

# SHIVANG AGGARWAL

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<https://shivang94.github.io>

<http://www.github.com/shivang94>

**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

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**Northeastern University, Massachusetts, USA** December 2022  
*Ph.D., Computer Engineering*

**University at Buffalo, State University of New York, New York, USA** December 2017  
*Master of Science, Computer Science and Engineering*

**Manipal Institute of Technology, Karnataka, India** July 2016  
*Bachelor of Technology, Computer Science and Engineering*

## EXPERIENCE

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**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 – Dec 2021

- 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

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- 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*

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## PATENT

- **Realizing Enterprise-Grade Localization using WiFi 802.11mc Fine Time Measurement**  
Pending US Patent Application  
*Filed March 25, 2022*

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## 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)

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## SERVICE

- **TPC Co-Chair** – ACM S<sup>3</sup> Wireless of the Students, by the Students, and for the Students Workshop (ACM MobiCom 2022)
- **TPC Member** – ACM WiNTECH 2022, IEEE WoWMoM 2023, IEEE LANMAN 2023
- **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<sup>3</sup> Wireless of the Students, by the Students, and for the Students Workshop (ACM MobiCom 2018)
- **Secretary** – UB Computational Sciences Club 2018-19

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## 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

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## 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