Rachee Singh

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Employment

Assistant Professor of Computer Science, Cornell University, Ithaca, Spring 2023 –

Senior Researcher, Office of the CTO, Microsoft Azure for Operators, 2020 – 2023

Researcher, Mobility and Networking, Microsoft Research Redmond, 2019 – 2020

Research Intern, Mobility and Networking, Microsoft Research, Redmond, Summer 2017, 2018

Research Intern, International Computer Science Institute (ICSI), Berkeley, Summer 2016

Software Engineer, Arista Networks, Bangalore, 2012 – 2015

Software Engineering Intern, Arista Networks, Bangalore, Fall 2011

Education

Ph.D., Computer Science, University of Massachusetts, Amherst, 2021.

M.S., Computer Science, University of Massachusetts, Amherst, 2019.

B.E. (Hons.), Computer Science, Birla Institute of Technology and Science, 2012.

Awards and Recognition

ACM SIGCOMM Doctoral Dissertation Award (Runner-up), 2022

Outstanding Doctoral Dissertation Award by University of Massachusetts, Amherst, 2021

Rising Star in Networking and Communications by N^2Women, 2021

EECS Rising Star by UC Berkeley, 2020

Google PhD Fellowship in Systems and Networking, 2018

Silver medal at ACM Student Research Competition at SIGCOMM, 2016

Publications

Google Scholar: https://scholar.google.com/citations?user=GKja_-QAAAAJ

1. An optical slice of the wide-area network
   Abhishek Vijaya Kumar, Bill Owens, Nikolaj Bjorner, Victor Bahl, Binbin Guan,
   Yawei Yin, Rachee Singh
   USENIX Symposium on Networked Systems Design and Implementation **(NSDI 2024)**.

2. Teal: Learning-Accelerated Optimization of WAN Traffic Engineering
   Zhiying Xu, Francis Y. Yan, Rachee Singh, Justin T. Chiu, Alexander M. Rush, Minlan Yu
   ACM Special Interest Group on Data Communications **(SIGCOMM 2023)**.

3. OneWAN is better than two: Unifying a split wide-area network architecture
   Umesh Krishnaswamy, <u>Rachee Singh</u>, Paul Mattes, Paul-Andre C Bissonette, Nikolaj Bjorner,
   Zahira Nasrin, Sonal Kothari, Prabhakar Reddy, John Abeln, Srikanth Kandula, Himanshu Raj,
   Luis Irun-Briz, Jamie Gaudette, Erica Lan
   USENIX Symposium on Networked Systems Design and Implementation **(NSDI 2023)**.

4. Glowing in the dark: Uncovering IPv6 address discovery and scanning strategies
   Hammas Bin Tanveer, <u>Rachee Singh</u>, Paul Pearce, Rishab Nithyanand
   USENIX Security Symposium **(USENIX Security 2023)**.

5. Synthesizing Collective Communication Algorithms for Distributed GPU Networks
   Aashaka Shah, Vijay Chidambaram, Meghan Cowan, Saeed Maleki, Madan Musuvathi,
   Todd Mytkowicz, Jacob Nelson, Olli Saarikivi, <u>Rachee Singh</u>
   USENIX Symposium on Networked Systems Design and Implementation **(NSDI 2023)**.

6. Traffic engineering: from ISP to cloud wide-area networks
   <u>Rachee Singh</u>, Nikolaj Bjorner, Umesh Krishnaswamy
   ACM SIGCOMM Symposium on SDN Research **(SOSR 2022)**.

7. Decentralized cloud wide-area network traffic engineering
   Umesh Krishnaswamy, <u>Rachee Singh</u>, Nikolaj Bjorner, Himanshu Raj
   USENIX Symposium on Networked Systems Design and Implementation **(NSDI 2022)**.

8. Cost-effective capacity provisioning in wide-area networks with Shoofly
   <u>Rachee Singh</u>, Nikolaj Bjorner, Sharon Shoham, Yawei Yin, John Arnold, Jamie Gaudette
   ACM Special Interest Group on Data Communications **(SIGCOMM 2021)**.
   Press coverage: APNIC
   US Patent #US11342996B1

9. PredictRoute: a path prediction toolkit
   <u>Rachee Singh</u>, David Tench, Phillipa Gill, Andrew McGregor
   ACM Special Interest Group for Computer Systems Performance Evaluation **(SIGMETRICS, 2021)**.

10. Cost-effective cloud edge traffic engineering with Cascara
    <u>Rachee Singh</u>, Sharad Agarwal, Matt Calder, Victor Bahl
    USENIX Symposium on Networked Systems Design and Implementation **(NSDI 2021)**.

11. Surviving switch failures in cloud datacenters
    <u>Rachee Singh</u>, Muqeet Mukhtar, Ashay Krishna, Ani Parkhi, Jitendra Padhye, Dave Maltz
    ACM SIGCOMM, Computer Communication Review **(CCR 2021)**.
    Press coverage: The Next Platform

12. RADWAN: Rate Adaptive Wide Area Network
    <u>Rachee Singh</u>, Manya Ghobadi, Klaus-Tycho Foerster, Phillipa Gill, Mark Filer
    ACM Special Interest Group on Data Communications **(SIGCOMM 2018)**.
    Press Coverage: Microsoft Research Blog

13. Beyond Binary Failures in Networks
    <u>Rachee Singh</u>, Manya Ghobadi, Klaus-Tycho Foerster, Phillipa Gill, Mark Filer
    ACM, IRTF and ISOC Applied Networking Research Workshop **(ANRW 2018)**.

14. Characterizing the deployment and performance of multi-CDNs
    <u>Rachee Singh</u>, Arun Dunna, Phillipa Gill
    ACM Internet Measurement Conference **(IMC 2018)**.

15. Run, Walk, Crawl: Towards Dynamic Link Capacities
    <u>Rachee Singh</u>, Manya Ghobadi, Klaus-Tycho Foerster, Phillipa Gill, Mark Filer
    ACM Hot Topics in Networks **(HotNets 2017)**.
    Press Coverage: [HotNets-XVI Dialogue](#), [Datacenter World Article](#)

16. Characterizing the Nature and Dynamics of Tor Exit Blocking
    <u>Rachee Singh</u>, Rishab Nithyanand, Sadia Afroz, Paul Pearce, Michael Carl Tschantz,
    Phillipa Gill, Vern Paxson
    USENIX Security Symposium **(USENIX Security 2017)**.

17. The Politics of Routing: Investigating the Relationship Between AS Connectivity
    and Internet Freedom
    <u>Rachee Singh</u>, Hyungjoon Koo, Najmehalsadat Miramirkhani,
    Fahimeh Mirhaj, Phillipa Gill, Leman Akoglu
    USENIX Workshop on Free and Open Communications on the Internet **(FOCI 2016)**.

18. Identifying and Circumventing the Pitfalls of AS-aware Tor Client Design
    Rishab Nithyanand, <u>Rachee Singh</u>, Shinyoung Cho, and Phillipa Gill
    ArXiv **2016**.

Talks

Conference and workshop presentations: Topic preview on wide-area networks at SIGCOMM 2022, SIGCOMM 2021, SIGMETRICS 2021, NSDI 2021, IMC 2018, SIGCOMM 2018, Applied Networking Research Workshop 2018, HotNets 2017, New England Security Day 2017, FOCI at USENIX Security 2016, New England Security Day 2016, Workshop on Active Internet Measurements CAIDA 2016.

Invited talks: UC Berkeley (2022), Rice University (2022), UIUC (2022), UT Austin (2022), USC (2022), UW Madison (2022), Brown University (2022), NYU (2022), Cornell Tech (2022), Cornell University (2022), University of Iowa (2021), Cornell University (2021), University of Cambridge (2021), Google (2021), Facebook (2020), Colorado State University (2018), University of Colorado Boulder (2018).

Cornell Graduate Student Advising

Abhishek Vijaya Kumar (PhD advisor, Spring 2023 –)

Karuna Grewal (Research project advisor, Spring 2023 –)

Jonathan Aimuyo (MS research advisor, Fall 2023 –)

Cornell Undergraduate Student Advising

Kenneth Cula (Undergraduate research advisor, Summer 2023)

Aaron Beiderman (Undergraduate research advisor, Summer 2023)

Yunus Mohammed (Undergraduate research advisor, Spring 2023 → Microsoft)

Other Student Mentoring

Anjali (PhD Student at UW Madison)

Hammas Tanveer (PhD Student at University of Iowa)

Zhiying Xu (PhD Student at Harvard University)

Aashaka Shah (PhD student at UT Austin → Microsoft Research, Redmond)

Teaching

1. Fall 2023, CS6458, Systems for Programmable Optical Interconnects

2. Spring 2023, CS 4450/5456: Introduction to Computer Networks
   Canvas Course, Enrollment Total: 95 (64 undergraduate and 31 masters)

Department Service

Area co-chair for Systems and Networking, Cornell CS PhD admissions committee, 2023

Service

Program Committee, ACM SIGMETRICS 2024

Selection Committee, ACM Doctoral Dissertation Award (India), 2023

Program Committee, ACM ASPLOS 2024

Program Committee, USENIX NSDI 2024

Program Committee, ACM HotNets 2023

Panelist, NeTS Medium, National Science Foundation, 2023

Session Chair, USENIX NSDI 2023

Program Committee, USENIX NSDI 2023

Selection Committee, ACM Doctoral Dissertation Award (India), 2022

Program Committee, ACM Internet Measurement Conference (IMC) Posters 2022

Program Committee, ACM Internet Measurement Conference (IMC) 2022

Program Committee, ACM SIGCOMM 2022

Program Committee, ACM SIGMETRICS 2022

Judge, ACM SIGCOMM Student Research competition (SRC) 2021

Program Committee, ACM/IEEE Symposium on Architectures for Networking and Communications Systems (ANCS) 2021

Organizer, Tutorial on traffic engineering in cloud WANs, ACM SIGCOMM 2021

Reviewer, ACM SIGCOMM CCR 2021

Program Committee, ACM SIGCOMM Free & Open Communications on the Internet (FOCI) 2021

Publications Chair, ACM Internet Measurement Conference (IMC) 2021

Program Committee, Privacy Enhancing Technologies Symposium (PETS) 2021

Program Committee, Passive and Active Measurement (PAM) 2021

Judge, ACM SIGCOMM Student Research competition (SRC) 2020

Program Committee, ACM SIGCOMM Posters and Demo 2020

Reviewer, ACM SIGCOMM CCR 2020

Reviewer, Intl. Symposium on Research in Attacks, Intrusions and Defenses (RAID) 2019
Reviewer, IEEE/ACM Transactions on Networking (ToN) 2019
Reviewer, ACM Transactions on Web (TWeb) 2018
Reviewer, IEEE ACM Transactions on Networking (ToN) 2018

Outreach

Panelist, Student and Early Career Networking Researcher Roundtable, theNetworking Channel, 2023

Panelist, Women in IOT Workshop at University of Florida, 2021

Panelist, Women at Microsoft panel at ACM SIGCOMM, 2021

ACM MobiSys Student Mentor, 2021

Classroom teacher for Introduction to CS, Beulah High School, North Dakota, 2020 – 2021

ACM SIGCOMM Student Mentor, 2020

Mentor, STEM Paths Innovation Network (SPIN), Seattle, 2019 – 2020

Mentor, Women in Engineering and Computing Career Day at UMass Amherst, 2018

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