TAUHID NABI

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4^{th}-year Ph.D. candidate in Computer Science (4.0/4.0) with expertise in large-scale Internet measurement, network topology inference, and ML-driven network analytics. Looking for a Summer 2026 research internship at the intersection of networking, systems, and applied machine learning.

Education

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

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

Research Interests

- Broadband Internet Policy
- LLM for Intrusion Detection
- Internet Measurement
- AI/ML in Networking
- IPv6 Structure & Topology
- Quality of Experience (QoE)

Publications

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

Research Projects & Presentations

NetBreakouts: Mapping Mobile Network Egress Topology | *Traceroute, IPv6 to Topology, ML* **Apr'25 – Present**

- *Research Output:* Early results presented at the *ACM IMC 2025 PRIME Workshop*; full paper in preparation for *ACM IMC/SIGCOMM 2026.*
- *IP-Level Inference:* Designed a scalable methodology using traceroute and BGP data to identify and geolocate mobile core gateways (P-GW/UPF) across U.S. operators.
- *IPv6 Structure Analysis:* Decoded hierarchical IPv6 bit patterns to infer regional and subregional router topology, enabling carrier-level segmentation.
- *Data Pipeline:* Built Python/Go pipelines for large-scale traceroute parsing, prefix clustering, and longitudinal tracking of carrier infrastructure.

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

- *Research Output:* Poster and Doctoral Consortium presentations at *ACM COMPASS 2025*; full paper in preparation for *ACM CHI/CSCW*.
- *User Experience Analytics:* Modeled relationships between network KPIs and user-perceived Quality of Experience (QoE) using large-scale crowdsourced data, revealing behavioral patterns comparable to engagement metrics in large consumer platforms.
- *Experimentation & Visualization:* Designed interactive analyses and visualizations to interpret KPI–QoE dynamics and identify factors driving service disparities in underserved regions.

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

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

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.

Work Experience

Virginia Tech – Dept. of Computer Science **Aug 2022 – Present**

Graduate Research Assistant (Internet Measurement & Data Systems) *Blacksburg, Virginia*

- Developed large-scale data pipelines in Python to process and analyze trillions of traceroute, BGP, and speed test records (M-Lab, FCC BDC, Ookla) for broadband validation and infrastructure mapping.
- Designed scalable heuristics to infer and geolocate mobile core gateways (P-GW/UPF) and carrier backbone routers using IPv6 structural patterns and prefix clustering.
- Built reproducible workflows for IP-level geolocation accuracy testing by integrating public datasets (M-Lab, CAIDA ITDK, RouteViews), enabling independent validation of carrier-reported coverage.
- Co-developed open tools for broadband data integrity and anomaly detection—later adopted by small ISPs for semi-automated FCC filings.
- Leading the "Signal Sense" project, combining network measurement and human-centered analysis to connect QoE data with infrastructure performance.

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

Manager – Wireless Systems Engineering & Data Analytics *Dhaka, Bangladesh*

- Developed large-scale network analytics pipelines using LTE measurement reports and IP-level telemetry to geolocate cell sites and detect routing anomalies with sub-100m precision.
- Designed an internal IP–to–cell mapping framework that reduced drive-test costs by 91% and enabled automated network performance auditing.
- Led integration of carrier Wi-Fi with Facebook's Magma Core, pioneering one of the first LTE–Wi-Fi hybrid architectures for traffic offloading and edge connectivity.
- Optimized TCP/IP and RAN parameters through data-driven modeling, improving network throughput and user QoE by 17%.
- Analyzed large-scale external datasets (Ookla, Facebook Insights) for benchmarking and reporting, applying ML-based forecasting for network capacity planning.

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

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

- Monitored and optimized end-to-end cellular network KPIs using real-time traffic and IP telemetry to enhance nationwide infrastructure reliability.
- Implemented data-driven frequency planning and mobility optimization strategies, improving spectral efficiency across major regions.
- Contributed to early validation of next-generation RAN and core designs, focusing on performance, coverage, and IP-level connectivity improvements.

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.

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

Technical Skills

Languages: Python, R, Go, SQL; Familiarity with C++, Rust, JavaScript and HTML/CSS
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**