

Zafar Ayyub Qazi

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Research Interests

My broad research interests are in computer networks and distributed systems. My research spans data centers, software-defined networking, middleboxes, virtualization, and mobile/wireless networking.

Education

- 2010–present **Ph.D. Computer Science**, *Stony Brook University (SBU)*, NY, USA.
◦ Advisors: Samir Das (Stony Brook University) and Vyas Sekar (Carnegie Mellon University)
- 2005–2009 **BSc Computer Science**, *Lahore University of Mgmt. Sciences (LUMS)*, Pakistan.

Professional Experience

- 2014 **Research Intern**, *AT&T Labs–Research*, Bedminster, NJ, USA.
◦ **Mentors:** Vijay Gopalakrishnan, Seungjoon Lee and Kaustubh Joshi.
◦ Researched and designed an analytical framework to help operators systematically evaluate the potential benefits (e.g., resource savings, cost reduction) that different points in the Network Functions Virtualization (NFV) design space can offer.
- 2013 **Research Intern**, *Hewlett-Packard (HP) Labs*, Palo Alto, CA, USA.
◦ **Mentor:** Jeongkeun Lee.
◦ Researched and designed Atlas, a system that enables accurate and scalable application classification in SDN. Atlas achieved ~94% accuracy for top 40 Android applications on HP Labs wireless networks ([SIGCOMM'13](#)).
- 2010–present **Research Assistant**, *WINGS Lab*, *Stony Brook University*, NY, USA.
◦ **A Minimally Disruptive Design for an Elastic Cellular Core**
KLEIN, a redesign of the cellular core network that leverages NFV, scales to billion of devices, is reponsive, and performs close to optimal load distribution ([SOSR'16](#)).
◦ **SIMPLE-fying Middlebox Policy Enforcement Using SDN**
SIMPLE, an orchestration layer for managing middleboxes using SDN. It improves middlebox loading balancing by 6× compared to today's deployments ([SIGCOMM'13](#)).
◦ **All-Wireless Inter-Rack Data Center Fabric Using Free-Space Optics**
FireFly, a flexible, all-wireless, inter-rack datacenter fabric that uses free-space optics and achieves performance close to a full bisection bandwidth network but at only 40-60% of the cost ([SIGCOMM'14](#)).
◦ **Multi-Radio Multi-Vehicle System for Metro-WiFi Access**
MRMV, a system that masks hand-off latencies and coverage holes in moving vehicles. Evaluation on a real metro-scale network showed that MRMV can substantially reduce coverage holes ([VANET'13](#)).
◦ **Flexible Channelization in 802.11 Networks**
Developed models for predicting link capacity in 802.11 wireless LANs where nodes employ variable width channels. The prediction error was less 10% for five interferers in more than 80% of the cases.

Publications

- Zafar Ayyub Qazi, Phani Krishna, Vyas Sekar, Samir Das, Vijay Gopalakrishnan, Kaustubh Joshi
KLEIN: A Minimally Disruptive Design for an Elastic Cellular Core
ACM SOSR 2016, Santa Clara, USA, March, 2016 (To appear, acceptance rate=25%)
- Navid H. Azimi, Zafar Ayyub Qazi, H. Gupta, Vyas Sekar, Samir Das, H. Shah, A. Tanwer
FireFly: A Reconfigurable Wireless Datacenter Fabric using Free-Space Optics
ACM SIGCOMM 2014, Chicago, USA, August 2014 (acceptance rate=19%)
- Zafar Ayyub Qazi, Cheng-chun Tu, Luis Chiang, Rui Miao, Vyas Sekar, Minlan Yu
SIMPLE-fying Middlebox Policy Enforcement Using SDN
ACM SIGCOMM 2013, Hong Kong, August 2013 (acceptance rate=15%, **Citations: 183+**)
- Zafar Ayyub Qazi, Jeongkeun Lee, G. Bellala, T. Jin, M. Arndt
Application-Awareness in SDN
ACM SIGCOMM 2013, Hong Kong, August 2013 (poster/demo session)
- Pralhad Deshpande, Zafar Ayyub Qazi, Samir R. Das
MRMV: Design and Evaluation of a Multi-Radio Multi-Vehicle System for Metro-WiFi Access
ACM MobiSys 2013 Workshop on VANET, Taipei, Taiwan, June 2013
- Zafar Ayyub Qazi, Cheng-chun Tu, Luis Chiang, Rui Miao, Vyas Sekar, Minlan Yu
Practical and Incremental Convergence between SDN and Middleboxes
Open Networking Summit (ONS), Research Track, Santa Clara, USA, 2013 (acceptance rate=23%)

Technical Reports

- Zafar Ayyub Qazi, Vyas Sekar, Samir Das
A Framework to Quantify the Benefits of Network Functions Virtualization in Cellular Networks.
Technical Report, arXiv:1406.5634, 2014
- Zafar Ayyub Qazi, Zhibin Dou, Samir R. Das,
Modeling Transmission Capacity of Links Using Flexible Channelization over WiFi
Technical Report, Stony Brook University, 2012.
- Zafar Ayyub Qazi, Saad Nadeem, Zartash Afzal Uzmi
Rate Adaptation in Vehicular Networks
Technical Report, LUMS, 2009

Talks

- 2015 “Minimally Disruptive Management Frameworks for Advanced Network Functions”, *Duke University*, Durham, NC, USA.
- 2015 “Minimally Disruptive Management Frameworks for Advanced Network Functions”, *Bell Labs*, NJ, USA.
- 2015 “Towards Flexible and Efficient Networked Systems”, *LUMS*, Lahore, Pakistan.
- 2013 “SIMPLE-fying Middlebox Policy Enforcement Using SDN”, *SIGCOMM'13*, Hong Kong.
- 2013 “SIMPLE-fying Middlebox Policy Enforcement Using SDN”, *HP Labs*, Palo Alto, CA, USA.
- 2013 “Integrating SDN and Middleboxes”, *LUMS*, Lahore, Pakistan.

Teaching Experience

- Spring 2010 **Teaching Assistant**, *Theory of Computation: Honors (CSE 350)*, SBU.
Carried weekly recitation sessions and graded weekly homeworks.
- Spring 2010 **Teaching Assistant**, *Computer Science B: Honors (CSE 260)*, SBU.
Graded weekly programming assignments.
- Fall 2010 **Teaching Assistant**, *Foundations of Computer Science: Honors (CSE 150)*, SBU.
Carried weekly recitation sessions, graded weekly homeworks, midterms and final exams.
- Fall 2010 **Teaching Assistant**, *Computer Science A: Honors (CSE 160)*, SBU.
Graded weekly programming assignments.
- Winter 2007 **Teaching Assistant**, *Discrete Mathematics (CS 221A)*, LUMS.
Carried weekly recitation sessions and graded weekly homeworks.

Honors and Awards

- Awarded travel grant for NeTS Early Career Award Workshop
- Awarded CoNEXT'13 travel grant
- Awarded SIGCOMM'13 travel grant
- Awarded MobiSys'13 travel grant
- Awarded Ph.D. student pass by Google for ONS'13
- University fellowship for Spring 2010-Fall 2010 at Stony Brook University
- Placed on the annual dean's honors list during the years (2005-06, 2006-07) at LUMS
- Awarded for high achievement (with A grades in Physics, Chemistry and Mathematics) in the Advanced level (or A'level) examinations conducted by the University of Cambridge

Computer Skills

- **Programming:** C, C++, Perl, Python, Tcl/OTcl, Awk, UNIX shell scripting
- **SDN software:** Open vSwitch/OpenFlow, POX controller
- **Virtualization Softwares:** VirtualBox, VMware
- **Network Simulators/Emulators:** ns2, htsim, Mininet, OpenAirInterface (an open LTE/EPC simulator/emulator), OpenEPC

Patents

- Application-Awareness in SDN (pending)
Zafar Ayyub Qazi, Jeongkeun Lee, G. Bellala, T. Jin, M. Arndt

References

1. Dr. Samir Das
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2. Dr. Vyas Sekar
Assistant Professor, Electrical and Computer Engineering, CMU, PA, USA
Phone: +1 631 632 8460
Email: vsekar@andrew.cmu.edu
3. Dr. Minlan Yu

Assistant Professor, Computer Science, University of Southern California (USC), CA, USA
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