023.

- S. Rahman, et. al., "End-to-end service provisioning based on extended segment routing in multi-domain optical networks of F5G," *Journal of Optical Communications and Networking*, vol. 14, no. 7, pp. 550-561, 2022.
- S. Rahman, et. al., "Automation of Photonic Networks Using Machine Learning: Case Studies and Future Works," *IEEE Photonics Technology Letters*, vol. 33, no. 23, pp. 1317-1321, 2021.
- **S. Rahman**, T. Ahmed, M. Huynh, M. Tornatore, and B. Mukherjee, "Auto-scaling Service Chains using Machine Learning and Negotiation Game," *IEEE Transactions on Network and Service Management*, 2020.
- T. Ahmed, A. Mitra, **S. Rahman**, M. Tornatore, A. Lord, B. Mukherjee, "C+ L-band upgrade strategies to sustain traffic growth in optical backbone networks," *Journal of Optical Communications and Networking*, 2021.
- **S. Rahman**, A. Gupta, M. Tornatore, and B. Mukherjee, "Dynamic Workload Migration over Backbone Network to Minimize Data Center Electricity Cost," *IEEE Transactions on Green Communications and Networking*, vol. 2, no. 2, pp. 570-579, June 2018.
- Z. Li, Y. Zhao, Y. Li, **S. Rahman**, F. Wang, X. Xin, J. Zhang, "Fault Localization based on Knowledge Graph in Software-Defined Optical Networks," *Journal of Lightwave Technology*, 2021.
- B. Yan, Y. Zhao, X. Yu, Y. Li, **S. Rahman**, Y. He, X. Xin, J. Zhang, "Service Function Path Provisioning With Topology Aggregation in Multi-Domain Optical Networks," *IEEE/ACM Transactions on Networking*, 2020.
- **S. Rahman**, T. Ahmed, S. Ferdousi, P. Bhaumik, P. Chowdhury, M. Tornatore, G. Das, and B. Mukherjee, "Virtualized Controller Placement for Optical Transport Networks using Machine Learning," *Journal of Photonic Network Communications*, 2020.
- T. Ahmed, **S. Rahman**, S. Ferdousi, M. Tornatore, A. Mitra, B. Chatterjee, and B. Mukherjee, "Dynamic Routing, Spectrum, and Modulation-Formal Allocation in Mixed-Grid Optical Networks," *Journal of Optical Communications and Networking*, 2020.
- T. Ahmed, **S. Rahman**, M. Tornatore, K. Kim, and B. Mukherjee, "A survey on high-precision time synchronization techniques for optical datacenter networks and a zero-overhead microsecond-accuracy solution," *Journal of Photonic Network Communications*, vol. 36, no. 1, pp. 56-67, Aug. 2018.
- B. Yan, Y. Zhao, **S. Rahman**, Y. Li, X. Yu, D. Liu, Y. He, and J. Zhang, "Dirty-data-based alarm prediction in self-optimizing large-scale optical networks," *Optical Express*, 2019.
- B. Zhang, Y. Zhao, **S. Rahman**, Y. Li, and J. Zhang, "Alarm classification prediction based on cross-layer artificial intelligence interaction in self-optimized optical networks (SOON)," *Optical Fiber Technology*, 2020.
- D. Huang, Y. Zhao, T. Yang, **S. Rahman**, X. Yu, X. He, and J. Zhang, "Quantum Key Distribution Over Double-Layer Quantum Satellite Networks," *IEEE Access*, vol. 8, pp. 16087-16098, 2020.

• **Conference Papers**

- S. Rahman, et. al., "Load-Balancing Routing Algorithm Against Inter-Satellite Link Congestion in LEO Satellite Optical Networks," *Optical Fiber Communications Conference and Exhibition (OFC)*, 2022.
- S. Rahman, et. al., "Adaptive Service Scheduling for Satellite-Ground Downlink Capacity in Optical Satellite Networks," *Asia Communications and Photonics Conference*, 2022.
- Z. Li, Y. Zhao, Y. Li, **S. Rahman**, X. Yu, and J. Zhang, "Demonstration of fault localization in optical networks based on knowledge graph and graph neural network," *Optical Fiber Communication Conference*, San Diego, CA, USA, March 2020.
- **S. Rahman**, T. Ahmed, M. Huynh, M. Tornatore, and B. Mukherjee, "Auto-scaling VNFs using Machine Learning to Improve QoS and Reduce Cost," *Proc., IEEE International Conference on Communications (ICC)*, Kansas City, MO, USA, May 2018.
- **S. Rahman**, H. Mun, H. Lee, Y. Lee, M. Tornatore, and B. Mukherjee, "Insights from Analysis of Video Streaming Data to Improve Resource Management," *Proc., 7th IEEE International Conference on Cloud Networking*, Tokyo, Japan, Oct. 2018.

- **S. Rahman**, A. Gupta, M. Tornatore, and B. Mukherjee, “Dynamic Workload Migration over Optical Backbone Network to Minimize Data Center Electricity Cost,” *Proc., IEEE International Conference on Communications (ICC)*, Paris, France, May 2017.
- **S. Rahman**, T. Ahmed, S. Ferdousi, P. Bhaumik, P. Chowdhury, M. Tornatore, G. Das, and B. Mukherjee, “Virtualized Controller Placement for Multi-Domain Optical Transport Networks,” *Proc., 23rd Conference on Optical Network Design and Modelling*, Athens, Greece, May 2019.
- **S. Rahman**, M. Bishop, and A. Holt, “Internet of Things Mobility Forensics,” *Proc., Information Security Research and Education (INSuRE) Conference*, Sep. 2016 (online).
- Z. Zaman, **S. Rahman**, and M. Naznin, “Novel Approaches for VNF Requirement Prediction Using DNN and LSTM,” *Proc., IEEE Global Communications Conference (GLOBECOM)*, Big Island, Hawaii, USA, Dec. 2019.

Academic Services

- **Reviewer (2012-present)**: IEEE/ACM Transactions on Networking; Elsevier Computer Networks Journal; IEEE Communications Surveys & Tutorials; IEEE Transactions on Network and Service Management, Springer Journal of Grid Computing; IEEE/OSA Journal of Optical Communications and Networking; Optical Switching and Networking; IEEE International Conference on Advanced Networks and Telecommunications Systems; IEEE International Conference on Cloud Networking; and International Conference on Computing, Networking and Communication.
- **TPC Member**: IEEE International Conference on Optical Communications and Networking, 2019; and International Conference on Advances in Science, Engineering and Robotics Tech., 2019.
- Former Member, SSU CS department curriculum committee, SSU CS department Sonoma Mountain Connection (SMC) program committee, SSU CS department Advising Committee.
- **Research Mentoring**: Graduate and undergraduate students in SSU and across the globe: Zipiao Zhao (BUPT, China), Boyuan Yan (BUPT, China), Bing Zhang (BUPT, China), Zakia Zaman (BUET, Bangladesh), and Andre Horota (FUB, Brazil).
- **Invited Talks**:
 - **July 4, 2019**: “Data-driven automation for cost-efficient network management,” Federal University of Bahia, Brazil (online).
 - **Oct. 22, 2019**: “Data-driven automation for cost-efficient network management,” NetSys Lab, University of California Berkeley, USA.
 - **March 19, 2020**: “Applied AI and Data-Driven Automation for Cost-Efficient Network Management,” Lawrence Berkeley National Laboratory, USA (online).
 - **June 4, 2020**: “Machine Learning and Data-Driven Solutions for Cost-efficient Connectivity,” Big Data Finance 2020 (organized by Cornell Engineering) (online).

Technical Skills

- **Programming Languages**: C/C++, Java, Scala, Python, R.
 - **Tools/Frameworks**: Gen AI, Scikit-learn, Tensorflow, Android, WEKA, RabbitMQ/OpenStack, OpenGL, Jupyter Notebook, AirFlow.
 - **Database Management Systems**: MySQL, Oracle DBMS, SQLite, Neo4j.
-