TAUHID NABI

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Education

Virginia Tech **GPA: 4.0/4.0** **Aug. 2022 – 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 **GPA: 4.0/4.0** **May 2020 – Apr. 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** **Jan. 2010 – Feb. 2014**
Bachelor in Electrical & Electronic Engineering *Among top 7%* *Dhaka, Bangladesh*
Thesis Supervisor: Dr. Rinku Basak

Research Interests

- Broadband Internet Policy
- AI/ML in Networking
- Internet Measurement
- Quality of Experience (QoE)
- Internet Data Analytics
- (Mobile) Network Architecture

Publications

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

  Authors: **Syed Tauhidun Nabi**, Zhowei Wen, Brooke Ritter, Shaddi Hasan
  Conference: *ACM Internet Measurement Conference 2024*
  Location: Madrid, Spain on Nov 4 - 6, 2024; *Paper link*

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

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

Experience *(10 Years ++)*

Virginia Tech - Dept. of Computer Science *(2 Years ++)* **Aug 2022 – Present**
Graduate Research Assistant *Blacksburg, Virginia*

- Conducted research on the Federal Communications Commission's (FCC) Broadband Data Collection (BDC) project, focusing on identifying low-quality service availability claims by ISPs across the United States. Developed a machine learning model to automatically detect low-quality availability claims
- Involved in the validation process of Broadband Data Collection tool development at the SPIN research lab, which integrates cloudRF *propagation models*. Assisted small ISPs in generating accurate BDC reports, enhancing data collection reliability.
- Played a pivotal role in preparing and certifying ISP submissions. Led certification of *Nez Perse Network Systems* ISP's BDC filings for three cycles, ensuring regulatory (FCC) compliance.
- Leading the "Signal Sense" project, exploring misalignment between traditional KPIs and user perceptions in cellular network performance. Investigated the correlation between network KPIs and user satisfaction, advocating human-centric network design.

Robi Axiata Ltd. *(5 Years 3 Months)* **May 2017 – Aug. 2022**
Manager (Senior Engineer), Network Planning (Radio Network Specialist) *Dhaka, Bangladesh*

- Utilized expert level proficiency in RF Planning tools (e.g. *Mentum Planet*) to generate radio coverage predictions for GSM, WCDMA, and LTE networks for approx. 40,000 radio sites.
- Hands-on experience in fine-tuning propagation models using Bangladeshi clutter data, improving RF coverage prediction accuracy by 15%.

- Developed a proprietary LTE measurement report-driven remote localization tool for cellular network field-level insights and customer location tracking, achieving high accuracy with a tile size of 50m x 50m. Provided valuable insights into network performance, optimization requirements, and subscriber behavior. Significantly reduced yearly drive-test budget by 91%
- Led groundbreaking deployment of carrier WiFi solution with Facebook Magma Core, establishing world-first parallel existence with cellular operator LTE core network. Spearheaded the building of heterogeneous network architecture, enabling WiFi as a spectrum offloading solution, and conducted extensive testing of the Open-Sourced Magma Core Solution.
- Implemented TCP optimization strategies, resulting in up to a 17% increase in cellular network throughput. Played a key role in enhancing network performance and user experience by optimizing TCP parameters.
- Analyzed extensive datasets from Ookla and Facebook insights to benchmark network performance. Regularly generated management reports, extracting insights from large data volumes.

Banglalink (VEON) ***(2 Years 9 Months)*** **Aug. 2014 – Apr. 2017**
Specialist Engineer, Radio Network Planning *Dhaka, Bangladesh*

- Managed network performance by actively monitoring cell KPIs and promptly addressing underlying issues for optimization.
- Enhanced network efficiency and performance through strategic radio design and precise frequency tuning in network planning.
- Spearheaded solution trials to revolutionize network architecture, driving efficiency and optimizing performance for enhanced user experience.

Leadership/ Voluntary

Computer Science Graduate Council **Aug. 2024 – Present**
Vice President (Elected) *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.

Core Research Projects

Integrating Subjective QoE into Traditional KPI Frameworks | *Community QoE, User-Centric Metrics* **Aug 2024**

- *Investigating Traditional KPIs:* Evaluating the status quo of traditional cellular network operators' Key Performance Indicators (KPIs) to identify gaps and potential improvements in capturing user experiences.
- *Community-Specific Insights:* Leveraging third-party application performance data and conducting ethnographic studies to capture and analyze internet usage experiences within specific communities, particularly in South Asia.
- *Integrating User-Centric Metrics:* Developing new KPIs that incorporate human-perceived subjective Quality of Experience (QoE) to enhance traditional network performance metrics for MNOs.

National Broadband Map Integrity Project | *Broadband Internet, Data Science, Machine Learning* **Jan' 23 - May' 24**

- *Third Party Speed Test Localization:* Localized third-party speed test data to compare ISP-reported coverage with actual speed test availability, identifying areas likely misrepresented in coverage claims.
- *Crowdsourced Data for Validation:* Investigated the use of crowd-sourced speed tests (e.g., Ookla, M-LAB) to validate self-reported ISP coverage data for the National Broadband Map.
- *Predictive Modeling:* Developed a tree-based machine learning model to predict and identify likely inaccuracies in specific portions of the US National Broadband Map.
- *Tool Development:* Collaborated with a team to develop and validate tools that enable small ISPs to more efficiently and accurately prepare the Federal Communications Commission's (FCC) Broadband Data Collection (BDC) report, which they are required to submit twice a year.

Traffic Forecasting and Radio Resource Optimization | *Deep Learning, LTE Networks* **Feb' 21 - Jul' 22**

- *Multivariate Traffic Forecasting:* Developed a time series deep learning-based fusion model to accurately forecast LTE traffic patterns across multiple variables.
- *Optimized Radio Parameters:* Implemented a model that optimizes radio resources/ parameters by predicting traffic loads, improving network efficiency and user experience.
- *Model Validation:* Conducted extensive validation against real-world data, demonstrating the model's ability to enhance the reliability and performance of LTE networks.

Carrier WiFi Solution with Facebook Magma Core | *Novel Solution, Capacity Management* **Jan' 20 - Jul' 21**

- *Network Offloading Implementation:* Deployed a Carrier WiFi offloading solution using Facebook's Magma Core, enabling automatic user device connectivity to WiFi when mobile networks reached capacity.
- *Prototype Deployment:* Successfully implemented the prototype in Cox's Bazar, Bangladesh, achieving all technical objectives in real-world conditions.
- *Capacity Optimization:* Enhanced network efficiency and user experience by offloading traffic from congested mobile networks to WiFi, demonstrating the effectiveness of the solution.

LTE Measurement Report Driven Geo-Positioning | *Network Optimization* **Oct' 19 - Aug' 20**

- *Geo-Localization Implementation:* Utilized LTE Measurement Reports to accurately geo-locate user devices, providing insights into signal strength and quality (RSRP, RSRQ) at the user device level.
- *Field Test Reduction:* Customized the solution to meet specific operator demands, leading to a 91% reduction in field drive tests from 2020 to 2022.

Technical Skills

Languages: Python, R, Go, HTML/CSS, C++, SQL
Developer Tools: VS Code, RStudio, Google Cloud Platform, Jupyter, Docker, Selenium
Technologies/Frameworks: Linux, Git, GitHub, Scikit-Learn, TensorFlow, PyTorch, Keras
Data Analysis: Pandas, NumPy, SciPy, Matplotlib, Seaborn, Plotly
Machine Learning: Supervised and Unsupervised Learning, Tree-based Models (e.g., Random Forest, XGBoost), Deep Learning, Natural Language Processing (NLP)
Networking: Network Protocols, Internet Architecture, Traffic Analysis, Wireless Networks
RF Engineering: Network Simulation Tools, Coverage Prediction Tools (Atoll, Mentum Planet), Ericsson & Huawei tools

Professional Memberships

- Graduate Student Member of **Association for Computing Machinery (ACM)**
- Graduate Student Member of **Institute of Electrical and Electronics Engineers (IEEE)**

Honors/ Awards

- **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
- **Dean's Award Nominee/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