

## Education

### North Carolina State University, Raleigh, North Carolina, USA

Aug 2018 – present

- Ph.D. in Computer Science. GPA: 3.47/4 (*Expected May 2023*)
- *Research Areas*: Cloud Computing and Gaming, Deep Learning, Networking and Performance Evaluation
- *Courses*: Design and Analysis of Algorithms, Operating System, Performance Evaluation, Advance Internet Protocols

### Lahore University of Management Sciences (LUMS), Pakistan

Aug 2016 – May 2018

- M.Sc. in Electrical Engineering. GPA: 3.2/4
- *Course*: Topics in Internet Research, Operating System, Probability and Random Processes, Numerical Analysis

## Publications

- Characterizing the Availability in AWS Network from the Perspective of Tenants (*Under review in PAM 2021*)
- Characterizing the Biases in Spam Filtering Algorithms of Gmail, Outlook, and Yahoo During the US Elections 2020 (*Under review in WWW 2021*)
- Interleaving Multiple IoT Stacks on a Single Radio (*ACM CoNEXT 2018*) [DOI]
- Taming Link-layer Heterogeneity in IoT (*ACM SenSys 2017*) [DOI]

## Experience

### Research Assistant

NCSU

Aug 2018 – Present

**Cloud Gaming:** Characterize and enhance the quality of service/experience of cloud gaming platform- Google Stadia

- Develop a lightweight chromium module for streaming and networking data extraction and identify bitrate adaptation parameters that degrade bitrate by 5 times and frame-rate by 2 times (*C, Python3, Chromium, WebRTC, QUIC, FFmpeg, usbmon*)
- Design, implement a deep-learning video-frame analysis technique to extract frames of interest with 95% accuracy (*TensorFlow*)

**AWS Network Measurement:** Analyze the availability and latency of AWS network for elastic compute cloud and serverless

- Build a large-scale longitudinal measurement system for 210 region pairs/ 244 availability zone pairs while identifying several cases of cloud unavailability and latency spikes on AWS network infrastructure (*Python3, C, AWS, Cloud formation, Serverless Lambda, Kubernetes, BPF*)
- Use long short-term memory (LSTM) to predict packet losses with 92% accuracy (*TensorFlow*)

**Spam Political Biases:** Model and evaluate political biases in spam filtering algorithm of Gmail, Outlook, and Yahoo (*Python3, C++, IMAP, Selenium WebDriver*)

### Research Assistant

LUMS

January 2017 – May 2018

**Scylla:** Develop a software control layer on contiki-OS, interleaving multiple wireless stacks such as 6LoWPAN/Bluetooth 4.2 on a single radio to achieve near stack-native performance while simultaneously offering both wireless stacks (*C, Contiki, Time-Slotted Channel Hopping, TI SensorTag CC2650*)

- Deliver a talk on challenges of wireless heterogeneity in IoT and emerging opportunities at COMSYS, RWTH Aachen, Germany

### Software Engineer

Netsol Technologies

March 2013 – August 2015

- Pursue front-end development and release of a consumer lease calculation engine for auto-financing industry (*C#, SQL, SVN*)
- Lead on optimizing performance and bug fixing on a live asset financing application

### Project Engineer

Alstom Grid

July 2012 – December 2012

- Lead a team of 5 for deployment and commissioning of telecom infrastructure in 14 power/grid stations and designed primary and backup routing plan for voice and data of 30+ sites of the national grid of Pakistan (*SDH, NEC PABX, AREVA PLC*)

## Projects

- **Multi-Server Queuing System:** Implement a simulator for M/M/m and M/G/m system and evaluate their performance for First Come First Serve and Shortest Job First service disciplines (*Python3*)
- **Web-Server:** Develop a web-server simulator, with multiple I/O disks, for queuing service disciplines First Come First Serve, Shortest Job First, and Priority Preemptive/Non-Preemptive, and evaluated on 10 million requests (*Python3*)
- **Blockchain in IoT:** Design prototype for access management in IoT using permissioned blockchain with PBFT (python)
- **Ramdisk:** Implement a virtual disk drive using system call interface of filesystem in userspace (*C, FUSE*)
- **User Shell:** Develop a shell command interpreter with parsing, I/O redirection, command execution, and signal handling (*C*)
- **Thread Library:** Implement a user-level threading library supporting create, yield, join, and exit operations (*C*)
- **Smart Energy Metering:** Design and implement a complete smart energy metering system involving data acquisition, concentration, transmission over GSM link to base station, and bill generation (*C, C#, SQL, Zigbee, GSM*)

## Technical Skills

- **Languages:** Python, C, C++, SQL, C#,  $\text{\LaTeX}$
- **Technologies & Platforms:** AWS, Cloud formation, Serverless Lambda, Kubernetes, Docker, GitHub, SVN, TensorFlow, Keras, NumPy, Pandas, Matplotlib, Visual studio, Eclipse, WebRTC, FFmpeg, BPF, ns-3, netem, Web APIs, IMAP