TAUHID NABI

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Education

Virginia Tech **CGPA: 4.0/4.0** **May 2027 (Exp.)**
PhD in Computer Science *Blacksburg, Virginia*
Advisor: Dr. Shaddi Hasan (Chair - PhD Committee)
Committee: Dr. Jeef Reed, Dr. Sang W. Lee, Dr. Tijay Chung

BRAC University **CGPA: 4.0/4.0** **June 2022**
M.Sc. in Computer Science Engineering *Highest Distinction* *Dhaka, Bangladesh*
Advisor: Dr. Golam Rabiul Alam
Thesis: Empowering Mobile Network Planning through Deep Learning: A Path to Democratization

American International University - Bangladesh **CGPA: 3.63/4.0** **Feb. 2014**
Bachelor in Electrical & Electronic Engineering *Among top 7%* *Dhaka, Bangladesh*
Thesis Supervisor: Dr. Rinku Basak

Research Interests

- AI/ML for Networking
- AI for Intrusion Detection
- Broadband Internet Policy
- ML in Internet Measurement
- Large Language Models (LLMs)
- (Mobile) Network Architecture

Publications

- **Red is Sus: Automated Identification of Low Quality Service Availability Claims in the US National Broadband Map** (Full Paper; Accepted and presented in *IMC'2024*)

  Focus: Built a *Machine Learning classifier* by combining regulatory and crowdsourced broadband datasets to create a labeled training set for detecting ISP coverage misreporting in the FCC's Broadband Data Collection, spanning the entire *United States*. *Paper link*

  Authors: **Syed Tauhidun Nabi**, Zhuowei Wen, Brooke Ritter, Shaddi Hasan
  Conference: *ACM Internet Measurement Conference 2024*
  Location: Madrid, Spain on Nov 4–6, 2024.

- **Deep Learning Based Fusion Model for Multivariate LTE Traffic Forecasting and Optimized Radio Parameter Estimation**

  Focus: Developed a *Deep Learning fusion model* on 6.2M real LTE network time-series samples to forecast cell-level traffic and PRB utilization, and devised algorithms for proactive radio parameter optimization to prevent QoS degradation. *Paper link*

  Authors: **Syed Tauhidun Nabi**, Md Rashidul Islam, Md Golam Rabiul Alam, Giancarlo Fortino
  Publisher (Journal): IEEE Access; Date of Publication: Feb 10, 2023.

Work Experience

Virginia Tech – Dept. of Computer Science **Aug 2022 – Present**
Graduate Research Assistant (AI/ML & Networking Systems) *Blacksburg, Virginia*

- Developed machine learning models for large-scale anomaly detection in ISP-reported data (FCC Broadband Data Collection), applying tree-based and deep learning approaches to ensure reliable broadband coverage validation.
- Designed data pipelines leveraging cloudRF *propagation models* and, independently, crowdsourced speed test datasets (Ookla, M-Lab) for large-scale benchmarking and validation, and co-developed tools later adopted by small ISPs for semi-automated FCC filings.
- Directed the "Signal Sense" project, combining crowdsourced QoE datasets with ML-driven KPI analysis; explored generative AI and LLM-based methods for anomaly detection in network traffic.
- Developing data pipelines to analyze large-scale traceroute measurements for identifying and geolocating PDN Gateway (P-GW/UPF) egress points in mobile broadband networks, enabling longitudinal mapping of carrier breakout topologies across the United States.
- Benchmarked LLM agents (GPT, OPT, BERT, DistilGPT2) against classical ML baselines for intrusion detection; implemented feedback-loop fine-tuning strategies and explored quantization/efficient model design for deployment in resource-constrained and edge environments.

Robi Axiata Ltd. **May 2017 – Aug. 2022**

Manager – Wireless Systems Engineering & Data-Driven Network Planning *Dhaka, Bangladesh*

- Engineered RF planning models (GSM, WCDMA, LTE) for 40,000+ radio sites; fine-tuned propagation models using clutter data, improving coverage prediction accuracy by 15%.
- Designed a proprietary LTE measurement-report–driven geo-localization tool with 50m resolution; reduced operator's annual drive-test budget by 91%.
- Pioneered deployment of carrier WiFi with Facebook Magma Core, establishing world-first integration with LTE core networks and enabling heterogeneous spectrum offloading.
- Optimized TCP/IP configurations and radio resource parameters to enhance efficiency and user QoE, boosting average cellular network throughput by 17%.
- Processed and analyzed high-volume datasets (Ookla, Facebook Insights) for benchmarking and executive-level reporting, applying ML-driven traffic forecasting for resource planning.

Banglalink (VEON) **Aug 2014 – Apr 2017**

Specialist Engineer – Access Networks & Performance Optimization *Dhaka, Bangladesh*

- Monitored, modeled, and optimized cell-level KPIs in real time to improve reliability and efficiency of nationwide wireless infrastructure.
- Designed frequency plans and mobility strategies to enhance spectral efficiency and overall RAN performance.
- Tested new network architectures, delivering measurable improvements in coverage, efficiency, and end-user QoE.

Honors/ Awards

- **Finalist, Internet Society Pulse Fellowship 2025:** Selected among the top 10% of around 200 global applicants from 51 countries
- **Third Best Undergraduate Research Poster:** Supervised undergraduate research team awarded third place at the 2024 Virginia Tech Undergraduate Research in Computer Science competition
- **Best Research Publication Award:** Recognized for outstanding research publication at BRAC University for the academic year 2022-2023
- **Highest Distinction/Summa Cum Laude:** Achieved a perfect 4.0/4.0 CGPA in Master of Science in Computer Science and Engineering
- **Best Performance Award:** Honored multiple times by the Technology Division at Robi Axiata during the tenure from 2017 to 2022

Core Research Projects

NetBreakouts: Mobile Gateway Geolocation | *Traceroute Analysis, Topology, ML* **June' 25 – Present**

- *Gateway Identification:* Developed methodology to detect and geolocate P-GW/UPF egress points in mobile broadband networks using publicly available M-Lab's and CAIDA's `scamper1` traceroute dataset.
- *Data Pipelines:* Built scalable pipelines and ML heuristics to track infrastructure evolution across global operators.

LLM Agents for Intrusion Detection | *LLMs, AI Security, Feedback Learning* **Jan' 25 – May' 25**

- *Benchmarking:* Evaluated LLMs (GPT, OPT, BERT, DistilGPT2) against traditional ML models on NSL-KDD and CIC IoT datasets for intrusion detection.
- *Adaptation:* Designed preprocessing pipelines for tabular-to-sequence transformation and tested feedback-loop retraining for generalization.

Signal Sense: QoE-Aware KPIs | *QoE, Generative AI, User-Centric Metrics* **Aug' 24 – Present**

- *QoE Integration:* Investigated misalignment between operator KPIs and user-perceived QoE using crowdsourced datasets and ethnographic insights.
- *Visualization:* Investigating how generative AI can synthesize user-centric scenarios from QoE datasets to support decision-making in underserved regions.

Carrier WiFi with Magma Core | *Wireless Systems, Edge Offloading* **Jan' 20 – Jul' 21**

- *Deployment:* Implemented carrier WiFi offloading integrated with LTE core using Facebook's Magma Core.
- *Impact:* Enabled heterogeneous spectrum offloading and improved performance in congested regions.

Leadership/ Voluntary

Vice President, CSGC **Aug. 2024 – Jul. 2025**

Computer Science Graduate Council *Virginia Tech*

- **Facilitated Smooth Operations:** Ensured efficient functioning of the Computer Science Graduate Council, chairing meetings in the President's absence and overseeing various committees, representing around 800 CS graduate students.
- **Championing Student Engagement:** Organized key departmental events and represented the CS graduate student body in various committees, fostering student advocacy and community building.

Technical Skills

Languages: Python, R, Go, SQL, HTML/CSS; Familiarity with C++, Rust and JavaScript
Developer Tools: VS Code, RStudio, Google Cloud Platform, Jupyter, Docker, Selenium, CI/CD workflows
Technologies/Frameworks: Linux, Git, GitHub, Scikit-Learn, TensorFlow, PyTorch, Keras, TensorFlow Lite
Data Engineering & Analysis: Distributed Data Pipelines, Pandas, NumPy, SciPy, Matplotlib, Seaborn, Plotly
Machine Learning: Supervised/Unsupervised Learning, Tree-based Models (e.g., Random Forest, XGBoost), Deep Learning, Large Language Models (LLMs), Model Compression, Quantization
Networking & Systems: Internet Architecture, Network Protocols (TCP/IP, BGP, DNS, HTTP/2, QUIC), Traceroute Analysis, Traffic Engineering, DDoS Resilience, Edge Computing, Wireless Networks
RF Engineering: LTE/5G/6G, MIMO, OFDM, Beamforming, Signal Processing, Network Simulation Tools (Atoll, Mentum Planet), Ericsson & Huawei tools

Professional Memberships

- Professional Member of **Association for Computing Machinery (ACM)**
- Professional Member of **Institute of Electrical and Electronics Engineers (IEEE)**
- Member of **IEEE Young Professionals**