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Hassan Iqbal

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Education

North Carolina State University, Raleigh, North Carolina, USA **Aug 2018 – Present**
- Ph.D. in Computer Science *(Graduation Expected May 2023)*
- *Research Areas:* Cloud Gaming, Systems, 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
- *Course:* Topics in Internet Research, Operating System, Probability and Random Processes

NUCES-FAST, Lahore, Pakistan **Aug 2008 – May 2012**
- B.Sc. in Telecommunication Engineering
- *Course:* Programming for Engineers, Data Structures and Algorithms, Feedback and Control Systems, Electronics, Embedded Systems, Linear Algebra and Differential Equations, Multi-variable Calculus

Experience

Research Assistant **NCSU** **Aug 2018 – Present**

Cloud Gaming: Dissecting the quality of experience of cloud gaming platforms: Google Stadia, Amazon Luna, Nvidia GeForceNow
- Develop a general and extensible deep-learning based automated tool to measure round trip delay as server-end, network, and client-end delay with model accuracy $\geq$99% *(CNN, TensorFlow, FFmpeg)*
- Implement a lightweight chromium module for video stream logging and off-line analysis, thus identifying factors that degrade bitrate by 6.6-times and frame-rate by 2-times *(Chromium, WebRTC, FFmpeg, usbmon, C++, Python3)*

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 *(AWS, Cloud formation, Serverless Lambda, Kubernetes, EC2, EBS, BPF, Python3, C)*
- Use long short-term memory to predict packet losses with 92% accuracy *(LSTM, TensorFlow)*

Spam Political Biases: Model and evaluate political biases in spam filtering algorithm of Gmail, Outlook, and Yahoo
- Develop tool to collect data and extract over 1.3 million emails from 300 email accounts *(IMAP, Selenium WebDriver, Python3)*
- Apply propensity score matching to estimate the effect of treatment and minimizing the effect of confounding variables in the data

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, with priority-scheduling for multiple traffic types, to achieve near stack-native performance while simultaneously offering both wireless stacks *(C, Contiki, Time-Slotted Channel Hopping, TI SensorTag CC2650)*
- Delivered 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 solution for an auto-financing client in Australia *(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)*

Publications

- Dissecting Cloud Gaming Performance with DECAF *(Accepted in ACM SIGMETRICS 2022)*
- Interleaving Multiple IoT Stacks on a Single Radio *(ACM CoNEXT 2018)* [DOI]
- Taming Link-layer Heterogeneity in IoT *(ACM SenSys 2017)* [DOI]

(Two submissions under review in ACM TheWebConference 2022 and IEEE/ACM Transactions on Networking)

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, R, SQL, LaTeX
- **Technologies & Platforms:** AWS, Cloud formation, Serverless Lambda, Kubernetes, Docker, Linux, TensorFlow, Keras, NumPy, Pandas, PIL, MatplotLib, WebRTC, FFmpeg, BPF, ns-3, netem, IMAP, Visual studio, Eclipse, GitHub, SVN

Academic Services

- Mentor two undergrad students on convolutional neural networks and transfer learning (GEARS Summer 2021)
- Mentor two undergrad students on high accuracy video time-stamping (GEARS Summer 2021)
- Reviewer IFIP Networking 2020
- Reviewer journal IEEE Access
- Mentor two undergrad students on web application algorithm analysis (GEARS Summer 2020)
- Mentor two undergrad students on performance evaluation of cloud applications (Spring 2020)

Honors and Awards

- NSF Travel Grant for ACM CoNEXT, 2018
- NCSU Student Travel Grant for ACM IMC 2018
- College of Engineering Graduate Merit Award, NCSU, 2018
- Graduate School Scholarship for fully-funded PhD at NCSU
- DAAD Summer Research Exchange Grant, 2017

Leadership

- **CoVID-19 Relief:** Initiate and organize ration distribution campaign during pandemic by collecting over $1000.00 and served 130+ affected families in Pakistan
- **Head Software Competition:** In SOFTEC 2012, manage nationwide software competition with 36 shortlisted teams
- **Vice President:** In NUCES Circuits Society 2011, manage 3 national programming and circuit design competitions