A. Identifying Data

Name: Keith Winstein
Date: March 1, 2024
Title: Associate Professor of Computer Science

B. Academic History

1.	Ph.D. (computer science)	Massachusetts Institute of Technology	June 2014
2.	Electrical Engineer	Massachusetts Institute of Technology	February 2014
3.	M.Eng. in Elec. Eng. and Comp. Sci.	Massachusetts Institute of Technology	February 2005
4.	B.S. in Elec. Eng. and Comp. Sci.	Massachusetts Institute of Technology	June 2004

C. Employment Record

1.	Associate Professor of Computer Science	Stanford University	Sept. 2022 to present
2.	Assistant Professor of Computer Science	Stanford University	Oct. 2014 to Aug. 2022
3.	Postdoctoral Associate	Mass. Inst. of Technology	June 2014 to Oct. 2014
4.	V.P. of Product Management	Ksplice, Inc.	Dec. 2009 to July 2011
5.	Staff Reporter	The Wall Street Journal	Jan. 2007 to Dec. 2009

D. Professional Activities

	Activity	*Organization/event*
1.	SIG board member	SIGCOMM (2023–)
2.	Steering-committee member	HotNets (2021–)
3.	Program-committee member	NSDI 2023
4.	Program-committee member	HotNets 2022
5.	Review-panel member	NSF CISE/CNS panel (Oct. 2021)
6.	Program-committee member	IAB Workshop on Measuring Network Quality for End-Users (2021)
7.	Program-committee member	SIGCOMM 2021
8.	External reviewer	HotNets 2020
9.	Organizing-committee member	SIGCOMM Education Workshop and Community Discussion (2020)
10.	Program-committee member	ACM Symposium on Cloud Computing (SoCC 2020)
11.	Review-panel member	NSF CISE/CNS panel (March 2020)
12.	Program-committee member	NSDI 2020
13.	Program-committee member	Workshop on Buffer Sizing 2019
14.	External reviewer	MobiCom 2019
15.	Program-committee member	SIGCOMM 2019
16.	Publications co-chair	SIGCOMM 2019
17.	Extended review committee	USENIX Annual Technical Conference 2019
18.	Program-committee member	NSDI 2019
19.	Program-committee member	SIGCOMM 2018
20.	Workshop organizer	NSF Workshop "Toward a Research Agenda for Cloud 3.0" (Jan. 2018)
21.	Program-committee member	NSDI 2018
22.	Program-committee member	HotNets 2017
23.	External reviewer	IMC 2017
24.	Program-committee member	SIGCOMM 2017
25.	Conference scribe coordinator	SIGCOMM 2015, 2016, 2017; HotNets 2013, 2014; NSDI 2013
26.	Judge	ACM Student Research Competition at SIGCOMM 2017
27.	Mentor	N2Women Workshop at SIGCOMM 2017
28.	Program-committee member	CoNEXT 2016
29.	Program-committee member	SIGCOMM 2016

30.	Program-committee member	CoNEXT 2015
31.	Program-committee member	SIGCOMM 2015
32.	External reviewer	NSDI 2015
33.	Program-committee member	HotNets 2014
34.	External reviewer	NSDI 2013
35.	Program-committee member	SIGCOMM 2012 workshop on MedCOMM

E. University and Departmental Service

Within computer science department:

2023-24	Faculty search committee
	Curriculum committee
2022-23	M.S. admissions committee
	Curriculum committee
	Reappointment committee
2021-22	M.S. admissions committee
	New-building committee
	Assistant Prof. (Teaching) appt. committee
	Breadth requirement revision committee
2020–21	M.S. admissions committee
	New-building committee
	Assistant Prof. (Teaching) appt. committee
2019–20	M.S. admissions committee
	Curriculum committee
2018–19	Ph.D. admissions committee
	Curriculum committee
2017–18	Prof. of CS Education search committee
	Ph.D. admissions committee
	Curriculum committee
	"Student CS Experience in 2027" committee
2016–17	Ph.D. admissions committee
	Curriculum committee
	Lecturer search committee
2015–16	Ph.D. admissions committee
	Curriculum committee
2014–15	Ph.D. admissions committee

Outside computer science department:

1.	Steering Committee, COLLEGE 102 "Citizenship in the 21st Century"	2023–
2.	Faculty Steering Committee, Haas Center for Public Service	2022–
3.	Advisory committee, Stanford Cyber Initiative	2017–19

F. Awards and Honors

	Award	Year
1.	Applied Networking Research Prize (awarded to paper: "Learning in situ: a randomized experiment in video streaming")	2021
2.	NSF CAREER Award	2021
3.	ACM SIGCOMM Rising Star Award	2020

4.	Usenix NSDI Community Award (for "Learning *in situ*: a randomized experiment in video streaming")	2020
5.	Applied Networking Research Prize (awarded to paper "Salsify: Low-Latency Network Video through Tighter Integration between a Video Codec and a Transport Protocol")	2020
6.	Sloan Research Fellowship	2019
7.	Usenix ATC Best Paper Award (for "Pantheon: the training ground for Internet congestion-control research")	2018
8.	Usenix NSDI Community Award (for "The Design, Implementation, and Deployment of a System to Transparently Compress Hundreds of Petabytes of Image Files for a File-Storage Service")	2017
9.	Google Faculty Research Award	2017
10.	Facebook Faculty Award	2016
11.	Google Faculty Research Award	2015
12.	ACM SIGCOMM Doctoral Dissertation Award	2015
13.	MIT George M. Sprowls Award for outstanding PhD thesis in CS	2014
14.	Applied Networking Research Prize (for "Stochastic Forecasts Achieve High Throughput and Low Delay over Cellular Networks")	2014

G. Bibliographical Information

Publications

Customary practice for order of authors in computer systems and networking: students are named in decreasing order of contribution, followed by advisors.

Refereed Journal Publications

1. Z. Niu, Q. Su, P. Cheng, Y. Xiong, D. Han, K. Winstein, C. Xue and H. Xu, "NetKernel: Making Network Stack Part of the Virtualized Infrastructure," in IEEE/ACM Transactions on Networking, vol. 30, no. 3, pp. 999-1013 (June 2022).
2. **L. Hsiao**, B. Krajancich, P. Levis, G. Wetzstein and K. Winstein, "Towards Retina-Quality VR Video Streaming: 15ms Could Save You 80% of Your Bandwidth," *Computer Communication Review* 52, 1 (January 2022).
3. T. Li, K. Zheng, K. Xu, R. Jadhav, T. Xiong, K. Winstein and K. Tan, "Revisiting Acknowledgment Mechanism for Transport Control: Modeling, Analysis, and Implementation," in *IEEE/ACM Transactions on Networking*, DOI: 10.1109/TNET.2021.3101011.
4. D. Schroeder, J. Dowdeswell, M. Siegert, R. Bingham, W. Chu, E. MacKie, M. Siegfried, K. Vega, **J. Emmons** and K. Winstein, "Multidecadal observations of the Antarctic ice sheet from restored analog radar records," *Proc. National Academy of Sciences* Sep 2019, 201821646; DOI: 10.1073/pnas.1821646116.
5. A. Sivaraman, K. Winstein, P. Varley, S. Das, J. Ma, A. Goyal, J. Batalha and H. Balakrishnan, "Protocol Design Contests," *Computer Communication Review* 44, 3 (July 2014), 38–44.

Refereed Conference/Symposia Proceedings

1. **G. Yuan,** M. Sotoudeh, D. Zhang, M. Welzl, D. Mazières and K. Winstein, "Sidekick: In-Network Assistance for Secure End-to-End Transport Protocols," USENIX Symposium on Networked Systems Design and Implementation (NSDI '24), Santa Clara, Calif., 2024.

2. **Y. Deng**, **A. Montemayor**, A. Levy and K Winstein, "Computation-Centric Networking," A*CM Workshop on Hot Topics in Networks (HotNets '22)*, Austin, Texas, 2022.

3. **G. Yuan**, D.K. Zhang, M. Sotoudeh, M. Welzl and K. Winstein, "Sidecar: in-network performance enhancements in the age of paranoid transport protocols," A*CM Workshop on Hot Topics in Networks (HotNets '22)*, Austin, Texas, 2022.

4. **S. Fouladi**, B. Shacklett, F. Poms, A. Arora, A. Ozdemir, D. Raghavan, P. Hanrahan, K. Fatahalian and K. Winstein, "R2E2: Low-Latency Path Tracing of Terabyte-Scale Scenes using Thousands of Cloud CPUs," ACM Trans. Graph., Vol. 41, No. 4 (SIGGRAPH 2022).

5. K. Winstein, "Five Observations on Measuring Network Quality for Users of Real-Time Media Applications," Internet Architecture Board (IAB) Workshop on Measuring Network Quality for End-Users, Sept. 2021.

6. **C. Josephson**, M. Kotaru, K. Winstein, S. Katti and R. Chandra, "Low-cost In-ground Soil Moisture Sensing with Radar Backscatter Tags," *ACM SIGCAS Conference on Computing and Sustainable Societies* (*COMPASS '21*).

7. T. Li, K. Zheng, K. Xu, R. Jadhav, T. Xiong, K. Winstein and K. Tan, "TACK: Improving Wireless Transport Performance by Taming Acknowledgments," *ACM SIGCOMM 2020*, New York, N.Y., 2020.

8. Z. Niu, H. Xu, P. Cheng, Q. Su, Y. Xiong, T. Wang, D. Han and K. Winstein, "NetKernel: Making Network Stack Part of the Virtualized Infrastructure," *USENIX Annual Technical Conference*, Boston, Mass., 2020.

9. **F. Yan**, H. Ayers, C. Zhu, **S. Fouladi**, J. Hong, K. Zhang, P. Levis and K. Winstein, "Learning *in situ*: a randomized experiment in video streaming," *USENIX Symposium on Networked Systems Design and Implementation (NSDI '20)*, Santa Clara, Calif., 2020.

10. **J. Emmons**, **S. Fouladi**, G. Ananthanarayanan, S. Venkataraman, S. Savarese and K. Winstein, "Cracking open the DNN black-box: Video Analytics with DNNs across the Camera-Cloud Boundary," *Workshop on Hot Topics in Video Analytics and Intelligent Edges (HotEdgeVideo '19)*, Los Cabos, Mexico, 2019.

11. **S. Fouladi**, F. Romero, **D. Iter**, Q. Li, S. Chatterjee, C. Kozyrakis, M. Zaharia and K. Winstein, "From Laptop to Lambda: Outsourcing Everyday Jobs to Thousands of Transient Functional Containers," *USENIX Annual Technical Conference*, Renton, Wash., 2019.

12. K. Alpernas, C. Flanagan, **S. Fouladi**, L. Ryzhyk, M. Sagiv, T. Schmitz and K. Winstein, "Secure Serverless Computing Using Dynamic Information Flow Control," *ACM Object-Oriented Programming, Systems, Languages & Applications (OOPSLA)*, Boston, Mass., 2018.

13. **F. Yan**, **J. Ma**, **G. Hill**, D. Raghavan, **R. Wahby**, P. Levis and K. Winstein, "Pantheon: the training ground for Internet congestion-control research," *USENIX Annual Technical Conference*, Boston, Mass., 2018.

14. **S. Fouladi**, **J. Emmons**, **E. Orbay**, **C. Wu**, **R. Wahby** and K. Winstein, "Salsify: low-latency network video through tighter integration between a video codec and a transport protocol," *USENIX Symposium on Networked Systems Design and Implementation (NSDI '18)*, Renton, Wash., 2018.

15. **D. Kogan**, **H. Stern**, A. Tolbert, D. Mazières and K. Winstein, "The Case For Secure Delegation," *ACM Workshop on Hot Topics in Networks (HotNets '17)*, Palo Alto, Calif., 2017.

16. M. Schapira and K. Winstein, "Congestion-Control Throwdown," *ACM Workshop on Hot Topics in Networks (HotNets '17)*, Palo Alto, Calif., 2017.

17. Z. Niu, H. Xu, D. Han, P. Cheng, Y. Xiong, G. Chen and K. Winstein, "Network Stack as a Service in the Cloud," *ACM Workshop on Hot Topics in Networks (HotNets '17)*, Palo Alto, Calif., 2017.

18. Y. Lu, A. Cavallaro, C. Crump, G. Friedland and K. Winstein, "Privacy Protection in Online Multimedia," *ACM Multimedia '17*, 2017.

19. J. Wilson**, R. Wahby**, H. Corrigan-Gibbs**,** D. Boneh, P. Levis and K. Winstein, "Trust but Verify: Auditing the Secure Internet of Things," *Annual International Conference on Mobile Systems, Applications, and Services (MobiSys '17)*, Niagara Falls, N.Y., 2017.

20. **S. Fouladi**, **R. Wahby**, **B. Shacklett**, K. Balasubramaniam, **W. Zeng**, R. Bhalerao, A. Sivaraman, G. Porter and K. Winstein, "Encoding, Fast and Slow: Low-Latency Video Processing Using Thousands of Tiny Threads," *USENIX Symposium on Networked Systems Design and Implementation (NSDI '17)*, Boston, Mass., 2017.

21. D. Horn, K. Elkabany, C. Lesniewski-Laas and K. Winstein, "The Design, Implementation, and Deployment of a System to Transparently Compress Hundreds of Petabytes of Image Files for a File-Storage Service," *USENIX Symposium on Networked Systems Design and Implementation (NSDI '17)*, Boston, Mass., 2017.

22. A. Levy, J. Hong, L. Riliskis, P. Levis and K. Winstein, "Beetle: Flexible Communication for Bluetooth Low Energy," *Annual International Conference on Mobile Systems, Applications, and Services (MobiSys '16)*, Singapore, 2016.

23. R. Netravali, A. Sivaraman, S. Das, A. Goyal, K. Winstein, J. Mickens and H. Balakrishnan, "Mahimahi: Accurate Record-and-Replay for HTTP," *USENIX Annual Technical Conference*, Santa Clara, Calif., 2015.

24. A. Sivaraman, K. Winstein, P. Thaker and H. Balakrishnan, "An Experimental Study of the Learnability of Congestion Control," *ACM SIGCOMM 2014*, Chicago, Ill., 2014.

25. A. Sivaraman, K. Winstein, S. Subramanian and H. Balakrishnan, "No Silver Bullet: Extending SDN to the Data Plane," *ACM Workshop on Hot Topics in Networks (HotNets '13)*, College Park, Md., 2013.

26. K. Winstein and H. Balakrishnan, "TCP ex Machina: Computer-Generated Congestion Control," *ACM SIGCOMM 2013*, Hong Kong, China, 2013.

27. K. Winstein, A. Sivaraman and H. Balakrishnan, "Stochastic Forecasts Achieve High Throughput and Low Delay over Cellular Networks," *USENIX Symposium on Networked Systems Design and Implementation (NSDI '13)*, Lombard, Ill., 2013.

28. K. Winstein and H. Balakrishnan, "Mosh: An Interactive Remote Shell for Mobile Clients," *USENIX Annual Technical Conference*, Boston, Mass., June 2012.

29. K. Winstein and H. Balakrishnan, "End-to-End Transmission Control by Modeling Uncertainty about the Network State," *ACM Workshop on Hot Topics in Networks (HotNets '11), Cambridge, Mass., 2011.*

Non-refereed Publications

1. M. Rau, K. Winstein, S. Porter, S. Petersen and J. Kaneda, "Stagecast: Experiments in Performance + Technology" (production program), March 2021.

2. **S. Fouladi**, F. Romero, **D. Iter**, Q. Li, **A. Ozdemir**, S. Chatterjee, C. Kozyrakis, M. Zaharia and K. Winstein, "Outsourcing Everyday Jobs to Thousands of Cloud Functions with gg," *;login: magazine*, Usenix Assoc., 2019.
3. A. Akella, G. Porter and K. Winstein (orgs.), "NSF Cloud 3.0 Workshop Report," June 2018, *http://pages.cs.wisc.edu/~akella/cloud3workshopreport.pdf*
4. K. Winstein, "Introducing the 'right to eavesdrop on your things,'" *The Agenda*, Politico, 2015.
5. K. Winstein and H. Balakrishnan, "Mosh: A State-of-the-Art Good Old-Fashioned Mobile Shell," *;login: magazine*, Usenix Assoc., 2012.
6. R. Riemann and K. Winstein, "Improving 802.11 Range with Forward Error Correction," *MIT CSAIL A.I. Memo 2005-004*, 2003.

Non-refereed pre-print servers

1. **E. Marx**, **F. Yan** and K. Winstein, "Implementing BOLA-BASIC on Puffer: Lessons for the use of SSIM in ABR logic," arXiv:2011.09611, Nov. 19, 2020.
2. H. Corrigan-Gibbs and K. Winstein, "Some of the Math in the November 8, 2014 Draft of 'Challenging the Randomness of Panel Assignment in the Federal Courts of Appeals,' Including the Bottom-Line Statistical Analysis, is Incorrect," SSRN #2526494, Nov. 17, 2014.

<u>Presentations</u>

Invited Plenary Talks and Distinguished Lectures

1. "Four Steps to the Apocalypse," MIT CSAIL 20/60 Anniversary Celebration, Cambridge, Mass., June 26, 2023.
2. Keynote (SIGCOMM Rising Star Award presentation), *ACM CoNEXT 2020*, Barcelona, Spain (virtual conference), Dec. 2, 2020.
3. Keynote, *ACM SIGCOMM 2020 Workshop on Hot Topics in Video Analytics and Intelligent Edges (HotEdgeVideo 2020)*, New York, N.Y. (virtual conference), Aug. 10, 2020.
4. Keynote, *Bay Area Security Research Summit*, San Francisco, Calif., April 8, 2016.

Other Invited Presentations (selected)

1. "The future of serverless is computation," *Microsoft Research Summit* (virtual event), Oct. 21, 2021.
2. "The bigger picture, looking forward" (panelist), *ACM SIGCOMM Education Workshop and Community Discussion*, Aug. 6, 2020.
3. Moderator, "Is there a buffer sizing problem?" (panel discussion), *Workshop on Buffer Sizing*, Stanford, Calif., Dec. 2, 2019.
4. "Course functions for codecs, compilation, and (maybe) soon everything," *IFIP Working Group 2.8 on Functional Programming*, Bordeaux, France, May 20, 2019.
5. "The Good, the Bad, and the Ugly of ML for Networked Systems," *Microsoft Research Faculty Summit*, Renton, Wash., Aug. 1, 2018.
6. "Congestion-Control Throwdown" (with M. Schapira), *ACM Workshop on Hot Topics in Networks (HotNets '17)*, Palo Alto, Calif., Dec. 1, 2017.
7. "Transport Architectures for the Developing World," *Microsoft Research Faculty Summit*, Seattle, Wash., July 14, 2016.

8. "Deprogramming Gender Bias" (panelist), *Medallia workshop*, Palo Alto, Calif., Nov. 5, 2015.

Patents

Patents Issued
1. D. Horn, K. Elkabany and K. Winstein, "Lossless compression of digital images using prior image context," U.S. Patent No. 11,716,476 (issued Aug. 1, 2023).
2. D. Horn, K. Elkabany and K. Winstein, "Lossless compression of digital images using prior image context," U.S. Patent No. 11,343,514 (issued May 24, 2022).
3. D. Horn, K. Elkabany and K. Winstein, "Digital image recompression," U.S. Patent No. 10,701,374 (issued June 30, 2020).
4. D. Horn, K. Elkabany and K. Winstein, "Digital image recompression," U.S. Patent No. 10,171,820 (issued Jan. 1, 2019).
5. D. Horn, K. Elkabany and K. Winstein, "Digital image recompression," U.S. Patent No. 9,832,475 (issued Nov. 28, 2017).
6. D. Horn, K. Elkabany and K. Winstein, "Techniques for image recompression," U.S. Patent No. 9,712,830 (issued July 18, 2017).

Patents under consideration
1. D. Horn, K. Elkabany and K. Winstein, "Lossless decompression of digital images using prior image context," U.S. Patent App. Pub. No. US 2023/0345014 A1 (published Oct. 26, 2023).

Students

PhD students

Current PhD Student
Yuhan Deng

Current PhD Student
Akshay Srivatsan (co-advised by Dawson Engler)

Current PhD Student
Colin Drewes (co-advised by Caroline Trippel)

Current PhD Student
Gina Yuan (co-advised by David Mazières and Matei Zaharia)

Former PhD Student
Sadjad Fouladi
Thesis: "Tiny Functions at Large Scale: New Systems for Interactive Computing"
Graduated: 2021

Former PhD Student
Francis Yan (co-advised by Philip Levis)
Thesis: "Practical Machine Learning for Sequential Decision Problems on the Internet"

Graduation year: 2020

Former PhD Student
Colleen Josephson (co-advised by Sachin Katti)
Thesis: "Exploring low-power ubiquitous sensing using RF backscatter"
Graduated: 2020

Former PhD Student
Luke Hsiao (co-advised by Philip Levis)
Thesis: "Creating Hardware Component Knowledge Bases from PDF Datasheets"
Graduated: 2021

Former PhD Student
Riad S. Wahby (co-advised by Dan Boneh)
Thesis: "Concretely Efficient Interactive Proofs and their Applications"
Graduated: 2021

Former PhD Student
John Emmons (co-advised by Silvio Savarese)
On leave starting: 2018

Former PhD Student
Gregory Hill
On leave starting: 2017

Postdoctoral researchers supervised

Former
Sadjad Fouladi
Appointed: Oct. 2021 through Feb. 2022

Masters students supervised (with publications)

Former
Angela Montemayor
Graduated: 2023

Former
Emily Marx
Graduated: 2020

Former
Jestin Ma
Graduated: 2019

Former

Dan Iter
Graduated: 2018

Former
Henri Stern
Graduated: 2018

Former
Emre Orbay
Graduated: 2018

Undergraduate students supervised (with publications)

Former
Brennan Shacklett
Graduation: 2018

Former
William Zeng
Graduation: 2018

High-school students supervised (with publications)

Former
Catherine Wu (Saratoga High School)
Graduation: 2019