Imran Khan

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Summary

Currently pursuing my Ph.D. in Computer Engineering under Dr. Dimitrios Koutsonikolas with a research focus on end-to-end performance, reliability, mobility, and performance consistency of 5G Cellular Networks.

Education

- **Northeastern University** — Boston, MA
  Ph.D. in Computer Engineering — *Jan 2021 - Continuing*
- **University at Buffalo, SUNY Buffalo** — Buffalo, NY
  Ph.D. in Computer Science and Engineering(Transferred to Northeastern University) — *August 2020 - January 2021*
- **Southern Illinois University Carbondale** — Carbondale, IL
  Masters of Science in Electrical and Computer Engineering — *Jan 2018 - July 2020*
- **Bangladesh University of Engineering and Technology** — Dhaka, Bangladesh
  Bachelor of Science in Electrical and Electronic Engineering — *July 2014*

Experience

- **Northeastern University** — Boston, MA
  Graduate Research Assistant — *Jan 2021 - Present*
  - I am working on the project X5G: An Open, Programmable Platform to Conquer the 5G and 6G Wireless Spectrum. The project involves acquiring the necessary hardware and software components to build an 8-node mmWave experimental testbed, which would combine the following features: (i) dual-band operation at both 60 GHz and 28 GHz, enabling both WLAN and 5G cellular research, and extensibility towards higher (6G) frequency bands, (ii) practical phased antenna arrays, (iii) bidirectional SISO, 2x2 SU-MIMO, and MU-MIMO operations in both bands, (iv) full programmability at all layers of the protocol stack, and (vi) O-RAN compliance.
  - Employed bandwidth aggregation (802.11ad, 802.11ac, & Cellular) with MultiPath TCP on smartphones and exploring the impact on power consumption and resource utilization
  - Looked at the characteristics of 5G mm-Wave network for Single/Multi-user AR(Augmented Reality) applications
  - Conducted experiments and analysis with 60GHz devices (smartphones, laptops) and Access Points to understand the challenges of mm-Wave networks
- **AT&T Labs. Inc** — Boston, MA
  Research Intern & External Collaborator — *June 2021 - May 2023*
  - Investigated the impact on QoE of low-latency video streaming application over 5G networks

Publications

- **An Open, Programmable, Multi-vendor 5G O-RAN Testbed with NVIDIA ARC and OpenAirInterface.**
  Imran Khan*, D Villa*, Florian Kaltenberger, Nicholas Hedberg, Ruben Soares da Silva, Anupa Kelkar, Chris Dick, Stefano Basagni, Josep M Jornet, Tommaso Melodia, Michele Polese, Dimitrios Koutsonikolas.
  IEEE INFOCOM NG-OPERA, 2024
- **Performance of Cellular Networks on the Wheels.**
  Imran Khan*, M. Ghoshal*, Z. Jonny Kong*, Phuc Dinh, Jiayi Meng, Y. Charlie Hu, Dimitrios Koutsonikolas.
  ACM IMC, 2023
- **Can 5G mmWave Enable Edge-Assisted Real-Time Object Detection for Augmented Reality?**
  Moinak Ghoshal, Z Jonny Kong, Qiang Xu, Zixiao Lu, Shivang Aggarwal, **Imran Khan**, Jiayi Meng, Yuanjie Li, Y Charlie Hu, Dimitrios Koutsonikolas
  ACM IMC, 2023
- **Demo: NextG-up: a tool for measuring uplink performance of 5G networks.**
  Imran Khan*, Moinak Ghoshal*, Qiang Xu, Z. Jonny Kong, Y. Charlie Hu, and Dimitrios Koutsonikolas
  ACM Mobisys, 2022
- **MuSher: An Agile Multipath-TCP Scheduler for Dual-Band 802.11ad/ac Wireless LANs.**
  S. Aggarwal, S. K. Saha, **Imran Khan**, R. Pathak, D. Koutsonikolas and J. Widmer
  IEEE/ACM Transactions on Networking, 2022

- **An In-Depth Study of Uplink Performance of 5G mmWave Networks.**
  Moinak Ghoshal, Z. Jonny Kong, Qiang Xu, Zixiao Lu, Shivang Aggarwal, **Imran Khan**, Yuanjie Li, Y. Charlie Hu, Dimitrios Koutsonikolas
  ACM SIGCOMM 5G-MEMU, 2022
- **Multipath TCP in Smartphones Equipped with Millimeter Wave Radios.**
  Imran Khan, Moinak Ghoshal, Shivang Aggarwal, Dimitrios Koutsonikolas, Joerg Widmer
  ACM WiNTECH, 2021
- **Efficient Bandwidth Aggregation with MPTCP for Connected Vehicles.**
  Imran Khan, K. Chen
  IEEE Internet of Things, 2021
- **Bandwidth-need driven energy efficiency improvement of MPTCP users in wireless networks.**
  M. R. Palash, K. Chen, **Imran Khan**
  IEEE Trans. Green Commun. Netw., 2019
- **Towards Efficient, Work-Conserving, and Fair Bandwidth Guarantee in Cloud Datacenters.**
  B. S. Ali, K. Chen and **Imran Khan**
  IEEE Access, 2019

Skills Summary

- **Languages**: C, C++, Python, Android, Unix/Kernel Programming
- **Tools**: Scikit-learn, Keras, Pytorch, Matlab, MPI, Open MP, NS-3, Wireshark
- **Protocols**: TCP/MPTCP/UDP protocols and their implementation (Linux Source Codes), IEEE 802.11 ax/ad/ac/b/g/n standards, NR/LTE 3GPP standards

Honors and Awards

- Web Chair of IEEE LANMAN 2024
- Reviewer IEEE ICC 2024
- TPC Member of IEEE WCNC 2024
- Web Chair of WoWMoM 2023
- Reviewer IEEE GLOBECOM 2021
- Got selected for NSF Funded Student travel grant for Mobicom'2021
- Got selected for NSF Funded POWDER Network and Wireless Week, Salt Lake City , Utah 2019
- Ranked in top 1% among 7000+ applicants in undergraduate school admission test, 2009
- Education Board Scholarship, ranked in Top 1% among 100K+ applicants in secondary school certificate exam

Research Interest

5G/6G O-RAN, Software Defined Networks, mm-Wave Networks