

Swetank Kumar Saha

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Education

- 2013-2019 **Doctor of Philosophy (Ph.D.)**, Computer Science & Engineering | GPA 3.81/4.0
University at Buffalo (UB), SUNY, NY, US | Advisor: [Dr. Dimitrios Koutsonikolas](#)
Thesis (CSE **Best PhD Dissertation** Award):
Improving Client Performance and Energy-Efficiency in Current and Next-Generation Wireless LANs
- 2009-2013 **Bachelor of Technology**, Computer Science & Engineering (*with Honors*) | GPA 9.01/10.0
IIIT-Delhi, New Delhi, IN
Thesis: *Smartphone-based Anomalous Human Activity Detection and Prediction*

Research Interests & Directions

Wireless Networking

- Next-generation WiFi: Millimeter-wave (60 GHz)/802.11ad based Wireless LANs (WLANs)
 - Characterize 802.11ad PHY/MAC performance using both commercial and SDR testbeds
 - Use Multipath-TCP to combine Legacy/802.11ac and Gigabit/802.11ad WiFi
 - Related publications: [\[C11\]](#), [\[C9\]](#), [\[C8\]](#), [\[C5\]](#), [\[C3\]](#), [\[J2\]](#), [\[J1\]](#)
- LTE-Unlicensed and WiFi Co-existence in 5 GHz
 - Quantify coexistence issues with LTE-Unlicensed (LTE-U/LAA) and 802.11ac-based Enterprise WLAN
 - Build standard-compliant WiFi-based system to combat LTE interference and ensure fair channel usage
 - Related publications: [\[C10\]](#), [\[P1\]](#)

Mobile Systems

- WiFi Power-Performance Tradeoffs in Smartphones
 - Identify the power-performance relationship in the context of 802.11n/ac/ad in mobile devices
 - Build accurate power models that account for both CPU and network component of data transfers
 - Related publications: [\[C6\]](#), [\[C4\]](#), [\[C2\]](#)
- Multipath-TCP in Smartphones
 - Study MPTCP in the context of using LTE+WiFi interfaces together on smartphones
 - Characterize the impact of MPTCP on performance, power and CPU utilization for real applications
 - Related publications: [\[C7\]](#)

Publications

Conference

- C11 **MuSher: An Agile Multipath-TCP Scheduler for Dual-Band 802.11ad/ac Wireless LANs**
[Swetank Kumar Saha](#), Shivang Aggarwal, Rohan Pathak, Dimitrios Koutsonikolas, Joerg Widmer
ACM International Conference on Mobile Computing and Networking (MobiCom) 2019
- C10 **DeMiLTE: Detecting and Mitigating LTE Interference for Enterprise Wi-Fi in 5 GHz**
[Swetank Kumar Saha](#), Christina Vlachou, Dimitrios Koutsonikolas, Kyu-Han Kim
ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc) 2019
- C9 **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, and Matthias Hollick
IEEE International Conference on Sensing, Communication and Networking (SECON) 2018
- C8 **Medium Access and Transport Protocol Aspects in Practical 802.11ad Networks**
Hany Assasa, [Swetank Kumar Saha](#), Adrian Loch, Dimitrios Koutsonikolas, Joerg Widmer
IEEE International Symposium on A World of Wireless, Mobile and Multimedia Networks (WoWMoM) 2018

- C7 **Multipath TCP in Smartphones: Impact on Performance, Energy, and CPU Utilization**
Swetank Kumar Saha, Abhishek Kannan, Geunhyung Lee, Nishant Ravichandran, Parag Kamalakar Medhe, Naved Merchant, Dimitrios Koutsonikolas
ACM International Symposium on Mobility Management and Wireless Access (MobiWac) 2017
- C6 **A Detailed Look into Power Consumption of Commodity 60 GHz Devices**
Swetank Kumar Saha, Tariq Siddiqui, Dimitrios Koutsonikolas, Adrian Loch, Joerg Widmer, Ramalingam Sridhar
IEEE International Symposium on A World of Wireless, Mobile and Multimedia Networks (WoWMoM) 2017
- C5 **A Feasibility Study of 60 GHz Indoor WLANs**
Swetank Kumar Saha, Tariq Siddiqui, Viral Vijay Vira, Anuj Garg, Dimitrios Koutsonikolas
IEEE International Conference on Computer Communication and Networks (ICCCN) 2016
- C4 **Revisiting 802.11 Power Consumption Modeling in Smartphones**
Swetank Kumar Saha, Pratham Malik, Selvaganesh Dharmeswaran, Dimitrios Koutsonikolas
IEEE International Symposium on A World of Wireless, Mobile and Multimedia Networks (WoWMoM) 2016
- C3 **Multi-Gigabit Indoor WLANs: Looking Beyond 2.4/5 GHz**
Swetank Kumar Saha, Viral Vijay Vira, Anuj Garg, Dimitrios Koutsonikolas
IEEE International Conference on Communications (ICC) 2016
- C2 **Power-Throughput Tradeoffs of 802.11n/ac in Smartphones**
Swetank Kumar Saha, Pratik Deshpande, Pranav P Inamdar, Ramanujan K Sheshadri, Dimitrios Koutsonikolas
IEEE Conference on Computer Communications (INFOCOM) 2015
- C1 **Take Control of Your SMSes : Designing an Usable Spam SMS Filtering System**
 Kuldeep Yadav, Swetank K Saha, Ponnuram Kumaraguru, Rohit Kumra
IEEE International Conference on Mobile Data Management (MDM) 2012
- [Journal](#)
- J3 **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, Daniel Steinmetzer, Dimitrios Koutsonikolas, Joerg Widmer, Matthias Hollick
IEEE Transactions on Mobile Computing (TMC) 2020
- J2 **X60: A Programmable Testbed for Wideband 60 GHz WLANs with Phased Arrays**
Swetank Kumar Saha, Yasaman Ghasempour, Muhammad Kumail Haider, Tariq Siddiqui, Paulo De Melo, Neerad Somanchi, Luke Zakrajsek, Arjun Singh, Roshan Shyamsunder, Owen Torres, Daniel Uvaydov, Josep Miquel Jornet, Edward Knightly, Dimitrios Koutsonikolas, Dimitris Pados, Zhi Sun, Ngwe Thawdar
Elsevier Computer Communications (COMCOM) 2018
- J1 **60 GHz Indoor WLANs: Insights into Performance and Power Consumption**
Swetank Kumar Saha, Darshan Godabanahal Malleshappa, Avinash Palamanda, Viral Vijay Vira, Anuj Garg, Dimitrios Koutsonikolas
Springer Wireless Networks (WINE) 2017
- [Workshop](#)
- W4 **X60: A Programmable Testbed for Wideband 60 GHz WLANs with Phased Arrays**
Swetank Kumar Saha, Yasaman Ghasempour, Muhammad Kumail Haider, Tariq Siddiqui, Paulo De Melo, Neerad Somanchi, Luke Zakrajsek, Arjun Singh, Owen Torres, Daniel Uvaydov, Josep Miquel Jornet, Edward Knightly, Dimitrios Koutsonikolas, Dimitris Pados, Zhi Sun
ACM Workshop on Wireless Network Testbeds, Experimental evaluation & CHaracterization (WiNTECH) 2017
- W3 **Improving Connectivity, Coverage, and Capacity in 60 GHz Indoor WLANs Using Relays**
Swetank Kumar Saha, Li Sun, Dimitrios Koutsonikolas
ACM Workshop on Wireless of the Students, by the Students, & for the Students (S³) 2015
- W2 **A First Look at TCP Performance in Indoor IEEE 802.11ad WLANs**
Swetank Kumar Saha, Anuj Garg, Dimitrios Koutsonikolas
IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS) 2015
- W1 **Towards Multi-Gigabit 60 GHz Indoor WLANs**
Swetank Kumar Saha, Dimitrios Koutsonikolas
IEEE International Conference on Network Protocols (ICNP PhD Forum) 2015

Patents

P1 **LTE Interference Detection and Mitigation for Wi-Fi Links**

Christina Vlachou, [Swetank Kumar Saha](#), Kyu-Han Kim

Publication No.: US 2019/0335347 A1 (Patent No.: US 11,076,307 B2) Application #: 15/962,722

Poster

Po6 **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 International Conference on Mobile Computing and Networking (**MobiCom**) 2019

Po5 **Poster: AMuSe: An Agile Multipath TCP Scheduler for Dual-Band 802.11ad/ac Wireless LANs**

[Swetank Kumar Saha](#), Shivang Aggarwal, Dimitrios Koutsonikolas, Joerg Widmer

ACM International Conference on Mobile Computing and Networking (**MobiCom**) 2018

Po4 **Poster: Can MPTCP Improve Performance for Dual-Band 60 GHz/5 GHz Clients?**

[Swetank Kumar Saha](#), Roshan Shyamsunder, Naveen Muralidhar Prakash, Hany Assasa, Adrian Loch, Dimitrios Koutsonikolas, Joerg Widmer

ACM International Conference on Mobile Computing and Networking (**MobiCom**) 2017

Po3 **Poster: X60: A Programmable Testbed for Wideband 60 GHz WLANs with Phased Arrays**

[Swetank Kumar Saha](#), Yasaman Ghasempour, Muhammad Kumail Haider, Tariq Siddiqui, Paulo De Melo, Neerad Somanchi, Luke Zakrajsek, Arjun Singh, Owen Torres, Daniel Uvaydov, Josep Miquel Jornet, Edward Knightly, Dimitrios Koutsonikolas, Dimitris Pados, Zhi Sun

ACM International Conference on Mobile Computing and Networking (**MobiCom**) 2017

Po2 **LTE/WiFi Coexistence in 5 GHz: Bringing LTE-Awareness to Enterprise WiFi**

[Swetank Kumar Saha](#), Christina Vlachou, Kyu-Han Kim

Hewlett Packard Enterprise (**Technical Conference**) 2017

Po1 **On the Feasibility of Indoor IEEE 802.11ad WLANs**

[Swetank Kumar Saha](#), Viral Vijay Vira, Anuj Garg, Andrew Tennenbaum, Dimitrios Koutsonikolas

IEEE Conference on Computer Communications Workshops (**INFOCOM WKSHPS**) 2015

Work Experience

Nov. 2019 – **WiFi Performance Engineer, Apple Inc.**, Cupertino, CA, US.

Current Evaluating & Improving wireless connectivity performance of next-generation technologies and devices

- 802.11
 - Devise metrics/methodologies and develop the tools and techniques for wireless performance evaluation
- Python
 - Analyze data to identify areas for enhancement, prototype new solutions and guide them to commercialization
- Firmware
 - Designed and built a traffic emulator to generate realistic Thread traffic patterns, measure performance and report critical metrics; In use by several cross-functional teams
- OpenThread
 - Developed a tool to timesync & correlate performance data generated from host and network chipset
- TCP/IP
 - Built entire setup from scratch to evaluate wireless P2P performance both standalone and under co-existence with other co-channel technologies, uncovered areas with sub-optimal performance & proposed improvements
 - Developed a framework that allows analysis of music streaming performance across the networking stack

Summer 2019 **Course Instructor, State University of New York at Buffalo**, Buffalo, NY, US.

Programming *Languages* Introduction to Programming Languages

- Course Instructor for introductory course on Programming Languages, focusing on functional programming

Summer 2017 **Research Associate (Intern), Hewlett Packard Enterprise (HPE) Labs**, Palo Alto, CA, US.

C LTE-Unlicensed/WiFi Co-existence in 5 GHz for WiFi Access Points (APs)

- Python
 - Designed *DeMiLTE*, the first WiFi (802.11ac)-based system for enterprise APs to detect, quantify, and react to LTE-U/LAA interference in real time, without requiring additional AP hardware
- OpenWRT
 - Implemented the system inside the AP firmware making it light-weight and fully 802.11ac-standard compliant
 - Improved AP downlink throughput by up to **110%**, without requiring any client modifications
 - Published 1 top-tier conference paper [C3] and filed 1 patent [P1]

- Summer 2016** **Research Intern, *IMDEA Networks Institute*, Madrid, Spain.**
 C Millimeter-wave Networking
 Python
 - Analyzed performance bottlenecks in next-generation of WiFi: 60 GHz (802.11ad)-based indoor WLANs
 Drivers
 - Modified the Linux 802.11ad wireless device driver (wil16210) to export PHY/MAC information to userspace and allow control over PHY parameters, like beam direction [🔗](#)
 LEDE
 - Highlighted novel challenges and practical aspects like coverage and AP deployment, previously unreported
 - Published the results of the study in a top-tier conference [\[C2\]](#)

Summer 2013 **Software Developer, *Google Summer of Code 2013*, Google.**
 Python Funf: Open sensing and data collection framework for Android (acquired by Google) [🔗](#)
 Java
 - Improved Funf-in-a-box (FIAB), a service for users to build custom data collection app with zero programming
 Android
 - Ported the entire FIAB service from an always-on architecture running on a single EC2 server to on-demand VM instantiation on Google cloud (in <1 month), significantly reducing costs & increasing performance. [🔗](#)
 Django
 - Added support for configuring and deploying custom surveys and capturing additional user input

Summer 2012 **Research Intern, *Airbus India, EADS Innovation Works*, Bangalore, India.**
 Android Image based localization techniques
 Ubuntu Juju
 - Built an indoor localization service that uses image features to estimate location of an Android device
 - Packaged and deployed the system as a Juju charm for easy production orchestration

2013–2019 **Research Assistant (RA) | Teaching Assistant (TA), *University at Buffalo, SUNY*, NY, US.**

Awards

- CSE Best PhD Dissertation Award** UB Computer Science & Engineering department 2019 [🔗](#)
- Faculty Choice Graduate Award** UB Computer Science & Engineering department 2019 [🔗](#)
- 2nd Runner Up** ACM Student Research Competition (SRC) 2017 [P2]
- Best Paper Runner Up** ACM WiNTECH 2017 [W4]
- 1st prize** at the UB School of Engineering & Applied Sciences (SEAS) Lightning Talk Competition
- Winner** of the *Tally Innovation Award* at the [All-India Jedi Project Challenge 2012](#), IISc., Bangalore.
- Travel Grants: 2018: IEEE SECON, ACM SRC; 2017: ACM MobiCom, ACM SRC; 2016: ACM MobiCom, IEEE ICC; 2015: ACM IMC, IEEE ICNP

Professional Service

- Chair
 - ACM Wireless of the Students, by the Students, and for the Students (S³) Workshop 2018 [🔗](#)
- Web Chair
 - International Conference on Embedded Wireless Systems and Networks (EWSN) 2018 [🔗](#)
 - ACM Workshop on Wireless Network Testbeds, Experimental evaluation & CHaracterization (WiNTECH) 2016 [🔗](#)
- Invited
 - IEEE Transactions on Mobile Computing (TMC) 2021, 2020, 2018, 2017
 Journal
 - IEEE Transactions on Wireless Communications (TWC) 2020, 2019, 2017
 Reviews
 - Elsevier Ad Hoc Networks 2019
 - IEEE/ACM Transactions on Networking 2019
 - IEEE Vehicular Technology Magazine 2019
 - IEEE Journal on Selected Areas in Communications 2018
 - MDPI Applied Sciences 2017
 - IEEE Symposium on Computers and Communications (ISCC) 2017
 - MDPI Sensors 2015

Technical
 - IEEE INFOCOM 2022
 Program
 - IEEE WoWMoM 2021
 Committee
 - IFIP Networking 2021
 (TPC)
 - ACM mmNets 2020

Technical Skills

Languages Proficient: C, Python | Intermediate: Java | Familiar: C++
Linux Kernel Wireless device drivers (ath9k, ath10k, wil6210, iwlwifi), TCP and MPTCP Networking subsystem
Networking TCP/IP, HTTP, WiFi, LTE, packet sniffer, protocol analyzer, OpenWRT, ns2, ns3
Smartphone Android applications (SDK/NDK), Platform (AOSP), Kernel
SDRs USRP, GNURadio, LabView
Web Django, PHP, HTML, JavaScript, Jekyll