

Martin J. Strauss

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Work Address:

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Research Interests

- Sustainable Energy.
- Fundamental algorithms, especially randomized and approximation algorithms.
- Algorithms for massive data sets.
- Signal processing and computational harmonic analysis.
- Computer security and cryptography.
- Complexity theory.

Pedagogical Interests

- Manipulative Mathematics (teaching via pipe cleaners, paper folding and other mutilation, etc.)
- Kinesthetic Mathematics (teaching through movement, including acting out algorithms, permutations, and other transformations).

Education

- Ph.D., Mathematics, Rutgers University, October 1995. Thesis title: *Measure in Feasible Complexity Classes*. Advisor: Prof. E. Allender, Dept. of Computer Science.
- A.B. *summa cum laude*, Mathematics, Columbia University, May 1989. Minor in Computer Science.

Employment History

- Professor, Dept. of Mathematics and Dept. of Electrical Engineering and Computer Science (jointly appointed), University of Michigan, 2011–present.
- Associate Professor, Dept. of Mathematics and Dept. of Electrical Engineering and Computer Science (jointly appointed), University of Michigan, 2008–2011.
- Assistant Professor, Dept. of Mathematics and Dept. of Electrical Engineering and Computer Science (jointly appointed), University of Michigan, 2004–2008.
- Visiting Associate Research Scholar, Program in Applied and Computational Mathematics, Princeton University, Sept. 2006–Feb. 2007.

- Principal investigator, AT&T Laboratories—Research, 1997–2004. Most recent position: Principal Technical Staff Member, Internet and Network Systems Research Center.
- Consultant, Network Services Research Center, AT&T Laboratories, 1996.
- Post-Doctoral Research Associate, Department of Computer Science, Iowa State University, September 1995–May 1996.
- Intern. Speech recognition group, IBM Watson Research Center, summers, 1989–1990.
- Intern. Physics, AT&T Bell Laboratories, summers, 1986–1987.

Additional Billable Projects and Teaching

- Contractor, SciTec, image processing project under NSF STTR. (See Grants, below.)
- Teacher, Michigan Math and Science Scholars, and Epsilon Camp (see below.)
- Consultant, L3 Communications, ~2010. Wrote MATLAB code to speed up image processing tasks.
- Teacher in Michigan Math and Science Scholars, Summers 2012–2014 (expected); see below.
- Multidisciplinary Design Program, University of Michigan, 2014. Supervised a team of six engineering undergraduates with different majors, as they design an energy-harvesting insole pedometer.

Refereed Journal Publications

- Anna C. Gilbert, Yi Li, Ely Porat, Martin J. Strauss: Approximate Sparse Recovery: Optimizing Time and Measurements. *SIAM J. Comput.* 41(2): 436-453 (2012).
- Radu Berinde, Graham Cormode, Piotr Indyk, Martin J. Strauss. Space-optimal Heavy Hitters with Strong Error Bounds. *ACM Transactions on Database Systems*, vol. 35, issue 4, 2010, pages 26:1–26:28.
- Yuval Ishai, Tal Malkin, Martin J. Strauss, Rebecca N. Wright. Private multiparty sampling and approximation of vector combinations. *Theor. Comput. Sci.* 410(18): 1730–1745 (2009).
- M. A. Iwen, A. C. Gilbert, M. J. Strauss. Empirical evaluation of a sub-linear time sparse DFT algorithm, *Communications in Mathematical Sciences*, vol. 5, no. 4, 2007, pp. 981–998.
- A. C. Gilbert and M. J. Strauss, Group testing in statistical signal recovery. *Technometrics*, vol. 49, no. 3, August, 2007, pp. 346–356.
- X. Shi, L. A. Adamic, and M. J. Strauss. Networks of Strong Ties. *Physica A: Statistical Mechanics and its Applications*, Volume 378, Issue 1, pp. 33–47, 1 May 2007.
- J. Feigenbaum, Y. Ishai, T. Malkin, K. Nissim, M. Strauss, R. Wright. Secure Multiparty Computation of Approximations. *Transactions on Algorithms*, pp. 435–472, 2006.
- E. Cohen and M. Strauss. Maintaining Time-Decaying Stream Aggregates, *Journal of Algorithms*, 59(1) 19–36, 2006.
- J. Zou, A. Gilbert, M. Strauss, and I. Daubechies. Theoretical and Experimental Analysis of a Randomized Algorithm for Sparse Fourier Transform Analysis. *Journal of Computational Physics*, (211):2, 572–595, 2006.

- A. C. Gilbert, M. J. Strauss, and J. Tropp. Algorithms for simultaneous sparse approximation. Part I: Greedy pursuit. Special issue on sparse approximations in signal and image processing of *EURASIP J. Signal Processing*, Vol. 86, April, 2006, pp. 572–588.
- J. Fong, A. Gilbert, S. Kannan, and M. Strauss, Better alternatives to OSPF routing, Special issue of *Algorithmica* on network design, 43(1–2) 113–131, 2005.
- A. C. Gilbert, Y. Kotidis, S. Muthukrishnan, and M. Strauss, Domain-driven data synopses for dynamic quantiles, *IEEE Transactions on Knowledge and Data Engineering*, 17(7): 927–938, 2005.
- A. C. Gilbert, Y. Kotidis, S. Muthukrishnan, and M. J. Strauss, One-pass wavelet decompositions of data streams, *IEEE Transactions on Knowledge and Data Engineering*, vol. 15, no. 3, 2003, pp. 541–554.
- J. Feigenbaum, S. Kannan, M. Strauss, and M. Vishwanathan, Testing and spot-checking data streams. *Algorithmica*, 34(1): 67–80, 2002.
- J. Feigenbaum, S. Kannan, M. Strauss, and M. Vishwanathan. An Approximate L1-Difference Algorithm for Massive Data Streams. *SIAM J. Comput.*, 32(1): 131–151, 2002.
- J. Fong and M. Strauss. An Approximate Lp-Difference Algorithm for Massive Data Streams. *Discrete Mathematics and Theoretical Computer Science* (2): 301–322, 2001.
- H. Buhrman, D. van Melkebeek, K. Regan, D. Sivakumar and M. Strauss, A generalization of resource-bounded measure, with an application to the BPP vs. EXP problem. *SIAM J. Comput.* 30(2): 576–601, 2000.
- M. Blaze, J. Feigenbaum, P. Resnick, and M. Strauss. Managing trust in an information-labeling system. *European Transactions on Telecommunications*, 1997.
- Y.-H. Chu, J. Feigenbaum, B. LaMacchia, P. Resnick, M. Strauss, REFEREE: trust management for web applications, *World Wide Web Journal*, 2 1997, pages 127–139. (Reprinted from Proc. 6th International World Wide Web Conference, World Wide Web Consortium, Cambridge 1997, pages 227–238.)
- M. Strauss, Measure on P: strength of the Notion, *Information and Computation*, 136(1), 1997, pages 1–23.
- M. Strauss, Normal numbers and sources for BPP. *Theoretical Computer Science*, Vol. 178, Number 1-2, 1997 pages 155–169.
- J. Chelikowsky, J. Phillips, M. Kamal and M. Strauss, Surface and thermodynamic interatomic force fields for silicon clusters and bulk phases, *Physical Review Letters*, v. 62 **3** 1989, pages 292–295.

Refereed Conference Publications¹

- Anna C. Gilbert, Yi Li, Ely Porat, Martin J. Strauss: For-All Sparse Recovery in Near-Optimal Time. ICALP (1) 2014: 538–550.
- Anna C. Gilbert, Hung Q. Ngo, Ely Porat, Atri Rudra, Martin J. Strauss: ℓ_2/ℓ_2 -Foreach Sparse Recovery with Low Risk. ICALP (1) 2013: 461–472.

¹The average acceptance rates for a number of conferences where I have published papers, during the period of many of my publications, are: VLDB 17%, PODS 22%, STOC 27% , SODA 30%, and ICASSP 50%.

- Petros Boufounos, Volkan Cevher, Anna C. Gilbert, Yi Li, Martin J. Strauss: What's the Frequency, Kenneth?: Sublinear Fourier Sampling Off the Grid. APPROX-RANDOM 2012: 61-72.
- Ely Porat, Martin J. Strauss: Sublinear time, measurement-optimal, sparse recovery for all. SODA 2012: 1215-1227.
- Brett Hemenway, Rafail Ostrovsky, Martin J. Strauss, Mary Wootters: Public Key Locally Decodable Codes with Short Keys. APPROX-RANDOM 2011: 605-615.
- Xiangming Kong, Peter Petre, Roy Matic, Anna Gilbert, Martin Strauss. An analog-to-information converter for wideband signals using a time encoding machine, in *Proceedings of Digital Signal Processing Workshop and IEEE Signal Processing Education Workshop (DSP/SPE)*, 2011, pages 414-419.
- Anna C. Gilbert, Y. Li, E. Porat, and M. Strauss. Approximate Sparse Recovery: Optimizing Time and Measurements. *Symposium on Theory of Computing (STOC)*, 2010, 475-484.
- Volkan Cevher, Petros Boufounos, Richard G. Baraniuk, Anna C. Gilbert, Martin J. Strauss: Near-optimal Bayesian localization via incoherence and sparsity. ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN) 2009: 205-216
- Radu Berinde, Graham Cormode, Piotr Indyk, Martin J. Strauss. Space-optimal heavy hitters with strong error bounds. *Transactions of Principles of Database Systems (PODS)* 2009: 157-166.
- Radu Berinde, Anna Gilbert, Piotr Indyk, Howard Karloff, and Martin Strauss. Combining Geometry and Combinatorics: A Unified Approach to Sparse Signal Recovery. Proceedings of Allerton Conference, 2008.
- Joe Kilian, André Madeira, Martin J. Strauss, Xuan Zheng. Fast Private Norm Estimation and Heavy Hitters. *Theoretical Cryptography Conference*, 2008, 176-193.
- Ray Maleh, Anna C. Gilbert, and Martin J. Strauss. Sparse gradient image reconstruction done faster. International Conference on Image Processing ICIP (2) 2007: 77-80.
- Yuval Ishai, Tal Malkin, Martin J. Strauss and Rebecca N. Wright. Private Multiparty Sampling and Approximation of Vector Combinations. In *International Colloquium on Automata, Languages and Programming (ICALP)*, 2007, 243-254.
- A. Gilbert, M. Strauss, J. Tropp, and R. Vershynin. One sketch for all: Fast algorithms for compressed sensing. In *Symposium on Theory of Computing (STOC)*, 2007, 237-246.
- M. Iwen, G. Mandair, M. Morris, and M. Strauss. Fast Line-based Imaging of Small Sample Features. International Conference on Acoustics, Speech, and Signal Processing (ICASSP), poster, 2007.
- A. C. Gilbert, M. J. Strauss, J. A. Tropp, and R. Vershynin. Algorithmic linear dimension reduction in the ℓ_1 norm for sparse vectors. Invited paper, special session on "Compressed Sensing" in Proceedings of the 44th Annual Allerton Conference on Communication, Control and Computing, Allerton, September 2006.
- S. Muthukrishnan, M. Strauss, and X. Zheng. Workload-Optimal Histograms on Streams. European Symposium on Algorithms (ESA) conference, 734-745, 2005.

- A. C. Gilbert, S. Muthukrishnan, and M. Strauss, Improved Time Bounds for Near-Optimal Sparse Fourier Representations. Wavelets XI conference, part of SPIE’s International Symposium on Optical Science and Technology, 2005.
- A. R. Calderbank, A. Gilbert, K. Levchenko, S. Muthukrishnan, and M. Strauss. Improved Range-Summable Random Variable Construction Algorithms. Symposium on Discrete Algorithms (SODA), 840–849, 2005.
- J. Tropp, A. C. Gilbert, and M. J. Strauss. Simultaneous sparse approximation via greedy pursuit. Invited paper for the special session “Sparse representation in signal processing,” *Proc. of the 2005 IEEE Intl Conf on Acoustics, Speech, and Signal Processing (ICASSP)*, March, 2005.
- S. Muthukrishnan and Martin Strauss. Maintenance of Multidimensional Histograms. *Foundations of Software Technology and Theoretical Computer Science*, 352–362, 2003.
- A. C. Gilbert, S. Muthukrishnan, and M. J. Strauss, and J. Tropp. Improved sparse approximation over quasi-coherent dictionaries. *Proc. of Intl conf on Image Processing (ICIP)*, 37–40, 2003.
- A. Gilbert, S. Muthukrishnan, and M. Strauss. Approximation of Functions over Redundant Dictionaries Using Coherence. Symposium on Discrete Algorithms (SODA), 243–252, 2003.
- S. Muthukrishnan and M. Strauss. Rangesum Histograms. Symposium on Discrete Algorithms (SODA), 233–242, 2003.
- E. Cohen and M. Strauss. Maintaining Stream Statistics with Decay. Principles of Database Systems (PODS) conference, 223–233, 2003. Expanded version, Maintaining Time-Decaying Stream Aggregates, in *Journal of Algorithms*.
- S. Guha, P. Indyk, S. Muthukrishnan, and M. Strauss. Histogramming Data Streams with Fast Per-Item Processing. International Colloquium on Automata, Languages and Programming (ICALP) conference, 681–692, 2002.
- A. Gilbert, Y. Kotidis, S. Muthukrishnan, and M. Strauss. How to Summarize the Universe: Dynamic Maintenance of Quantiles. Conference on Very Large Data Bases (VLDB), 454–465, 2002.
- A. Gilbert, S. Guha, P. Indyk, S. Muthukrishnan, and M. Strauss. Near-Optimal Sparse Fourier Representations via Sampling. Symposium on Theory of Computing (STOC), 152–161, 2002.
- A. Gilbert, S. Guha, P. Indyk, Y. Kotidis, S. Muthukrishnan, and M. Strauss. Fast, Small-Space Algorithms for Approximate Histogram Maintenance. Symposium on Theory of Computing (STOC), 389–398, 2002.
- A. Gilbert, Y. Kotidis, S. Muthukrishnan, and M. Strauss. Surfing Wavelets on Streams: One-Pass Summaries for Approximate Aggregate Queries. Very Large Data Bases (VLDB), 79–88, 2001.
- A. Gilbert, Y. Kotidis, S. Muthukrishnan, and M. Strauss. Optimal and Approximate Computation of Summary Statistics for Range Aggregates. 227–236, Principles of Database Systems (PODS) conference, 2001.

- J. Feigenbaum, Y. Ishai, T. Malkin, K. Nissim, M. Strauss, R. Wright. Secure Multiparty Computation of Approximations. International Colloquium on Automata, Languages and Programming (ICALP), 927–938, 2001.
- J. Fong and M. Strauss. An Approximate L_p -Difference Algorithm for Massive Data Streams. Symposium on Theoretical Aspects of Computer Science (STACS) conference, 193–204, 2000.
- J. Lutz and M. Strauss, Bias invariance of small upper spans. Symposium on Theoretical Aspects of Computer Science (STACS) conference, 74–86, 2000.
- J. Feigenbaum, S. Kannan, M. Strauss, and M. Vishwanathan, Testing and spot-checking data streams. Symposium on Discrete Algorithms (SODA), 165–174, 2000.
- J. Feigenbaum, S. Kannan, M. Strauss, and M. Vishwanathan. An Approximate L_1 -Difference Algorithm for Massive Data Streams. Foundations of Computer Science (FOCS) conference, 501–511, 1999.
- W. Aiello, A. Rubin, and M. Strauss. Using smartcards to secure a personalized gambling device. Computer and Communication Security (CCS) conference, 128–137, 1999.
- H. Kaplan, M. Strauss, M. Szegedy: Just the Fax–Differentiating Voice and Fax Phone Lines Using Call Billing Data. Symposium on Discrete Algorithms (SODA) 935–936, 1999.
- M. Blaze, G. Bleumer and M. Strauss. Protocol divertibility and atomic proxy cryptography. Eurocrypt conference, 127–144, 1998.
- M. Blaze, J. Feigenbaum and M. Strauss. Compliance checking in the PolicyMaker trust management system. 254–274, Financial Cryptography conference, 1998.
- H. Buhrman, D. van Melkebeek, K. Regan, D. Sivakumar and M. Strauss, A generalization of resource-bounded measure, with an application to the BPP vs. EXP problem. Symposium on Theoretical Aspects of Computer Science (STACS) conference, 129–138, 1998.
- J. Feigenbaum and M. Strauss, An information-theoretic treatment of random-self-reducibility, Symposium on Theoretical Aspects of Computer Science (STACS) conference, 523–534, 1997.
- J.-Y. Cai, D. Sivakumar, and M. Strauss. Constant-depth circuits and the Lutz hypothesis. FOCS, 595–604, 1997.
- M. Strauss, Normal numbers and sources for BPP. Symposium on Theoretical Aspects of Computer Science (STACS) conference, 515–526, 1995.
- E. Allender and M. Strauss. Measure on P: Robustness of the notion. Mathematical Foundations of Computer Science (MFCS) Conference, 129–138, 1995.
- E. Allender and M. Strauss. Measure on small complexity classes with applications for BPP. FOCS, 807–818, 1994.

Refereed Workshop Publications

- A. Gilbert, B. Hemenway, M. Strauss, D. Woodruff, and M. Wootters: Reusable Low-Error Compressive Sampling Schemes Through Privacy. Statistical Signal Processing 2012. (Reviewed poster.)

- Y. Massoud, S. Pfetsch, T. Ragheb, J. Laska, H. Nejati, A. Gilbert, M. Strauss, R. Baraniuk. On the feasibility of hardware implementation of sub-Nyquist random-sampling based analog-to-information conversion. In *Proceedings of IEEE International Symposium on Circuits and Systems (ISCAS)*, 2008.
- A. C. Gilbert, M. J. Strauss. Fundamental performance bounds for a compressive sampling system. In *Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2008.
- Tamer Ragheb, Sami Kirolos, Jason Laska, Martin Strauss, Anna Gilbert, Richard Baraniuk, and Yehia Massoud. Implementation Models for Analog-to-Information Conversion via Random Sampling. IEEE International Midwest Symposium on Circuits & Systems, Montreal, Canada, 2007.
- J. Laska, S. Kirolos, Y. Massoud, R. Baraniuk, A. Gilbert, M. Iwen, and M. Strauss. Random Sampling for Analog-to-Information Conversion of Wideband Signals. Fifth IEEE Dallas Circuits and Systems Workshop, Oct., 2006.
- J. Fong, A. Gilbert, S. Kannan, M. Strauss, Better Alternatives to OSPF Routing. Approximation and Randomized Algorithms in Communication Networks (ARACNE) workshop, 2001.
- J. Lathrop and M. Strauss, A universal upper bound on the performance of the Lempel-Ziv algorithm on maliciously-constructed data, SEQUENCES'97 conference, Positano, Italy.

Book Chapters and Expository Papers

- M. J. Strauss, Histograms on Streams. In *Encyclopedia of Database Systems*, Springer Verlag. 1315–1318, 2009.
- A. C. Gilbert, M. J. Strauss, J. A. Tropp, A Tutorial on Fast Fourier Sampling, *IEEE Signal Processing Magazine*, vol. 25, no. 2, 2008, pp. 57–66.
- S. Muthukrishnan and M. J. Strauss. Approximate Histogram and Wavelet Summaries of Streaming Data. In *Data Stream Management: Processing High-Speed Data Streams*, Springer-Verlag. Minos N. Garofalakis, contact editor. In progress.

Preprints and Technical Reports

- A. C. Gilbert, M. J. Strauss, J. A. Tropp, and R. Vershynin, Algorithmic linear dimension reduction in the l_1 norm for sparse vectors, 2006.
- A. R. Calderbank, A. C. Gilbert, and M. J. Strauss, List decoding of noisy Reed-Muller-like codes, 2006.
- M. J. Strauss and X. Zheng, Private Approximate Heavy Hitters, 2006.
- A. Gilbert, Y. Kotidis, S. Muthukrishnan, and M. Strauss. QuickSAND: Quick Summary and Analysis of Network Data.

Awards

- 2010 Signal Processing Best Paper Award from the European Association for Signal Processing (EURASIP), joint with Joel Tropp and Anna C. Gilbert.

- National Science Foundation Graduate Fellowship, 1990–1993.
- Phi Beta Kappa, May 1989.
- John Dash Van Buren, Jr., Prize Winner in Mathematics, Columbia College, 1988 and 1989.

Grants

- NSF STTR: Advanced Signal Processing for Sensor Fusion. 8/1/2013 to 3/31/2014. \$40,000. Jennifer Davis, SciTec, PI.
- NSF AF: Medium: Collaborative Research: Sparse Approximation: Theory and Extensions Awarded Dt: 05/02/2012. Period: 07/01/2012 to 06/30/2015. \$603,762. Anna Gilbert, PI.
- NSF CDI-Type II: New Cyber Technologies to Enable Space Weather Forecasting. Co-I; Tamas Gombosi, Michigan AOSS, is PI. October 1, 2010, to September 30, 2013. \$1,700,000.
- CAREER: Next-Generation Algorithmics for Sparse Recovery, NSF CCF 0743372, August, 2008–July, 2013, \$400,000. Single PI.
- Analog-to-Information (A-to-I) Receiver Development, DARPA N66001-08-1-2065, July, 2008–Jan, 2010, \$1,948,566. Option period, Jan, 2010–July, 2011, \$2,009,706. (Subcontract of a grant of which Rich Baraniuk (Rice University) is PI; various additional co-PIs.
- How streaming can help pattern matching. United States-Israel Binational Science Foundation (BSF), 2007–2011, \$70,000. Co-PI: Ely Porat, Bar-Ilan University Computer Science.
- Theory and Practice of Analog-to-Information Conversion, DARPA/ONR N66001-06-1-2011, February 2006–January, 2007, \$150,000. Co-PIs include Richard Baraniuk (Rice ECE), Ronald DeVore (South Carolina Mathematics, emeritus), Anna Gilbert (Michigan Mathematics), Yehia Massoud (Rice ECE), and Joel Tropp (Michigan Mathematics).
- Theory, Implementation, and Applications of Sublinear-time Fourier Transform Algorithms, NSF DMS 0510203, August 2005–2008, \$125,010. Single PI.
- FRG: Collaborative Research in Algorithms for Sparse Data Representation, NSF DMS 0354600, September 2004–2007, \$317,808. Co-PIs: Ingrid Daubechies (Princeton Mathematics), Ronald DeVore (South Carolina Mathematics, emeritus), Anna Gilbert (Michigan Mathematics), and S. Muthukrishnan (Rutgers Computer Science). PI is Gilbert.

Mentoring

- Mentor of Brett Hemenway, Math postdoc, Fall, 2010, to Winter, 2013.
- Mentor of Carl Miller, first joint Math-CS postdoc, 2009–2010.
- Informal mentor to Lada Adamic, junior faculty in School of Information, University of Michigan.
- Formal mentor to Joel Tropp, postdoc in the Department of Mathematics, University of Michigan. Tropp will take a tenure-track job at California Institute of Technology starting in the Fall of 2007.
- Formal mentor to Brian Jennings, graduate student in the Department of Mathematics, University of Michigan.
- Mentored two PhD students via email under the auspices of Mentornet.

Students

- Audra McMillan, Mathematics Department, Michigan, candidate.
- Jeremy West, Mathematics Department, Michigan, candidate.
- Mary Wootters, Mathematics Department, Michigan. PhD, 2014. Now at CMU.
- Yi Li, EECS/CSE Department, Michigan. PhD, 2013. Now at Harvard.
- Xiaolin Shi (secondary advisor; primary advisor is Lada Adamic, School of Information, Michigan), EECS/CSE Department, Michigan. PhD, 2009. Now at Microsoft.
- Ray Maleh (informal secondary advisor; primary advisor is Anna Gilbert, Department of Mathematics, Michigan), Mathematics Department, Michigan. PhD, 2009. Now at L-3.
- Mark Iwen, Mathematics Department, Michigan. PhD, 2008. Now at Michigan State University.
- Xuan Zheng, EECS/CSE Department, Michigan. PhD, 2008. Now at Groupon.
- Joel Lepak, Mathematics Department, Michigan. MA, 2007. Now at LMI Government Consulting.

PhD and Similar Committees

- Cognate member of Thesis committees Brooke Ullery, Ariel Shnidman, Wenling Shang, Math department, Michigan, 2015.
- Cognate member of Thesis committees of Hieu Trung Ngo, Harry Altman, Michael Chmutov, Math department, Michigan, 2014.
- Cognate member of Thesis committees of Earnest Hunter Brooks, Zachary Scherr, Seung Jin Lee, Math department, Michigan, 2013.
- Cognate member of Thesis committee of Robin Lassonde, Math department, Michigan, 2012.
- Thesis Committee of Kuang-Hung Liu, EECS/ECE department, Michigan, 2011.
- Thesis Committee of Ran Duan EECS/CSE department, Michigan, 2010.
- Cognate member of Thesis Committees of Brian Jurgelewicz, Felipe Ramirez, and Florian Block, Math Department, Michigan, 2010.
- Thesis Committee of Denny VandenBerg, EECS/CSE department, Michigan, 2010.
- Preliminary examination committee of Xiaodi Wu, EECS/CSE department, Michigan, 2010.
- Cognate member of Thesis committee of Marie Snipes and Ellen Eischen, Math department, Michigan, 2009.
- Thesis Proposal and Defense committee of Smita Krishnaswamy. EECS/CSE department, Michigan, 2006–08.
- Thesis Proposal and Defense committee of You Jung Kim, EECS/CSE department, Michigan, 2007–08.
- Thesis Proposal and Defense committee of Nuwee Wiwatwattana, EECS/CSE department, Michigan, 2006–07.

- Cognate member of Thesis Proposal and Defense committee of Sandeep Tata. EECS/CSE department, Michigan, 2006–07.
- Preliminary examination committee of Erin Rhode, EECS/CSE department, Michigan, 2007.
- Preliminary examination committee of David Wingate, EECS/CSE department, Michigan, 2006.
- Preliminary examination committee of Jonathan Brown, EECS/CSE department, Michigan, 2005.
- Ph.D. committee of James Lathrop, Computer Science Department, Iowa State University, 1997.

Summer and other Students

- Kunjan Singh and Jake Moline, UROP students, 2012–2014.
- Olivia Nordquist, summer REU student, 2013.
- Danielle Woerdeman (REU student), 2009–2010, Michigan. Helped with museum outreach project.
- Ethan Jewett, PhD student in biomedical sciences, 2009–2010, Michigan. Helped with museum outreach project.
- Jeff Madsen (undergraduate REU student), summer of 2007, Math Department, Michigan.
- Mike Nowak (high school student at Dearborn Center for Math, Science and Technology), fall of 2006. I helped him with his science fair project, which won second place in the category of Computer Science.
- Joel Tropp (Institute for Computational Engineering and Sciences, University of Texas), AT&T Labs-Research (2002).
- Jing Zou (Program in Applied and Computational Mathematics, Princeton University), AT&T Labs-Research (2002).
- Jessica Fong (Department of Computer Science, Princeton University), AT&T Labs-Research (1999 and 2000).
- Aris Gionis (Department of Computer Science, Stanford University), AT&T Labs-Research (2000).
- Nina Fefferman (graduate student) and Barry Walker (undergraduate), Department of Mathematics, Rutgers University REU program, AT&T Labs-Research (2000).
- Mahesh Vishwanathan (Department of Computer and Information Science, University of Pennsylvania), AT&T Labs-Research (1998).

University Teaching

- Teacher at the University of Michigan, departments of Math and EECS. Taught undergrads and graduate students, majors and non-majors, in Math and Computer Science. Class sizes from approximately 10 to approximately 300. Several classes taught incorporating methodology of Inquiry-Based Learning (definitions and theorem statements are presented; students come up with proofs on their own). 2004–present.

- Adjunct instructor at Rutgers University.

Courses Taught

- Department of Mathematics, University of Michigan. Math 583, Probabilistic and Interactive Proofs, Winter, 2010 (newly developed course), and Winter, 2015.
- Department of Mathematics, University of Michigan. Math 389, Explorations in Mathematics (inquiry-based learning. Students worked projects, including theorem proving, computer simulation, written reports, and oral presentations), Winter, 2015.
- Department of EECS/CSE, University of Michigan. EECS 376, Foundations of Computer Science, Winter, 2014, Winter, 2013, Winter, 2012, Winter, 2009, and Fall, 2007.
- Department of Mathematics, University of Michigan. Math 371, Numerical Methods for Engineers and Scientists, Fall, 2013, Fall, 2009, and Winter, 2008.
- Department of Mathematics, University of Michigan. Math 481, Introduction to Mathematical Logic, Fall, 2011, and Fall, 2012.
- Department of EECS/CSE, University of Michigan. EECS 477, Introduction to Algorithms, Winter, 2008.
- Department of Mathematics, University of Michigan. Math 115, flipped calculus I, Winter, 2007, and Fall, 2005.
- Department of EECS/CSE, University of Michigan. EECS 586, Algorithms. Winter, 2006.
- Department of EECS/CSE, University of Michigan. EECS 684, Advanced graduate course in topics in databases, Winter, 2005.
- Department of Mathematics, University of Michigan. Math 416, Advanced undergraduate algorithms, Fall, 2004.
- Department of Computer Science, Rutgers University, Fall, 2002. Graduate level complexity course.
- Department of Computer Science, Iowa State University, Spring, 1996. Introductory C/C++.
- Department of Mathematics, Rutgers University, Summer, 1995. Senior-level undergraduate combinatorics.
- Department of Mathematics, Rutgers University, Summer, 1993. Calculus II.
- Department of Mathematics, Rutgers University, Summer, 1991. Pre-college algebra.
- Rutgers and Columbia math departments: served as teaching assistant for various courses.

Projects Supervised

- Energy-harvesting Insole Pedometer. Supervised six undergraduates of varying engineering backgrounds. Under the Multidisciplinary Design Program, University of Michigan, 2014.
- Bicycle Power Meter. Supervised four mechanical engineering undergraduates in their capstone project for the ME450 class. University of Michigan, Fall, 2014.

Invited Talks and Meetings

- Toyota Technological Institute, Chicago, March 28, 2014.
- University of Texas, Austin, Computer Science Seminar, February, 28, 2014.
- Information Theory and Applications workshop, San Diego, 2012–2014.
- Duke Workshop on Sensing and Analysis of High-Dimensional Data (SAHD), 2011 and 2013.
- University of Pennsylvania seminar, November, 2009.
- DIMACS workshop, March, 2009.
- ITA workshop, UCSD, February, 2009.
- Bar Ilan University, Seminar, December, 2008.
- Tel Aviv University, Seminar, December, 2008.
- Dagstuhl program, November, 2008.
- SIAM Conference on Imaging Science, (organized mini-symposium and gave talk), July, 2008.
- Massachusetts Institute of Technology, Computer Science and Artificial Intelligence Laboratory, Theory of Computation Colloquium, Piotr Indyk, host, April, 2008.
- Pennsylvania State University, Department of Computer Science, Colloquium, Sofya Raskhodnikova and Adam Smith, hosts, November, 2007.
- MADALGO Summer School on Data Stream Algorithms, Piotr Indyk, host. Aarhus, Denmark, August, 2007.
- ACM von Neumann Symposium, J. Tanner, host. Snowbird, Utah, July, 2007.
- University of Michigan, Department of EECS/CSE, Toyota AI seminar, March, 2007.
- University of Michigan, Department of Mathematics, Combinatorics Seminar, February, 2007.
- Rennselaer Polytechnic Institute, Department of Computer Science, Petros Drineas, host. January, 2007.
- Workshop on Algorithms for Data Streams, S. Ganguly, host. IIT Kanpur, December, 2006.
- University of Maryland, Department of Computer Science, Aravind Srinivasan, host. November, 2006.
- Princeton University, Program in Applied and Computational Mathematics, Sparse Approximation Workshop, November, 2006.
- AT&T Labs—Research, Henry Landau, host. November, 2006.
- University of Pennsylvania, Department of Computer and Information Science, Sudipto Guha, host. Seminar, November, 2006.
- UCLA, Department of Mathematics, Stan Osher, host. Seminar, October, 2006.
- Princeton Theoretical Computer Science Lunch, M. Charikar, host. September, 2006.
- Rutgers Theory Seminar, E. Allender, host. September, 2006.
- Workshop on Algorithms for Modern Massive Data Sets, P. Drineas, host. Palo Alto, CA, June, 2006.

- Workshop on Space-Conscious Algorithms, S. Muthukrishnan, host. Bertinoro, Italy, June, 2006.
- SIAM Conference on Imaging Science, E. Candès, host. Session speaker, May, 2006.
- UC Davis, Department of Mathematics, Assistant Professor Roman Vershynin, host. Seminar, March, 2006.
- UCLA, Department of Mathematics, Professor Terence Tao, host. Seminar, February, 2006.
- Rice University, ECE department, Victor E. Cameron Professor Richard Baraniuk, host. Seminar, January 27, 2006.
- Dagstuhl seminar on Sublinear Algorithms, 2005.
- Institute for Pure and Applied Mathematics workshop on multiscale geometric algorithms, 2004.
- University of Arkansas Mathematics Department Spring Lecture Series, J. Hogan, host. 2004.
- Workshop: Privacy-Preserving Data Mining, 2004.
- International Congress on Applied and Industrial Mathematics, 2003.
- DIMACS Workshop on Streaming Data Analysis and Mining, 2001.
- DIMACS mixer, 2000.
- International Symposium on Artificial Intelligence and Mathematics, 2000.
- Dagstuhl seminar on Structure and Complexity, 1996.
- Seminars (through 2005): Air Force Institute of Technology, Arkansas, Berkeley, DIMACS, Iowa State, Jussieu (Paris, France) IMA, Michigan, MIT, Rutgers, Paris-Sud (Orsay, France), Pennsylvania, Princeton, Stanford; AT&T Labs, Bell Labs, IBM Almaden Research Center, Telcordia, United Technologies Research Center, Xerox PARC.

Business-related Projects

- Classified phone lines as business or residence lines, based on calling patterns. Wrote special-purpose compression software.
- Classified phone lines as voice or fax lines, based on calling patterns.

Patents

- A. Gilbert, Y. Kotidis, S. Muthukrishnan, and M. Strauss, Method and Apparatus for Using Wavelets to Produce Data Summaries. 7,296,014.
- A. Gilbert, Y. Kotidis, S. Muthukrishnan, and M. Strauss, Method and Apparatus for Using Wavelets to Produce Data Summaries. 7,272,599.
- S. Muthukrishnan and M. Strauss. Space- and Time-Efficient Management and Summarization of Data Using Intermediate Summary Structure and Hierarchical Multidimensional Histogram. 7,249,136.
- A. Gilbert, S. Guha, P. Indyk, Y. Kotidis, S. Muthukrishnan, and M. Strauss, Method and Apparatus for Using Histograms to Produce Data Summaries. 7,177,282.

- W. Aiello, A. Rubin, and M. Strauss, Using Smartcards to Enable Probabilistic Transactions on an Untrusted Device. 6,496,808.
- M. Blaze, J. Feigenbaum, and M. Strauss, Compliance Checking in the PolicyMaker Trust Management System. 6,256,734.
- P. D. McDaniel and M. Strauss. End-to-End Secure Wireless Communication. (Filed.)
- A. Gilbert, S. Muthukrishnan, and M. Strauss, Apparatus and method for providing near-optimal representations over redundant dictionaries. (Filed.)
- J. Fong, A. Gilbert, S. Kannan, and M. Strauss, Method For Routing Data Using a Fractional Open Shortest Path First Protocol. (Filed.)
- A. Rubin and M. Strauss, System and Method For Storage and Retrieval of Personal Communications in a Broadband Network. (Filed.)
- J. Feigenbaum, S. Kannan, M. Strauss, and M. Vishwanathan, Streaming Algorithms for Distributed, Massive Data Sets. (Filed.)

Professional Service, Activities, and Committees

- Head of Theory Lab, 2012–present.
- Organized Midwest Theory Day, 2008 and 2014.
- Organized workshop on Complexity, Codes, and Sparsity, 2011–2013.
- Math Grad admission committee, Dept. of Math, Univ. of Michigan, 2012–2013.
- Math AIM Prelim committee, Dept. of Math, Univ. of Michigan, 2012–2013.
- Computer committee, Dept. of Math, Univ. of Michigan, 2007–2009 and 2011–present.
- Co-organized Coding, Complexity and Sparsity Workshop, Michigan, 2011.
- AIM Preliminary Exam committee (formally and informally), Dept. of Math, Univ. of Michigan, 2004–present.
- Doctoral committee, Dept. of Math, Univ. of Michigan, 2007–2010.
- Established and oversee joint Math-Computer Science postdoctoral position, 2009–2013.
- Advisor, CS/LSA program, Dept. of EECS, Univ. of Michigan, 2007–2009.
- Curriculum committee, Dept. of EECS/CSE, Univ. of Michigan, 2007
- Sparse approximation weekly reading group, Univ. of Michigan, 2005–2006.
- Applied and Interdisciplinary Mathematics (AIM) graduate committee, Department of Mathematics, University of Michigan, 2005–2007.
- Graduate committee, Dept. of EECS/CSE, Univ. of Michigan, 2004–2005.
- Organized (or co-organized, most semesters) Theoretical computer Science seminar, Univ. of Michigan, 2004–present.
- Organized DIMACS workshop on Sublinear Algorithms, September, 2000.
- Member of DIMACS graduate student committee (that awards grants to students for summer salary, travel support, etc.)

- Member of the AT&T Research Advisory Council for Research, that addresses quality-of-life issues in research, 1999–2001. Chair, 2001.
- Member of AT&T Shannon postdoctoral fellowship search committee, 2000.

Editorial Service

- Serve on editorial committee of *Contemporary Mathematics*, 2008–present.
- Serve on editorial board of *Theory of Computing Systems*, 2001–present.
- Referee for submissions to journals *Software—Practice & Experience*, *Computational Complexity*, *Foundations of Computational Mathematics*, *Information and Computation*, *Parallel Processing Letters*, *Theoretical Computer Science*, *Theory of Computing Systems*, *Journal of Computer Security*, *IEEE Journal of Selected Topics in Signal Processing*, *IEEE Transactions on Computers*, *ACM Transactions on Computer Systems*, and *IEEE Transactions on Knowledge and Data Engineering*; reviewer for submissions to conferences Computational Complexity Conference, Crypto, EUROCRYPT, ESA, FOCS, STOC, STACS, Usenix security.

Program Committees and Session Organization

- LATIN 2012 and 2014.
- MFCS 2013.
- COCOA 2012
- FSTTCS 2011.
- ICALP2011GT. (Group Testing workshop, part of ICALP, 2011.)
- DEXA 2009–2010.
- COCOON 2010.
- SWAT 2010.
- DBKDA 2009–2010.
- DB 2009, The First International Conference on Advances in Databases, Gosier, Guadeloupe/France, 2009.
- RANDOM, Cambridge, MA, 2008.
- SIAM Conference on Imaging Science, (organized mini-symposium and gave talk), July, 2008.
- VLDB, Vienna, 2007.
- Allerton conference on communication, control, and computing, Urbana-Champaign, session, 2006.
- CISS, Princeton, session, 2006.
- ICDE, Tokyo, 2005.
- Information Technology Workshop, San Antonio, session, 2004.
- International Congress on Applied and Industrial Mathematics, session, 2003.
- SODA'99.

Programming Experience

- Experience with C, UNIX, MATLAB, and various special-purpose scripting languages.

Educational Outreach and Inreach

- Michigan Undergraduate Mathematics Club. Presented to undergraduates on cross-curricular and motivational math topics, including Borromean rings, finding derivatives and integrals of common functions from symmetry, Conway's rational tangles, wallpaper symmetry, and NP-completeness.
- Math Enrichment Club. Held weekly meetings for 3-5 graders at the Hebrew Day School of Ann Arbor (MI). For students taking the Mathematical Olympiad for Middle and Elementary Schools. Administered the contests, prepared students for the contests, reviewed the contests. In approximately half the sessions, did math-camp-style activities independent of the contests, including hands-on activities with paper cutting, pipe cleaner bending, etc. 2009–present. (Disclaimer: My children were in that class.)
- Provided bi-weekly math enrichment activities for first graders at Hebrew Day School, Ann Arbor. 2009–2010. (Disclaimer: My son was in that class.)
- Michigan Math Circle. Spoke to middle schoolers and (separately) to high schoolers, in a series of two 90-minute talks. Three series (6 talks) altogether.
- Future University. Presented a math activity for a hour to middle schoolers from an underprivileged school in Detroit. Twice so far, 2012–present.
- Developed cryptography and communication outreach activities with the Ann Arbor Hands-on Museum, 2008–2010. Presented February 13–14, 2010.
- Ad Hoc visitor in high-IQ first- and second- grade classroom. Presented Math enrichment activities; approximately three times total. Brighton (Michigan) Area Schools. Kacey Tulley, teacher.

Educational Service and Activities

- Member of Michigan's Provost's Task Teams on Engaged Education and Digital Learning. Our team was tasked (January 31, 2014) on finding ways to engage students at our residential university, for an appropriate cost, in this age of MOOCs.
- Michigan College of Engineering Liaison to the Math department. Charged with incorporating more Engineering applications into advanced calculus classes offered by the Math department.
- Participant in several CRLT workshops. University of Michigan's Center for Research on Learning and Teaching offers many services to Michigan's teachers. Over the years, I've attended several programs, including several one-hour independent presentations and, in 2013, a semester-long workshop on engaging students in large engineering lectures. This met four times during the semester, and earned me \$1,000 to spend on improving students' experiences in large lectures.

Courses Taught, outreach

- Epsilon Camp (two-week summer camp for mathematically talented 8–11 year olds), Summers, 2014–2015. In 2015 (expected), plan to teach a daily kinesthetic mathematics session.

- Michigan Math and Science Scholars, “Art and Mathematics,” Summers, 2014 and 2015 (expected). Taught a summer session for 10–15 high school students, six hours a day for two weeks. This is a math camp program for non-matriculating high school students under the auspices of the University. This course and “...Interpolation Tricks” featured many hands-on activities.
- Michigan Math and Science Scholars, “Stupid Interpolation Tricks,” Summers, 2012 and 2013.