SHIVANG AGGARWAL

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SUMMARY: Currently working as a Research Scientist in the Networking and Distributed Systems Lab at Hewlett Packard Labs with research interests in mobile computing and wireless networks such as WiFi 6/WiFi 7 (WLANs) and 5G/6G (cellular)

EDUCATION

Northeastern University, Massachusetts, USA December 2022
Ph.D., Computer Engineering CGPA: 4/4

University at Buffalo, State University of New York, New York, USA December 2017
Master of Science, Computer Science and Engineering CGPA: 3.83/4

Manipal Institute of Technology, Karnataka, India July 2016
Bachelor of Technology, Computer Science and Engineering CGPA: 7.63/10

EXPERIENCE

Research Scientist – Hewlett Packard Labs Sept 2022 – Present

- Working in the Networking and Distributed Systems Lab (NDSL) at Hewlett Packard Enterprise

Research Assistant – WiNS Lab (Northeastern University, University at Buffalo) Oct 2017 – Aug 2022

- Looked at aspects of using high speed millimeter-wave networks (802.11ad/5G) on smartphones and the effect on the power consumption and performance of high-quality video/VR/AR applications
- Worked on the Linux kernel to modify Multipath TCP using 60 GHz and 5 GHz networks to optimize performance under various possible scenarios
- Performed experimental evaluation and analysis of commercial off-the-shelf 60 GHz devices such as APs, laptops, and smartphones to understand the performance of such devices as compared to the understanding of the challenges faced by millimeter-wave networks

Research Intern – NEC Laboratories America, Inc. May 2021 – Mar 2022

- Worked on enabling real-time user localization and tracking in indoor environments leveraging existing WiFi infrastructure using 802.11mc WiFi FTM ranging

Teaching Assistant – Department of Computer Science and Engineering (University at Buffalo) Jan 2018 – May 2019
Jan 2020 – May 2020

- Worked as a Teaching Assistant (TA) for the Modern Networking Concepts course and the Operating Systems course
- Held recitations and office hours to help students and guide them through the demanding course projects

Research Assistant – ODIn Lab (University at Buffalo) Jun 2017 – Dec 2017

- Worked on Mimir database, a probabilistic database which attempts to guess missing and incorrect values to assist with efficiently dealing with messy data.
- Worked on prioritizing data errors to be fixed by building a linear solver based on confidence gain. Also, built a model to fill in missing values by detecting functional dependencies between attributes.

Research and Development Intern – Defence Research and Development Organisation (DRDO) Feb 2016 – Jun 2016

- Used data mining techniques to find ways to improve the cyber security of government networks by increasing the rate of intrusion detections.

PUBLICATIONS

- **Is WiFi 802.11mc Fine Time Measurement Ready for Prime-Time Localization? (Best Paper Award)**
  Shivang Aggarwal, Ramanujan K Sheshadri, Karthikeyan Sundaresan, Dimitrios Koutsonikolas
  ACM WiNTECH 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

- **A Detailed Look at MIMO Performance in 60 GHz WLANs**
  Shivang Aggarwal, Srisai Karthik Neelamraju, Ajit Bhat, Dimitrios Koutsonikolas
  ACM SIGMETRICS / IFIP Performance 2022
- **MuSher: An Agile Multipath-TCP Scheduler for Dual-Band 802.11ad/ac Wireless LANs**
  Shivang Aggarwal, Swetank Kumar Saha, Imran Khan, Rohan Pathak, Dimitrios Koutsonikolas, Joerg Widmer
  IEEE/ACM ToN 2022
- **Multipath TCP in Smartphones Equipped with Millimeter Wave Radios**
  Imran Khan, Moinak Ghoshal, **Shivang Aggarwal**, Dimitrios Koutsonikolas, and Joerg Widmer
  ACM WiNTECH 2021
- **Throughput Prediction on 60 GHz Mobile Devices for High-Bandwidth, Latency-Sensitive Applications**
  Shivang Aggarwal, Zhaoning Kong, Moinak Ghoshal, Y. Charlie Hu, Dimitrios Koutsonikolas
  PAM 2021
- **An Experimental Study of the Performance of IEEE 802.11ad in Smartphones**
  Shivang Aggarwal, Moinak Ghoshal, Piyali Banerjee, Dimitrios Koutsonikolas
  Elsevier COMCOM 2021
- **802.11ad in Smartphones: Energy Efficiency, Spatial Reuse, and Impact on Applications**
  Shivang Aggarwal, Moinak Ghoshal, Piyali Banerjee, Dimitrios Koutsonikolas, Joerg Widmer
  IEEE INFOCOM 2021
- **LiBRA: Learning-Based Link Adaptation Leveraging PHY Layer Information in 60 GHz WLANs**
  Shivang Aggarwal, Urjit Satish Sardesai, Viral Sinha, Deen Dayal Mohan, Moinak Ghoshal, Dimitrios Koutsonikolas
  ACM CoNEXT 2020
- **An Experimental Study of Rate and Beam Adaptation in 60 GHz WLANs**
  Shivang Aggarwal, Urjit Satish Sardesai, Viral Sinha, Dimitrios Koutsonikolas
  ACM MSWiM 2020
- **An Analysis of Delay in Live 360° Video Streaming Systems**
  Jun Yi, Md Reazul Islam, **Shivang Aggarwal**, Dimitrios Koutsonikolas, Y. Charlie Hu, Zhisheng Yan
  ACM MM 2020
- **How to Evaluate Mobile 360° Video Streaming Systems?**
  Shivang Aggarwal, Sibendu Paul, Pranab Dash, Nuka Saranya Illa, Y. Charlie Hu, Dimitrios Koutsonikolas, Zhisheng Yan
  ACM HotMobile 2020
- **Poster: Link Adaptation in 60 GHz WLANs using PHY Layer Information**
  Shivang Aggarwal, Urjit Satish Sardesai, Viral Sinha, Dimitrios Koutsonikolas
  ACM HotMobile 2020
- **Performance and Pitfalls of 60 GHz WLANs Based on Consumer-Grade Hardware**
  Swetank Kumar Saha, **Shivang Aggarwal,** Hany Assasa, Adrian Loch, Naveen Muralidhar Prakash, Roshan Shyamsunder Anantharamakrishna, Daniel Steinmetzer, Dimitrios Koutsonikolas, Joerg Widmer, Matthias Hollick
  IEEE TMC 2020
- **A First Look at 802.11ad Performance on a Smartphone (Best Paper Award)**
  Shivang Aggarwal, Arvind Thirumurugan, Dimitrios Koutsonikolas
  ACM mmNets 2019
- **Poster: Can Mobile Hardware Keep Up with Today's Gigabit Wireless Technologies?**
  Shivang Aggarwal, Swetank Kumar Saha, Pranab Dash, Jiayi Meng, Arvind Thirumurugan, Dimitrios Koutsonikolas, Y. Charlie Hu
  ACM MobiCom 2019
- **MuSher: An Agile Multipath-TCP Scheduler for Dual-Band 802.11ad/ac Wireless LANs**
  Swetank Kumar Saha, **Shivang Aggarwal,** Dimitrios Koutsonikolas, Joerg Widmer
  ACM MobiCom 2019
- **Fast and Infuriating: Performance and Pitfalls of 60 GHz WLANs Based on Consumer-Grade Hardware**
  Swetank Kumar Saha, Hany Assasa, Adrian Loch, Naveen Muralidhar Prakash, Roshan Shyamsunder Anantharamakrishna, **Shivang Aggarwal,** Daniel Steinmetzer, Dimitrios Koutsonikolas, Joerg Widmer, Matthias Hollick
  IEEE SECON 2018

- **Poster: AMuSe: An Agile Multipath TCP Scheduler for Dual-Band 802.11ad/ac Wireless LANs**
  Swetank Kumar, **Shivang Aggarwal**, Dimitrios Koutsonikolas, Joerg Widmer
  ACM MobiCom 2018

AWARDS

- **Best Paper Award** – ACM WiNTECH 2022, ACM mmNets 2019
- **Outstanding PhD Research Award** – Northeastern University College of Engineering 2022
- **Best Dataset Award –** Passive and Active Measurement (PAM) Conference 2021
- **Best PhD Research Award** – UB CSE 2020
- **Best PhD Teaching Award** – UB CSE 2020
- **Best Poster Award** – UB CSE PhD Poster Competition 2019
- **Travel/Conference Grants** – IEEE INFOCOM (2018, 2019, 2021), ACM HotMobile (2020), ACM CoNEXT (2020), ACM SIGMETRICS (2022), ACM MobiCom (2022)

SERVICE

- **TPC Co-Chair –** ACM S^3 Wireless of the Students, by the Students, and for the Students Workshop (ACM MobiCom 2022)
- **TPC Member –** ACM WiNTECH 2022
- **Shadow TPC Member** – ACM IMC 2022
- **Reviewer** – IEEE/ACM Transactions on Networking (TON), IEEE Transactions on Mobile Computing (TMC), IEEE Transactions on Wireless Communications (TWC), IEEE Transactions on Multimedia (TMM), IEEE Journal on Selected Areas in Communications (JSAC)
- **Web Chair –** ACM S^3 Wireless of the Students, by the Students, and for the Students Workshop (ACM MobiCom 2018)
- **Secretary** – UB Computational Sciences Club 2018-19

SOURCE CODE/DATA RELEASE

- **MuSher –** Released source code for our MPTCP scheduler, a set of MPTCP instrumentation tools, and the dataset characterizing MPTCP performance ACM MobiCom 2019, IEEE/ACM ToN 2022
- **LiBRA, 60 GHz Link Adaptation –** Released dataset used in studying link adaptation under various link impairment scenarios and developing LiBRA, a learning based 60 GHz link adaptation protocol ACM CoNEXT 2020, ACM MSWiM 2020
- **60 GHz Throughput Prediction –** Released dataset used to study throughput predictability of 60 GHz mobile devices for high-bandwidth, latency-sensitive applications PAM 2021
- **802.11ad Smartphone –** Released dataset used to study 802.11ad power consumption, spatial reuse, and application performance on smartphones IEEE INFOCOM 2021
- **MPTCP for mmWave Smartphones –** Released source code for our MPTCP kernel for a dual-band smartphone (ASUS RoG Phone II) equipped with 802.11ad and 802.11ac radios ACM WiNTECH 2021
- **MIMO Performance in 60 GHz –** Released dataset used to study SU- and MU-MIMO performance in 60 GHz WLANs in various environments ACM SIGMETRICS/IFIP Performance 2022

TECHNICAL SKILLS

- **Languages –** C, C++, Python, Java, Scala, Android, LabView
- **Linux** – Wireless Device Drivers (ath10k, wil6210), TCP/MPTCP Networking Subsystem/Stack
- **Web** – HTML, CSS, js