

Arpit Gupta

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Research Interests

As a systems researcher, I design and build systems that contribute to realizing an equitable digital future. Currently, my research focuses on **democratizing access to critical data** to support both data-driven policymaking and trustworthy machine learning (ML) in networking.

Education

- May'13-Aug'18 **Princeton University**, *Ph.D.*, Computer Science.
Dissertation: Flexible and Scalable Systems for Network Management
Adviser: Nick Feamster
Honorable Mention, SIGCOMM Doctoral Dissertation Award
- Jan'15-Jun'16 **Princeton University**, *M.A.*, Computer Science.
- Aug'10-May'13 **NC State University**, *M.S.*, Computer Science.
- Aug'05-May'09 **Indian Institute of Technology, Roorkee**, *B.Tech.*, Electronics & Comm.

Professional Experience

- Jul'19– **University of California, Santa Barbara**, *Assistant Professor*, Santa Barbara, CA.
- Apr'24– **Lawrence Berkeley National Lab**, *Faculty Scientist*, Berkeley, CA.
- Oct'22– **Beegol Inc.**, *Consultant*, Olímpia, Sao Paulo, Brazil.
- Sept'24– **Meter**, *Consultant*, San Francisco, CA, US.
- Sep'18–Aug'19 **Columbia University**, *Postdoctoral Research Scientist*, New York, NY.
- Jan'15–Aug'18 **Princeton University**, *Graduate Research/Teaching Assistant*, Princeton, NJ.
- May'16–Aug'16 **Microsoft Research**, *Research Intern*, Redmond, WA.
- May'13–Dec'14 **Georgia Tech**, *Graduate Research/Teaching Assistant*, Atlanta, GA.
- Aug'11–May'12 **NC State University**, *Graduate Research/Teaching Assistant*, Raleigh, NC.
- May'11–Aug'11 **Google**, *Software Engineering Intern*, Mountain View, CA.
- Feb'10–Aug'10 **Indian Institute of Science**, *Project Assistant*, Bangalore, India.

Awards

Students

- 2024 **SIGCOMM Doctoral Dissertation Award**—Udit Paul
- 2024 NSF Graduate Research Fellowship (GRFP)—Haarika Manda
- 2023 UCSB CS Outstanding Dissertation Award—Udit Paul
- 2023 UCSB CS Outstanding Publication Award—Udit Paul
- 2023 UCSB CS Summer Fellowship—Roman Beltiukov
- 2022 Google' M-Lab Research Fellowship—Sanjay Chandrasekaran
- 2022 UCSB CS Outstanding Graduate Research Award—Sanjay Chandrasekaran
- 2022 UCSB CS Outstanding Undergraduate Research Award—Chaofan Shou
- 2022 UCSB CS Outstanding Teaching Assistant Award—Rohan Bhatia

Self

- 2023 **IETF/IRTF Applied Networking Prize**
- 2022 **ACM SIGCOMM IMC Distinguished Paper Award (Long)**
- 2022 Honorable Mention, ACM CCS Best Paper
- 2018 Honorable Mention, SIGCOMM Dissertation Award
- 2017 Best Paper Award winner, ACM SOSR
- 2016 USENIX “Best of the Rest” Paper Award for Best Paper in all USENIX Conferences
- 2016 USENIX Community Contribution Award, USENIX NSDI
- 2013 Internet-2 Innovation Award
- 2010 College of Engineering Fellowship, North Carolina State University

Publications

Conferences

- [1] Jiamo Liu, David Lerner, Jae Chung, Udit Paul, Arpit Gupta, and Elizabeth Belding. Watching Stars in Pixels: The Interplay of Traffic Shaping and YouTube Streaming QoE over GEO Satellite Networks. In *International Conference on Passive and Active Network Measurement*, pages 153–169. Springer, 2024.
- [2] Haarika Manda, Varshika Srinivasavaradhan, Laasya Koduru, Kevin Zhang, Xuanhe Zhou, Udit Paul, Elizabeth Belding, Arpit Gupta, and Tejas Narechania. Assessing the Efficacy of the Connect America Fund in Addressing Internet Access Inequities in the US. In *ACM SIGCOMM*, 2024.
Building block for “Amici Curiae Brief in Support of Respondents, Wisconsin Bell v. U.S. ex rel. Heath (No. 23-1127) (U.S. Oct. 1, 2024)”.
- [3] Haarika Manda, Varshika Srinivasavaradhan, Laasya Koduru, Kevin Zhang, Xuanhe Zhou, Udit Paul, Elizabeth Belding, Arpit Gupta, and Tejas Narechania. Measuring Broadband Policy Success. In *Harvard Law Review Blog*, 2024.
- [4] Chris Misa, Ram Durairajan, Arpit Gupta, Reza Rejaie, and Walter Willinger. Leveraging Prefix Structure to Detect Volumetric DDoS Attack Signatures with Programmable Switches. In *IEEE Symposium on Security and Privacy (S&P)*, 2024.
- [5] Chaofan Shuo, Rohan Bhatia, Arpit Gupta, Rob Harrison, Daniel Lokshtanov, and Walter Willinger. Query planning for robust and scalable hybrid network telemetry systems. In *ACM Conference on Emerging Networking Experiments and Technologies (CoNEXT)*, 2024.
- [6] Roman Beltiukov, Wenbo Guo, Arpit Gupta, and Walter Willinger. In Search of netUnicorn: A Data-Collection Platform to Develop Generalizable ML Models for Network Security Problems. In *ACM Conference on Computer and Communications Security (CCS)*, 2023.
- [7] Udit Paul, Vinothini Gunasekaran, Jiamo Liu, Tejas Narechania, Arpit Gupta, and Elizabeth Belding. Decoding the Divide: Analyzing Disparities in Broadband Plans Offered by Major US ISPs. In *ACM SIGCOMM*, 2023.
Part of Udit Paul’s Dissertation—ACM SIGCOMM Dissertation Award.
- [8] Taveesh Sharma, Tarun Mangla, Arpit Gupta, Junchen Jiang, and Nick Feamster. Estimating webrtc video qoe metrics without using application headers. In *ACM SIGCOMM Internet Measurement Conference (IMC)*, 2023.

- [9] Fuheng Zhao, PunnaI Ismail Khan, Divyakant Agrawal, Amr El Abbadi, Arpit Gupta, and Zaoxing Liu. Panakos: Chasing the tails for multidimensional data streams. In *International Conference on Very Large Data Bases (VLDB)*, 2023.
- [10] Arthur S Jacobs, Roman Beltiukov, Walter Willinger, Ronaldo A Ferreira, Arpit Gupta, and Lisandro Z Granville. Ai/ml for network security: The emperor has no clothes. In *ACM Conference on Computer and Communications Security (CCS)*, 2022.
IETF/IRTF’23 Applied Networking Research Prize (ANRP)
ACM CCS’22 Best Paper Award (Honorary Mention).
- [11] Congcong Miao, Minggang Chen, Arpit Gupta, Zili Meng, Lianjin Ye, Jingyu Xiao, Jie Chen, Zekun He, Xulong Luo, Jilong Wang, and Heng Yu. Detecting Ephemeral Optical Events with OpTel. In *USENIX Symposium on Networked Systems Design and Implementation (NSDI)*, 2022.
- [12] Udit Paul, Jiamo Liu, Arpit Gupta, Mengyang Gu, and Elizabeth Belding. The Importance of Contextualization of Crowdsourced Active Speed Test Measurements. In *ACM SIGCOMM Internet Measurement Conference (IMC)*, 2022.
ACM SIGCOMM IMC’22 Distinguished Paper Award
Part of Udit Paul’s Dissertation—ACM SIGCOMM Dissertation Award.
- [13] Vivek Adarsh, Michael Nekrasov, Udit Paul, Alexander Ermakov, Arpit Gupta, Morgan Vigil-Hayes, Ellen W Zegura, and Elizabeth M Belding. Coverage is Not Binary: Quantifying Mobile Broadband Quality in Urban, Rural and Tribal Contexts. In *International Conference on Computer Communications and Networks (ICCCN)*, 2021.
- [14] Todd Arnold, Ege Gürmeriçliler, Georgia Essig, Arpit Gupta, Matt Calder, Vasileios Giotsas, and Ethan Katz-Bassett. (How Much) Does a Private WAN Improve Cloud Performance? In *IEEE Conference on Computer Communications (INFOCOM)*, 2020.
- [15] Arpit Gupta, Rob Harrison, Ankita Pawar, Marco Canini, Nick Feamster, Jennifer Rexford, and Walter Willinger. Sonata: Query-Driven Network Telemetry. In *ACM SIGCOMM*, 2018.
- [16] Robert MacDavid, Rüdiger Birkner, Ori Rottenstreich, Arpit Gupta, Nick Feamster, and Jennifer Rexford. Concise Encoding of Flow Attributes in SDN Switches. In *ACM Symposium on SDN Research (SOSR)*, 2017.
ACM SOSR’17 Best Paper Award.
- [17] Arpit Gupta, Robert MacDavid, Rüdiger Birkner, Marco Canini, Nick Feamster, Jennifer Rexford, and Laurent Vanbever. An Industrial-Scale Software Defined Internet Exchange Point. In *USENIX Symposium on Networked Systems Design and Implementation (NSDI)*, 2016.
NSDI’16 Community Award
USENIX’16 Best of the Rest.
- [18] Hyojoon Kim, Joshua Reich, Arpit Gupta, Muhammad Shahbaz, Nick Feamster, and Russ Clark. Kinetic: Verifiable Dynamic Network Control. In *USENIX Symposium on Networked Systems Design and Implementation (NSDI)*, 2015.
- [19] Arpit Gupta, Laurent Vanbever, Muhammad Shahbaz, Sean Patrick Donovan, Brandon Schlinker, Nick Feamster, Jennifer Rexford, Scott Shenker, Russ Clark, and Ethan Katz-Bassett. SDX: A Software Defined Internet Exchange. In *ACM SIGCOMM*, 2014.
Internet2 Innovation Award.
- [20] Arpit Gupta, Jeongki Min, and Injong Rhee. Wifox: Scaling wifi performance for large audience environments. In *ACM Conference on Emerging Networking Experiments and Technologies (CoNEXT)*, 2012.

Workshops & Short Papers

- [21] Punnaal Ismail Khan, Satyandra Guthula, Roman Beltiukov, Roland Schmid, Tobias Bühler, Arpit Gupta, Laurent Vanbever, and Walter Willinger. Harnessing public code repositories to develop production-ready ml artifacts for networking. In *Proceedings of the Applied Networking Research Workshop*, 2024.
- [22] Roman Beltiukov, Sanjay Chandrasekaran, Arpit Gupta, and Walter Willinger. Pinot: Programmable infrastructure for networking. In *Proceedings of the Applied Networking Research Workshop*, 2023.
- [23] Arpit Gupta, Ramakrishnan Durairajan, and Walter Willinger. Special issue on the acm sigmetrics workshop on measurements for self-driving networks. *ACM SIGMETRICS Performance Evaluation Review*, 2023.
- [24] Tarun Mangla, Udit Paul, Arpit Gupta, Nicole P Marwell, and Nick Feamster. Internet inequity in chicago: Adoption, affordability, and availability. *Affordability, and Availability (August 5, 2022)*, 2022.
Part of Udit Paul’s Dissertation—ACM SIGCOMM Dissertation Award.
- [25] Vivek Adarsh, Michael Nekrasov, Udit Paul, Alexander Ermakov, Arpit Gupta, Morgan Vigil-Hayes, Ellen W Zegura, and Elizabeth M Belding. Too Late for Playback: Estimation of Video Stream Quality in Rural and Urban Contexts. In *Passive and Active Measurement Conference (PAM)*, 2021.
- [26] Todd Arnold, Matt Calder, Arpit Gupta, Italo Cunha, Michael Schapira, and Ethan Katz-Bassett. Beating BGP is Harder than We Thought. In *ACM HotNets*, 2019.
- [27] Arpit Gupta, Chris MacStoker, and Walter Willinger. An Effort to Democratize Networking Research in the Era of AI/ML. In *ACM HotNets*, 2019.
- [28] Hyojoon Kim and Arpit Gupta. Ontas: Flexible and scalable online network traffic anonymization system. In *ACM SIGCOMM NetAI*, 2019.
- [29] Rob Harrison, Qizhe Cai, Arpit Gupta, and Jennifer Rexford. Network-Wide Heavy Hitter Detection with Commodity Switches. In *ACM Symposium on SDN Research (SOSR)*, 2018.
- [30] Rüdiger Birkner, Arpit Gupta, Nick Feamster, and Laurent Vanbever. SDX-Based Flexibility or Internet Correctness?: Pick Two! In *ACM Symposium on SDN Research (SOSR)*, 2017.
- [31] Arpit Gupta, Rüdiger Birkner, Marco Canini, Nick Feamster, Chris Mac-Stoker, and Walter Willinger. Network Monitoring as a Streaming Analytics Problem. In *ACM Workshop on Hot Topics in Networks (HotNets)*, 2016.
- [32] Arpit Gupta, Nick Feamster, and Laurent Vanbever. Authorizing Network Control at Software Defined Internet Exchange Points. In *ACM Symposium on SDN Research (SOSR)*, 2016.
- [33] Arpit Gupta, Matt Calder, Nick Feamster, Marshini Chetty, Enrico Calandro, and Ethan Katz-Bassett. Peering at the Internet’s Frontier: A First Look at ISP Interconnectivity in Africa. In *Passive and Active Network Measurement (PAM)*, 2014.

Research Proposals and Grants

Telemetry-driven Foundation Models for Self-Driving Networks.

Sponsor: Cisco Research
Investigator(s): A. Gupta
Amount: \$ 90k for 1 year.
Awarded: Spring 2024.

netFound: An AI/ML foundational model for Network.

Sponsor: DoE
Investigator(s): A. Gupta and I. Monga (ESnet)
Amount: \$100k GPU and 100k CPU hours for 1 year.
Awarded: Winter 2024.

IMR: MT: NetFlex: A Flexible Scalable & Privacy-Preserving Network Measurement Platform to Iteratively Collect Multi-modal Multi-view Network Data from Access Networks.

Sponsor: NSF
Investigator(s): A. Gupta
Amount: \$ 600k for 2 years.
Awarded: Fall 2023.

IMR: RI-P: Programmable Closed-loop Measurement Platform for Last-Mile Networks.

Sponsor: NSF
Investigator(s): A. Gupta and N. Feamster
Amount: \$ 100k for 2 years.
Awarded: Fall 2022.

IMR: MM-1A: ADDRESS: Augment, Denoise and Debias Crowdsourced Measurements for Statistical Synthesis of Internet Access Characterization.

Sponsor: NSF
Investigator(s): E. Belding, A. Gupta, and M. Gu
Amount: \$ 600k for 3 years.
Awarded: Fall 2022.

CC* Integration-Large: Democratizing Networking Research in the Era of AI/ML.

Sponsor: NSF
Investigator(s): A. Gupta, T. Gupta, E. Belding, and N. Feamster
Amount: \$ 1M for 3 years.
Awarded: Fall 2021.

CC* Integration-Large: Bringing Code to Data: A Collaborative Approach to Democratizing Internet Data Science.

Sponsor: NSF
Investigator(s): R. Durairajan, A. Gupta, R. Rezai, J. Miyake, and D. Teach
Amount: \$ 1M for 3 years.
Awarded: Fall 2021.

Scaling Network Security with PISA Switches.

Sponsor: Verizon
Investigator(s): A. Gupta
Amount: \$ 200k for 2 years.
Awarded: December 2019.

Self-Driving Broadband Networks.

Sponsor: Beegol Inc.
Investigator(s): A. Gupta
Amount: \$ 35k for 1 year.
Awarded: July 2020.

Workshop on Next-G Mobile Security.

Sponsor: NSF

Investigator(s): A. Gupta

Amount: \$ 49k for 1 year.

Awarded: July 2020.

MLWiNS: RL-based Self-driving Wireless Network Management System for QoE Optimization.

Sponsor: NSF & Intel

Investigator(s): A. Gupta (PI), E. Belding, Y. Wang

Amount: \$ 840k for 3 years.

Awarded: July 2020.

Professional Activities

Program Committee Chair

- 2021 ACM SIGCOMM Artifact Evaluation Committee, Virtual
- 2020 ACM SIGCOMM Student Research Competition, Virtual
- 2019 ACM SIGCOMM Workshop on Network Meets AI & ML (NetAI), Beijing, CN

Organizing Committee Chair

- 2023 NSF Workshop on “Bridging the Divide: Answering Internet Policy Questions with Cutting-Edge Network Measurement Algorithms, Datasets, and Platforms”, Berkeley, CA
- 2023 SIGMETRICS Workshop on “Measurements for Self-driving Networks”, Orlando, FL
- 2020 NSF Workshop on NextG Security, Virtual
- 2019 NSF Workshop on “Measurements for Self-driving Networks”, Princeton, NJ

Program Committee Member

- 2024 ACM SIGMETRICS
- 2023-24 ACM SIGCOMM IMC
- 2021-24 USENIX Networked System Design and Implementation (NSDI)
- 2020-21 ACM SIGCOMM
 - 2020 USENIX Networked System Design and Implementation (NSDI)
 - 2019 ACM Conference on Emerging Networking Experiments and Technologies (CoNEXT)
 - 2019 ACM SIGCOMM Symposium on SDN Research (SOSR)
 - 2018 ACM SIGCOMM Workshop on Self-Driving Networks

Organizing Committee Member

- 2018 NSF Workshop on Self-driving Networks, Princeton

Panelist

- 2016 GENI Network Innovators Community Event 2016
- 2016 CITP Conference on Global Internet Interconnection

External Reviewer

- 2019 Privacy Enhancing Technologies Symposium (PETS)
- 2017 ACM SIGCOMM
- 2016 IEEE International Conference on Network Protocol (ICNP)
- 2014 USENIX Networked System Design and Implementation (NSDI)

Teaching

Instructor

- 2020-2024 (New) ML For Networked Systems, (CS 293N), UCSB
- 2020-24 Advanced Topics in Internet Computing, (CS 176C), UCSB
- 2021-23 (New) Programmable Networks, (CS 176B), UCSB
- 2023-24 (New) ML for Networks, (CS 190N), UCSB

Students

Current Ph.D. Students

- Fall 2019 – * Sanjay Chandrasekaran—M-Lab Research Fellowship
- Fall 2021 – * Roman Beltiukov—ACM CCS’22 Best Paper Award Honorable Mention, IRTF’23 Applied Network Research Prize, UCSB CS Summer Fellowship’23
- Fall 2021 – * Punnaal Ismail Khan
- Fall 2022 – * Satyandra Guthula
- Fall 2023 – * Haarika Manda (co-advised by Prof. Belding)—NSF Graduate Research Fellowship (GRFP)
- Fall 2023 – * Jaber Daneshamooz
- Fall 2024 – * Laasya Koduru

Past Ph.D. Students

- Fall 2018 – 23 Udit Paul, UCSB, Ph.D. (co-advised with Prof. Belding)—ACM SIGCOMM Dissertation Award’24, IMC’22 Distinguished Paper Award, UCSB CS Outstanding Publication Award’23, UCSB CS Outstanding Dissertation Award’23

Current MS Students

- Spring 2024 – * Jessica Nguyen
- Fall 2024 – * Sai Vamsi Alisetti
- Fall 2024 – * Abhishek Kumar

Past MS Students

- Fall 2019 – 21 Abtin Bateni
- Fall 2020 – 22 Irene Pattarachanyakul
- Fall 2020 – 22 Rohan Bhatia
- Fall 2021 – 23 Navya Battula
- Fall 2023 – 24 Laasya Koduru