

## MARK A. DAVENPORT

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School of Electrical and Computer Engineering  
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### RESEARCH INTERESTS

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Signal processing, statistical inference, and machine learning with high-dimensional data  
Low-dimensional models and the use of optimization for exploiting structure in data  
Sparse approximation; low-rank matrix recovery; inverse problems

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### EDUCATION

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#### **PhD in Electrical and Computer Engineering**

Rice University, December 2010

Advisor: Dr. Richard Baraniuk

Thesis: “Random observations on random observations: Sparse signal acquisition and processing”

*Winner of Budd Award for Best Thesis in School of Engineering*

#### **MS in Electrical and Computer Engineering**

Rice University, May 2007

Advisor: Dr. Richard Baraniuk

Thesis: “Error control for support vector machines”

#### **BSEE in Electrical and Computer Engineering, *cum laude***

Rice University, May 2004

#### **BA in Managerial Studies, *cum laude***

Rice University, May 2004

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### ACADEMIC POSITIONS

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#### **Associate Professor of Electrical and Computer Engineering**

School of Electrical and Computer Engineering, Georgia Institute of Technology, 2017–present

#### **Assistant Professor of Electrical and Computer Engineering**

School of Electrical and Computer Engineering, Georgia Institute of Technology, 2012–2017

#### **NSF Mathematical Sciences Postdoctoral Research Fellow**

Statistics Department, Stanford University, 2010–2012

#### **Research Visitor**

Laboratoire Jacques-Louis Lions, Université Pierre et Marie Curie, 2011

#### **Instructor**

Department of Electrical and Computer Engineering, Rice University, 2010

#### **Research Assistant**

Department of Electrical and Computer Engineering, Rice University, 2005–2010

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## SELECTED HONORS AND RESEARCH AWARDS

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Sloan Research Fellowship, 2017  
IEEE Signal Processing Society Best Paper Award, 2015  
Information and Inference Best Paper Prize Finalist, 2015  
AFOSR Young Investigator Award, 2014  
NSF CAREER Award, 2014  
Ralph Budd Award for Best Thesis in the School of Engineering at Rice University, 2011  
NSF Mathematical Sciences Postdoctoral Research Fellowship, 2010  
Hershel M. Rich Outstanding Invention Award, 2007  
NSF Graduate Fellowship Honorable Mention, 2005  
Texas Instruments Graduate Fellowship, 2004–2005  
Best Senior Project Award, ECE Department, Rice University, 2004  
Tau Beta Pi, 2004  
Eta Kappa Nu, 2003  
L. J. Walsh Scholarship, 2001–2004

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## TEACHING AWARDS

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Class of 1940 W. Roane Beard Outstanding Teacher Award, 2017  
CETL/BP Junior Faculty Teaching Excellence Award, 2016  
Richard M. Bass Outstanding Teacher Award, 2015  
Lockheed Dean's Excellence in Teaching Award, 2015  
Georgia Institute of Technology Class of 1969 Teaching Fellow, 2014–2015  
LexisNexis Dean's Excellence Award, 2014  
Georgia Institute of Technology Class of 1940 Teaching Effectiveness Award, 2013  
Teaching Fellowship, ECE Department, Rice University, 2006–2007

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## PROFESSIONAL ACTIVITIES

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### Editorial Activity

Associate Editor for *IEEE Transactions on Information Theory* (2019–present)  
Associate Editor for *IEEE Transactions on Signal Processing* (2016–present)

### Meetings Organized

Symposium on “Low-dimensional dynamical systems in signal processing and data analysis,” at *IEEE Int. Work. on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, 2017.  
Special session on “Signal processing and adaptive systems,” at *Asilomar Conf. on Signals, Systems, and Computers*, 2017.  
Symposium on “Randomness and efficient computation in signal processing,” at *IEEE Int. Work. on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, 2015.  
Mini-symposium on “Finding and exploiting structure in data,” at *SIAM Conf. on Applied Linear Algebra*, 2015  
Symposium on “Low-dimensional models and optimization in signal processing,” at *IEEE Global Conf. on Signal and Information Processing (GlobalSIP)*, 2013

Symposium on “Compressive sensing: Sensing sparse phenomena in theory and practice,” at *Annual Meeting of the AAAS*, 2013

Workshop on “Manifolds, Sparsity, and Structured Models: When Can Low-Dimensional Geometry Really Help?” at *Advances in Neural Information Processing Systems (NeurIPS)*, 2009.

### **Technical Program Committees**

*European Conf. on Signal Processing (EUSIPCO)*, 2017.

*Int. Conf. on Artificial Intelligence and Statistics (AISTATS)*, 2017.

*IEEE Int. Work. on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, 2015.

*IEEE Signal Processing and Signal Processing Education Work. (SPW)*, 2015.

Symposium on “Information Processing for Big Data” at *IEEE Global Conf. on Signal and Information Processing (GlobalSIP)*, 2014.

*IEEE Work. on Statistical Signal Processing (SSP)*, 2012.

### **University Service**

ECE Graduate Recruiting Coordinator, 2018–present

Member, College of Engineering Diversity & Inclusion Council, 2018–present

Member, Institute Graduate Curriculum Committee, 2017–present

Member, ECE Faculty Recruitment Committee, 2017–present

Member, Center for Machine Learning (ML@GT), 2016–present

Faculty Advisor, Opportunity Research Scholars Program, 2015–present

Faculty Associate, Georgia Tech Grand Challenges Program, 2013–2016, 2017–present

Member, Center for Signal and Information Processing (CSIP), 2012–present

Member, ECE Graduate Student Recruitment Committee, 2013–2017

Panelist, Young Investigator Award Proposal Workshop (ECE, ME), 2016

Admissions Panel, Georgia Tech President’s Scholarship Program, 2015

Panelist, NSF CAREER Award Proposal Workshop (GT OSP), 2014 & 2015

Member, ECE Student/Faculty Committee, 2012–2013

Guest Lecturer, ECE 8010 Graduate Research Seminar, 2012

Member, Stating Committee on Student Health Insurance (Rice University), 2006–2010

Graduate Student Mentor (Rice University), 2008–2009

Graduate Student Council (ECE Department, Rice University), 2005–2007

### **Reviewer for the Following Journals**

*Annals of Statistics*

*Applied Computational and Harmonic Analysis*

*Applied Mathematics and Computation*

*Biometrika*

*Electronic Journal of Statistics*

*Foundations of Computational Mathematics*

*IEEE Journal of Selected Topics in Signal Processing*

*IEEE Signal Processing Letters*

*IEEE Signal Processing Magazine*

*IEEE Transactions on Aerospace and Electronic Systems*

*IEEE Transactions on Circuits and Systems I*

*IEEE Transactions on Communications*

*IEEE Transactions on Computational Imaging*  
*IEEE Transactions on Image Processing*  
*IEEE Transactions on Instrumentation and Measurement*  
*IEEE Transactions on Information Theory*  
*IEEE Transactions on Knowledge and Data Engineering*  
*IEEE Transactions on Neural Networks*  
*IEEE Transactions on Signal Processing*  
*Information and Inference*  
*Inverse Problems*  
*Journal of the Royal Statistical Society: Series B*  
*Journal of Complexity*  
*Journal of Machine Learning Research*  
*Machine Learning*  
*Neurocomputing*  
*Pattern Recognition*  
*Pattern Recognition Letters*  
*Physical Communication*  
*Signal Processing*  
*SIAM Journal on Imaging Sciences*  
*SIAM Journal on Numerical Analysis*

#### **Reviewer for the Following Conferences**

*Conference on Computational Complexity (CCC)*  
*Conference on Learning Theory (COLT)*  
*European Conference on Signal Processing (EUSIPCO)*  
*IEEE Global Conference on Signal Processing (GlobalSIP)*  
*IEEE Information Theory Workshop (ITW)*  
*IEEE Int. Conference on Communications (ICC)*  
*IEEE Int. Conference on Computer Communications (INFOCOM)*  
*IEEE Int. Symposium on Information Theory (ISIT)*  
*IEEE Int. Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*  
*IEEE Signal Processing and Signal Processing Education Workshop (SPW)*  
*IEEE Symposium on Foundations of Computer Science (FOCS)*  
*IEEE Workshop on Statistical Signal Processing (SSP)*  
*Int. Conference on Machine Learning (ICML)*  
*Int. Conference on Sampling Theory and Applications (SAMPTA)*  
*Military Communications Conference (MILCOM)*  
*Neural Information Processing Systems (NeurIPS)*  
*Workshop on Signal Processing with Adaptive Sparse Structured Representations (SPARS)*

#### **Reviewer for the Following Funding Agencies**

*Air Force Office of Scientific Research (AFOSR)*  
*National Science Foundation (NSF)*

#### **Professional Societies**

*IEEE (Senior Member), SIAM, AAAS, Tau Beta Pi, Eta Kappa Nu*

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## RESEARCH SUPPORT

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### **Coulter Foundation**

Wheelchair activity tracker (2018 – 2019)

### **National Institute of Health**

Development of technologies to increase in-seat movement to prevent sitting-acquired injuries in wheelchair users (2017 – 2022)

### **Alfred P. Sloan Foundation**, Sloan Research Fellowship

From measurements to information: Exploiting the structure in data (2017 – 2019)

### **Lockheed Martin**

Compressive beamforming (2017 – 2020)

### **National Science Foundation**, Division of Civil, Mechanical, and Manufacturing Innovation

An audio-based spatiotemporal system for automated monitoring of construction operations (2015 – 2019)

### **IERUS Technologies**

Compressive sensing for radar discrimination (2015 – 2016)

### **National Science Foundation**, Division of Computer and Communication Foundations

Subspace matching on the continuum (2014 – 2018)

### **Air Force Office of Scientific Research**, Young Investigator Program

Solving inference and inverse problems using soft data (2014 – 2017)

### **National Science Foundation**, Division of Computer and Communication Foundations

CAREER: Learning from coarse, nonmetric, and incomplete data (2014 – 2019)

### **Naval Research Laboratory**

Detecting anomalous signals via low-dimensional geometry (2013 – 2017)

### **National Science Foundation**, Division of Mathematical Sciences

Mathematical Sciences Postdoctoral Research Fellowship (2010 – 2012)

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## COURSES TAUGHT

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### **Convex Optimization: Theory, Algorithms, and Applications**

ECE 8823c, Georgia Institute of Technology

Spring 2019

### **Advanced Digital Signal Processing**

ECE 6250, Georgia Institute of Technology

Fall 2018, Fall 2017

### **Statistical Machine Learning**

ECE 6254, Georgia Institute of Technology

Spring 2017, Spring 2015, Spring 2014

### **Introduction to Probability and Statistics for ECEs**

ECE 3077, Georgia Institute of Technology  
Summer 2016, Fall 2015, Summer 2013

### **Introduction to Signal Processing**

ECE 2026, Georgia Institute of Technology  
Fall 2014, Fall 2012

### **Harmonic Analysis for Signal Processing**

ECE 8823a, Georgia Institute of Technology  
Spring 2013

### **Digital Signal Processing**

ELEC 431, Rice University  
Spring 2010

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## **STUDENT SUPERVISION AND ADVISING**

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### **PhD Students**

Andrew McRae, 2018–present

Topic: Low-rank matrix estimation under non-Gaussian observation models

Nauman Ahad, 2017–present

Topic: Robust change point detection

Niranjana Kannabiran, 2016–present

Topic: Mass prediction from observation of object dynamics

Co-advised with Irfan Essa

Matthew R. O’Shaughnessy, 2016–present

Topic: Bayesian methods for dynamic sparse models

Co-advised with Christopher Rozell

*NDSEG Graduate Fellowship*

Chieh-Feng Cheng, 2015–present

Topic: Classification algorithms for weakly labeled time series

Co-advised with David Anderson

Santhosh Karnik, 2015–present

Topic: Subspace models and matching on the continuum

Liangbei Xu, 2014–present

Topic: Dynamic low-rank matrix recovery

Andrew K. Massimino, 2012–2018

Thesis: Learning to adapt under practical sensing constraints

*Algorithms and Randomness Center (ARC) Student Fellowship*

Michael G. Moore, 2012–2018

Thesis: Maximum likelihood estimation of Poisson and Hawkes processes and extensions to Hawkes process analysis

Now at Numerica Corporation

Hongteng Xu, 2013–2017

Thesis: Point process-based modeling and analysis of asynchronous event sequences

Co-advised with Hongyuan Zha

Now at Duke University

### **MS Students**

Namrata Nadagouda, 2018–2019

Topic: Switched Hawkes processes

Malik Aqeel Anwar, 2016

Topic: Hyperspectral compressive sensing

### **Selected Undergraduate Students**

Austin J. Little, 2016–2018

Topic: Real-time activity tracking for wheelchair users

*Opportunity Research Scholars (ORS) Best Presentation Award*

Matthew R. O'Shaughnessy, 2014–2016

Topic: Algorithms for nonmetric triangulation and multidimensional scaling

*President's Undergraduate Research Award (PURA)*

### **Doctoral Committees**

Seyyed Hamed Fouladi, PhD, Norwegian University of Science and Technology, 2018

Advisors: Ilangko Balasingham and Kimmo Kansanen

Thesis: On signal recovery: Independent component analysis for multiple measurement vectors and source separation

Nathan Parrish, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2018

Advisor: David Anderson

Thesis: System configuration for proportional control of an assistive technology for patients with cervical spinal-cord injuries

Jason Zutty, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2018

Advisor: Aaron Lanterman

Thesis: Automated machine learning: A biologically inspired approach

Nicholas Gross, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2018

Advisor: Morris Cohen

Thesis: An ionospheric remote sensing method using an array of narrowband VLF transmitters and receivers

Brandon Carroll, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2018

Advisor: David Anderson

Thesis: Characterizing acoustic environments with OLAF and ELSA

Fan Zhou, PhD, Mathematics, Georgia Institute of Technology, 2018

Advisor: Vladimir Koltchinskii

Thesis: Statistical inference of high dimensional data with low rank structure

Yichen Wang, PhD, Computational Science and Engineering, Georgia Institute of Technology, 2018

Advisor: Le Song

Thesis: Modeling, learning, predicting, and guiding dynamics processes over networks

Yang Cao, PhD, Industrial and Systems Engineering, Georgia Institute of Technology, 2018

Advisor: Yao Xie

Thesis: Poisson matrix completion and sequential change-point detection

Mehrdad Farajtabar, PhD, Computational Science and Engineering, Georgia Institute of Technology, 2018

Advisors: Hongyuan Zha and Le Song

Thesis: Point process modeling and optimization of social networks

Ning Tian, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2018

Advisor: Justin Romberg

Thesis: Multichannel blind deconvolution in underwater acoustic channels

Zhihui Zhu, PhD, Colorado School of Mines, 2017

Advisor: Michael Wakin

Thesis: Subspace approximation on the continuum

Muhammad Rizwan, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2017

Advisor: David Anderson

Thesis: Adaptation of hybrid deep neural network-hidden Markov model speech recognition system using a sub-space approach

Peter Tuuk, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2017

Advisor: James McClellan

Thesis: Compressed sensing in radar with structured interference

Stephanie Gillespie, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2017

Advisor: Elliot Moore

Thesis: Analysis of affective states from vocal acoustics in adults with aphasia

Scott Spencer, PhD, Mathematics, Georgia Institute of Technology, 2017

Advisor: Michael Lacey

Thesis: Weighted inequalities via dyadic operators and a learning theory approach to compressed sensing

Matthew Hale, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2017

Advisors: Magnus Egerstedt and Yorai Wardi

Thesis: Mixed centralized/decentralized coordination protocols for multi-agent systems

Kaitlin Fair, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2017

Advisor: David Anderson

Thesis: A biologically plausible sparse approximation solver on neuromorphic hardware



Jun Zou, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2016  
Advisor: Faramarz Fekri  
Thesis: Social computing for personalization and credible information mining using probabilistic graphical models

Adam Charles, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2015  
Advisor: Christopher Rozell  
Thesis: Dynamics and correlations in sparse signal acquisition  
*Sigma Xi Best Dissertation Award*

Aurèle Balavoine, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2014  
Advisors: Justin Romberg and Christopher Rozell  
Thesis: Mathematical analysis of a dynamical system for sparse recovery

Nicholas Tzou, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2014  
Advisor: Abhijit Chatterjee  
Thesis: Low-cost sub-Nyquist sampling hardware and algorithm codesign for wideband and high-speed signal characterization and measurement

Hassan Kingravi, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2014  
Advisor: Patricio Vela  
Thesis: Reduced-set methods for improving the training and execution speed of kernel methods

Ali Ahmed, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2013  
Advisor: Justin Romberg  
Thesis: Low-rank matrix recovery: Blind deconvolution and efficient sampling of correlated signals

Salman Asif, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2013  
Advisor: Justin Romberg  
Thesis: Dynamic compressive sensing: Sparse recovery algorithms for streaming signals and video

William Mantzel, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2013  
Advisor: Justin Romberg  
Thesis: Parametric estimation of randomly compressed functions

Han Lun Yap, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2012  
Advisor: Christopher Rozell  
Thesis: Constrained measurement systems of low-dimensional signals

Chenchi Luo, PhD, Electrical and Computer Engineering, Georgia Institute of Technology, 2012  
Advisor: James McClellan  
Thesis: Non-uniform sampling: Algorithms and architectures

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## **P R E S S**

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***Rejecta Mathematica***, 2009

*Science, The Economist, Nature.com, USA Today, Chronicle of Higher Education, AMS Math in the Media, Ars Technica, MathDL, Rice News, Seed Magazine, Slashdot*

## **Single-Pixel Camera and Compressive Sensing, 2006–2008**

*Scientific American, SIAM Review, MIT Technology Review, Nature Photonics, New Scientist, The Economist, BBC News, BBC Digital Planet, The Guardian, The Times Online, USA Today, Business Week, Houston Chronicle, NAE Radio Series on Engineering, NPR (KUHF Houston Public Radio), Slashdot Technology Review TR10 Emerging Technologies for 2007*

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## **CONSULTING AND INDUSTRIAL EXPERIENCE**

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Data Science and Machine Learning Advisor, Mogean, Inc., 2016–present  
Technical Consultant, Qualcomm, Inc., 2013–2015  
Technical Consultant, HRL, 2013–2015  
Technical Consultant, Fulbright and Jaworsky, LLP, 2004–2005  
Software Engineer, ViaSat, Inc., 2004

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## **BOOKS AND BOOK CHAPTERS**

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M. A. Davenport, M. F. Duarte, Y. C. Eldar, and G. Kutyniok, “Introduction to compressed sensing,” in *Compressed Sensing: Theory and Applications*, Cambridge University Press, 2012. [amzn.to/KdvNIW]  
R. G. Baraniuk, M. A. Davenport, M. F. Duarte, and C. Hegde. *An Introduction to Compressive Sensing*. Connexions e-textbook, 2011. [cnx.org/content/col11133]

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## **JOURNAL PUBLICATIONS**

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M. R. O’Shaughnessy, M. A. Davenport, and C. J. Rozell, “Sparse Bayesian learning with dynamic filtering for inference of time-varying sparse signals,” *Preprint*.  
R. S. Srinivasa, M. A. Davenport, and J. Romberg, “Trading beams for bandwidth: Imaging with randomized beamforming,” *Preprint*.  
A. K. Massimino and M. A. Davenport, “As you like it: Localization via paired comparisons,” *Preprint*.  
C.-F. Cheng, A. Rashidi, M. A. Davenport, D. V. Anderson, and C. Sabillon, “Software and hardware requirements for audio-based analysis of construction operations,” *Preprint*.  
T. J. LaGrow, M. G. Moore, J. A. Prasad, A. Weber, M. A. Davenport, and E. L. Dyer, “Sparse recovery methods for cell detection and layer estimation,” *Preprint*.  
M. G. Moore and M. A. Davenport, “Estimation of Poisson arrival processes under linear models,” to appear in *IEEE Trans. on Information Theory*, 2019.  
S. Karnik, Z. Zhu, M. B. Wakin, J. Romberg, and M. A. Davenport, “The Fast Slepian Transform,” to appear in *Applied and Computational Harmonic Analysis*, 2019.  
Z. Zhu, S. Karnik, M. B. Wakin, M. A. Davenport, and J. Romberg, “ROAST: Rapid Orthogonal Approximate Slepian Transform,” *IEEE Trans. on Signal Processing*, 66(22), pp. 5887–5901, November 2018.  
H. Xu, L. Yu, M. A. Davenport, and H. Zha, “Active manifold learning via a unified framework for manifold landmarking,” *IEEE Trans. on Signal Processing*, 66(21), pp. 5563–5576, November 2018.  
Z. Zhu, S. Karnik, M. A. Davenport, J. Romberg, and M. B. Wakin, “The eigenvalue distribution of discrete periodic time-frequency limiting operators,” *IEEE Signal Processing Letters*, 25(1), pp. 95–99, January 2018.

- C.-F. Cheng, A. Rashidi, M. A. Davenport, and D. V. Anderson, "Activity analysis of construction equipment using audio signals and support vector machines," *Automation in Construction*, 81, pp. 240–253, September 2017.
- M. A. Davenport, A. K. Massimino, D. Needell, and T. Woolf, "Constrained adaptive sensing," *IEEE Trans. on Signal Processing*, 64(20), pp. 5437–5449, October 2016.
- M. A. Davenport and J. Romberg, "An overview of low-rank matrix recovery from incomplete observations," *IEEE J. of Selected Topics in Signal Processing*, 10(4), pp. 608–622, June 2016.
- M. A. Davenport, Y. Plan, E. van den Berg, and M. Wootters, "1-bit matrix completion," *Information and Inference*, 3(3), pp. 189–223, September 2014.  
*Finalist for Information and Inference Best Paper Prize*
- R. Willett, M. F. Duarte, M. A. Davenport, and R. G. Baraniuk, "Sparsity and structure in hyperspectral imaging: Sensing, reconstruction, and target detection," *IEEE Signal Processing Magazine*, 31(1), pp. 116–126, January 2014.
- A. Cohen, M. A. Davenport, and D. Leviatan, "On the stability and accuracy of least squares approximations," *Foundations of Computational Mathematics*, 13(5), pp. 819–834, October 2013.
- M. A. Davenport, D. Needell, and M. B. Wakin, "Signal space CoSaMP for sparse recovery with redundant dictionaries," *IEEE Trans. on Information Theory*, 59(10), pp. 6820–6829, October 2013.
- E. J. Candès and M. A. Davenport, "How well can we estimate a sparse vector?" *Applied and Computational Harmonic Analysis*, 34(2), pp. 317–323, March 2013.
- E. Arias-Castro, E. J. Candès, and M. A. Davenport, "On the fundamental limits of adaptive sensing," *IEEE Trans. on Information Theory*, 59(1), pp. 472–481, January 2013.
- M. A. Davenport and M. B. Wakin, "Compressive sensing of analog signals using discrete prolate spheroidal sequences," *Applied and Computational Harmonic Analysis*, 33(3), pp. 438–472, November 2012.
- M. A. Davenport, J. N. Laska, J. R. Treichler, and R. G. Baraniuk, "The pros and cons of compressive sensing for wideband signal acquisition: Noise folding vs. dynamic range," *IEEE Trans. on Signal Processing*, 60(9) pp. 4628–4642, September 2012.
- J. N. Laska, P. T. Boufounos, M. A. Davenport, and R. G. Baraniuk, "Democracy in action: Quantization, saturation, and compressive sensing," *Applied and Computational Harmonic Analysis*, 31(3) pp. 429–443, November 2011.
- M. A. Davenport, C. Hegde, M. F. Duarte, and R. G. Baraniuk, "Joint manifolds for data fusion," *IEEE Trans. on Image Processing*, 19(10) pp. 2580–2594, October 2010.
- M. A. Davenport, R. G. Baraniuk, and C. D. Scott, "Tuning support vector machines for minimax and Neyman-Pearson classification," *IEEE Trans. on Pattern Analysis and Machine Intelligence*, 32(10) pp. 1888–1898, October 2010.
- M. A. Davenport and M. B. Wakin, "Analysis of orthogonal matching pursuit using the restricted isometry property," *IEEE Trans. on Information Theory*, 56(9) pp. 4395–4401, September 2010.
- M. A. Davenport, P. T. Boufounos, M. B. Wakin, and R. G. Baraniuk, "Signal processing with compressive measurements," *IEEE J. of Selected Topics in Signal Processing*, 4(2) pp. 445–460, April 2010.  
*Winner of IEEE Signal Processing Society Best Paper Award*
- R. G. Baraniuk, M. A. Davenport, R. A. DeVore, and M. B. Wakin, "A simple proof of the restricted isometry property for random matrices," *Constructive Approximation*, 28(3) pp. 253–263, December 2008.
- M. F. Duarte, M. A. Davenport, D. Takhar, J. N. Laska, T. Sun, K. F. Kelly, and R. G. Baraniuk, "Single-pixel imaging via compressive sampling," *IEEE Signal Processing Magazine*, 25(2) pp. 83–91, March 2008.

C. D. Scott and M. A. Davenport, "Regression level set estimation via cost-sensitive classification," *IEEE Trans. on Signal Processing*, 55(6) pp. 2752–2757, June 2007.

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## CONFERENCE PUBLICATIONS

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- R. S. Srinivasa, M. A. Davenport, and J. Romberg, "Localized random projections with applications to coherent array imaging," in *Proc. Allerton Conf. on Communication, Control, and Computing*, Allerton, Illinois, October 2018.
- T. J. LaGrow, M. G. Moore, J. A. Prasad, M. A. Davenport, and E. L. Dyer, "Approximating cellular densities from high-resolution neuroanatomical imaging data," in *Proc. IEEE Int. Engineering in Medicine and Biology Conf.*, Honolulu, Hawaii, July 2018.
- C.-F. Cheng, D. V. Anderson, M. A. Davenport, and A. Rashidi, "Audio classification on weakly labeled data," in *Proc. IEEE Work. on Statistical Signal Processing*, Freiburg, Germany, June 2018.
- C. A. Sabillon, A. Rashidi, B. Samanta, C. F. Cheng, M. A. Davenport, and D. V. Anderson, "A productivity forecasting system for construction cyclic operations using audio signals and a Bayesian approach," in *Proc. Construction Research Congress (CRC)*, New Orleans, Louisiana, April 2018.
- L. Xu and M. A. Davenport, "Simultaneous recovery of a series of low-rank matrices by locally weighted matrix smoothing," in *IEEE Int. Work. on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, Curaçao, Dutch Antilles, December 2017.
- C. F. Cheng, A. Rashidi, M. A. Davenport, D. V. Anderson, and C. A. Sabillon, "Hardware and software requirements for acoustical monitoring of construction jobsites," in *Proc. Int. Work. On Computing in Civil Engineering (IWCCE)*, Seattle, Washington, June 2017.
- A. K. Massimino and M. A. Davenport, "The geometry of random paired comparisons," in *Proc. IEEE Int. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, New Orleans, Louisiana, March 2017.
- Z. Zhu, S. Karnik, M. B. Wakin, M. A. Davenport, and J. Romberg, "Fast orthogonal approximations of sampled sinusoids and bandlimited signals," in *Proc. IEEE Int. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, New Orleans, Louisiana, March 2017.
- S. Karnik, Z. Zhu, M. B. Wakin, J. K. Romberg, and M. A. Davenport, "Fast computations for approximation and compression in Slepian spaces," in *Proc. IEEE. Global Conf. on Signal and Information Processing (GlobalSIP)*, Washington D. C., December 2016.
- L. Xu and M. A. Davenport, "Dynamic matrix recovery from incomplete observations under an exact low-rank constraint," in *Proc. Advances in Neural Information Processing Systems (NeurIPS)*, Barcelona, Spain, December 2016.
- M. R. O'Shaughnessy and M. A. Davenport, "Localizing users and items from paired comparisons," in *Proc. IEEE Int. Work. on Machine Learning for Signal Processing (MLSP)*, Vietri sul Mare, Salerno, Italy, September 2016.
- M. G. Moore and M. A. Davenport, "Analysis of wireless networks using Hawkes processes," in *Proc. IEEE Int. Work. on Signal Processing Advances in Wireless Communications (SPAWC)*, Edinburgh, Scotland, July 2016.
- C-F. Cheng, A. Rashidi, M. A. Davenport, and D. Anderson, "Audio signal processing for activity recognition of construction heavy equipment," in *Proc. Int. Symp. on Automation and Robotics in Construction (ISARC)*, Auburn, Alabama, July 2016.
- A. K. Massimino and M. A. Davenport, "Binary stable embedding via paired comparisons," in *Proc. IEEE Work. on Statistical Signal Processing (SSP)*, Palma de Mallorca, Spain, June 2016.
- M. G. Moore and M. A. Davenport, "A Hawkes' eye view of network information flow," in *Proc. IEEE Work. on Statistical Signal Processing (SSP)*, Palma de Mallorca, Spain, June 2016.

- M. G. Moore, A. K. Massimino, and M. A. Davenport, "Randomized multi-pulse time-of-flight mass spectrometry," in *Proc. IEEE Int. Work. on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, Cancun, Mexico, December 2015.
- H. Xu, H. Zha, and M. A. Davenport, "Active manifold learning via Gershgorin circle guided sample selection," in *Proc. AAAI Conf. on Artificial Intelligence (AAAI-15)*, Austin, Texas, January 2015.
- H. Xu, H. Zha, and M. A. Davenport, "Manifold based dynamic texture synthesis from extremely few samples," in *Proc. IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, Columbus, Ohio, June 2014.
- M. A. Davenport, "Lost without a compass: Nonmetric triangulation and landmark multidimensional scaling," in *Proc. IEEE Int. Work. on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, Saint Martin, December 2013.
- M. Wootters, Y. Plan, M. A. Davenport, and E. van den Berg, "Lower bounds for quantized matrix completion," in *Proc. IEEE Int. Symp. on Information Theory (ISIT)*, Istanbul, Turkey, July 2013.
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- M. A. Davenport, C. Hegde, M. F. Duarte, and R. G. Baraniuk, "A theoretical analysis of joint manifolds," Rice University ECE Technical Report TREE 0901, January 2009.
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- R. G. Baraniuk, D. Z. Baron, M. F. Duarte, M. Elnozahi, M. B. Wakin, M. A. Davenport, J. N. Laska, J. A. Tropp, Y. Massoud, S. Kirolos, T. Ragheb, "Method and Apparatus for On-Line Compressed Sensing." US Patent No. 8,687,689. Issued April 1, 2014
- R. G. Baraniuk, P. T. Boufounos, S. R. Schnelle, M. A. Davenport, and J. N. Laska, "Method and Apparatus for Compressive Parameter Estimation and Tracking." US Patent No. 8,566,053. Issued October 22, 2013.
- R. G. Baraniuk, J. N. Laska, P. T. Boufounos, and M. A. Davenport, "A Method and Apparatus for Automatic Gain Control for Nonzero Saturation Rates." US Patent No. 8,487,796. Issued July 16, 2013.

- R. G. Baraniuk, M. F. Duarte, M. A. Davenport, and M. B. Wakin, "Method and Apparatus for Signal Detection, Classification and Estimation from Compressive Measurements." US Patent No. 8,483,492. Issued July 9, 2013.
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- R. G. Baraniuk, D. Z. Baron, M. F. Duarte, S. Sarvotham, M. B. Wakin, and M. A. Davenport, "Method and Apparatus for Distributed Compressed Sensing." US Patent No. 7,511,643. Issued March 31, 2009.
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## OPINION PIECES

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- M. A. Davenport, J. N. Laska, C. J. Rozell, and M. B. Wakin, "The Way I See It: The Lessons of Rejection Shouldn't be Overlooked." Rice University News, July 15, 2009.

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## INVITED PRESENTATIONS

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- "Sparse approximation for continuous-time signals," *Cirrus Logic*, Austin, Texas, July 2018.
- "Estimation of inhomogeneous point processes: Theory and applications," *Institute for Mathematics and its Applications (IMA) Workshop on Forecasting from Complexity*, Minneapolis, Minnesota, April 2018.
- "The Fast Slepian Transform," *Mathematical Institute*, Oxford, United Kingdom, June 2017.
- "Low-rank matrix recovery from incomplete observations: An overview and some recent advances," *Alan Turing Institute*, London, United Kingdom, June 2017.
- "The Fast Slepian Transform," *ITG Workshop on Smart Antennas*, Berlin, Germany, March 2017.
- "Localization via paired comparisons and nonmetric multidimensional scaling," *Department of Electrical and Computer Engineering, University of Washington*, Seattle, Washington, August 2016.
- "Localization and nonmetric multidimensional scaling via paired comparisons," *Simons Institute Workshop on Real-Time Decision Making*, Berkeley, California, June 2016.
- "Localization from paired comparisons," *Conference on Information Sciences and Systems (CISS)*, Princeton, New Jersey, March 2016.
- "1-bit matrix completion," *Information and Inference Best Paper Prize Meeting*, Oxford, United Kingdom, August 2015.
- "Constrained adaptive sensing," *ISI World Statistics Congress*, Rio de Janeiro, Brazil, July 2015.
- "Localization via paired comparisons," *ShanghaiTech Symposium on Data Science*, Shanghai, China, June 2015.
- "Adaptive sensing for sparse images," *Lorentz Center Workshop on Transformations in Optics*, Leiden, The Netherlands, May 2015.
- "Compressive sensing," *Lorentz Center Workshop on Transformations in Optics*, Leiden, The Netherlands, May 2015.
- "Localization via paired comparisons," *Department of Mathematics, University of Georgia*, Athens, Georgia, March 2015.
- "Localization via paired comparisons," *Department of Statistics, University of Wisconsin*, Madison, Wisconsin, February 2015.



“Recovery of low-rank matrices from incomplete observations,” *Qualcomm Advanced Modem Technology Forum*, San Diego, California, October 2014.

“Tracking a low-dimensional vector via quantized measurements or pairwise comparisons,” *International Conference on Signal Processing and Communications (SPCOM)*, Bangalore, India, July 2014.

“Tracking a low-dimensional vector via quantized measurements or pairwise comparisons,” *Society for Industrial and Applied Mathematics Annual Meeting*, Chicago, Illinois, July 2014.

“Adaptive sensing of sparse signals in noise,” *Bertinoro Workshop on Sublinear Algorithms*, Bertinoro, Italy, May 2014.

“Adaptive sensing for compressive imaging,” *Imaging and Modeling in Electron Microscopy – Recent Advances*, Banff International Research Station, Canada, May 2014.

“1-bit matrix completion,” *SINE Lab, Colorado School of Mines*, Golden, Colorado, October 2013.

“Sparsity and structure in imaging,” *Chester F. Carlson Center for Imaging Science, Rochester Institute of Technology*, Rochester, New York, October 2013.

“1-bit matrix completion,” *Rice University Departments of Computational and Applied Mathematics / Electrical and Computer Engineering*, Houston, Texas, October 2013.

“1-bit matrix completion,” *Center for Control Science and Technology, University of Texas at Dallas*, Dallas, Texas, September 2013.

“1-bit matrix completion,” *European Conference on Numerical Mathematics and Advanced Applications (ENUMATH)*, Lausanne, Switzerland, August 2013.

“1-bit matrix completion,” *Claremont McKenna College Department of Mathematical Sciences*, Claremont, California, May 2013.

“Adaptive envelope estimation of sparse signals,” *Qualcomm Advanced Modem Technology Forum*, San Diego, California, May 2013.

“A compressive introduction to compressive sensing,” *2013 Annual Meeting of the AAAS*, Boston, Massachusetts, February 2013.

“To adapt or not to adapt: The power and limits of adaptive sensing,” *Colorado School of Mines Department of Electrical Engineering and Computer Science*, Golden, Colorado, May 2012.

“To adapt or not to adapt: The power and limits of adaptive sensing,” *Carnegie Mellon University Department of Electrical and Computer Engineering*, Pittsburgh, Pennsylvania, February 2012.

“To adapt or not to adapt: The power and limits of adaptivity for sparse estimation,” *Carnegie Mellon University Department of Statistics*, Pittsburgh, Pennsylvania, February 2012.

“To adapt or not to adapt: The power and limits of adaptive sensing,” *Johns Hopkins University Department of Electrical and Computer Engineering*, Baltimore, Maryland, February 2012.

“To adapt or not to adapt: The power and limits of adaptive sensing,” *Georgia Institute of Technology School of Electrical and Computer Engineering*, Atlanta, Georgia, February 2012.

“To adapt or not to adapt: The power and limits of adaptive sensing,” *Arizona State University School of Electrical, Computer, and Energy Engineering*, Tempe, Arizona, January 2012.

“To adapt or not to adapt: The power and limits of adaptivity for sparse estimation,” *University of North Carolina Department of Statistics and Operations Research*, Chapel Hill, North Carolina, January 2012.

“How well can we estimate a sparse vector?” *Georgia Institute of Technology School of Electrical and Computer Engineering*, Atlanta, Georgia, November 2011.

“How well can we estimate a sparse vector?” *University of Michigan Department of Mathematics*, Ann Arbor, Michigan, October 2011.

“The pros and cons of compressive sensing,” *University of Wisconsin-Madison Department of Electrical and Computer Engineering*, Madison, Wisconsin, October 2011.

- “The pros and cons of compressive sensing,” *University of Minnesota Department of Electrical and Computer Engineering*, Minneapolis, Minnesota, October 2011.
- “Compressive sensing in practice: Noise, quantization, and real-world signals,” *Foundations of Computational Mathematics (FoCM): Workshop on Computational Harmonic Analysis, Image, and Signal Processing*, Budapest, Hungary, July 2011.
- “Compressive sensing: Theory and practice,” *IBM Watson Workshop: Emerging Leaders in Multimedia and Signal Processing*, Hawthorne, New York, October 2010.
- “Compressive measurements for signal acquisition and processing,” *University of Texas at Austin Department of Electrical and Computer Engineering*, Austin, Texas, June 2010.
- “Compressive measurements for signal acquisition and processing,” *Princeton University Department of Electrical Engineering*, Princeton, New Jersey, May 2010.
- “Corruption, justice, and democracy in compressive sensing,” *University of Michigan Department of Electrical Engineering and Computer Science*, Ann Arbor, Michigan, March 2010.
- “Corruption, justice, and democracy in compressive sensing,” *Colorado School of Mines Department of Electrical and Computer Engineering*, Golden, Colorado, March 2010.
- “Compressive imaging: Theory and practice,” *Workshop on Imaging in Electron Microscopy II*, Columbia, South Carolina, February 2010.
- “Starting and running an open access journal,” *Scholarly Communications Workshop, Rice University*, Houston, Texas, October 2009.

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## SHORT COURSES AND TUTORIALS

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- “Low-rank matrix completion: An overview and some recent advances,” *Minitutorial on Compressed Sensing/Dimensionality Reduction, SIAM Annual Meeting*, Pittsburgh, Pennsylvania, July 2017. (Part of a series of lectures co-organized with Deanna Needell and Jeff Blanchard)
- “The fundamentals of compressive sensing,” *Department of Electronics and Communication Engineering, National Institute of Technology Karnataka*, Mangalore, India, July 2014.
- “The Fundamentals of Compressive Sensing.” Three part tutorial on compressive sensing produced for IEEE Signal Processing Society Online Video Library, 2013. [<http://bit.ly/1XkIRjD>]
- “The fundamentals of compressive sensing,” *IEEE Signal Processing Society Summer School on Compressive Sensing and MIMO Signal Processing Systems*, National Tsing-Hua University, Hsinchu, Taiwan, July 2012.
- “Compressive sensing in noise and the role of adaptivity,” *JASON Compressed Sensing Study*, La Jolla, California, June 2012.
- “The fundamentals of compressive sensing,” *JASON Compressed Sensing Study*, La Jolla, California, June 2012.
- “Compressive sensing,” *Course on Sparse Representations, Compressed Sensing, and Machine Learning at US Naval Research Laboratory*, Washington, DC, September 2011. (Part of a 4 day course co-taught with Michael Elad and Yann LeCun)

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## OTHER PRESENTATIONS

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- “Learning from adaptive paired comparisons,” *Georgia Institute of Technology Quantitative Psychology Brown Bag Series*, Atlanta, Georgia, January 2019.
- “The Fast Slepian Transform,” *Information Theory and Applications Workshop (ITA)*, San Diego, California, February 2017.

- “Learning from pairwise comparisons,” *Information Theory and Applications Workshop (ITA)*, San Diego, California, February 2015.
- “Matrix recovery from coarse observations,” *Foundations of Computational Mathematics (FoCM): Workshop on Computational Harmonic Analysis, Image, and Signal Processing*, Montevideo, Uruguay, December 2014.
- “On the power and limits of adaptivity for sparse signal acquisition,” *Georgia Institute of Technology School of Industrial and Systems Engineering Statistics Seminar*, Atlanta, Georgia, October 2014.
- “Matrix completion: How to deal with massively undersampled datasets,” *Georgia Institute of Technology Quantitative Psychology Brown Bag Series*, Atlanta, Georgia, September 2013.
- “1-bit matrix completion,” *Georgia Institute of Technology School of Industrial and Systems Engineering Statistics Seminar*, Atlanta, Georgia, April 2013.
- “1-bit matrix completion,” *Information Theory and Applications Workshop (ITA)*, San Diego, California, February 2013.
- “1-bit matrix completion,” *Georgia Institute of Technology School of Mathematics Stochastics Seminar*, Atlanta, Georgia, February 2013.
- “Compressive sensing and signal processing,” *Georgia Institute of Technology, ECE 8010*, Atlanta, Georgia, September 2012.
- “A simple framework for analog compressive sensing,” *International Symposium on Mathematical Programming (ISMP)*, Berlin, Germany, August 2012.
- “On the fundamental limits of adaptive sensing,” *Information Theory and Applications Workshop (ITA)*, San Diego, California, February 2012.
- “The limits of adaptive sensing,” *University of California, Berkeley Networking, Communications, and DSP Seminar*, Berkeley, California, December 2011.
- “Corruption, justice, and democracy in compressive sensing,” *Information Theory and Applications Workshop (ITA)*, San Diego, California, January 2010.
- “Sparse geodesic paths,” *NeurIPS Workshop on Manifolds, Sparsity, and Structured Models: When Can Low-Dimensional Geometry Really Help?* Whistler, Canada, December 2009.
- “Compressive radio receivers,” *Communication Theory Workshop (CTW)*, Napa, California, May 2009.
- “Joint manifold models for collaborative inference,” *Institute for Mathematics and Its Applications Hot Topics Workshop: Multi-Manifold Data Modeling and Applications*, Minneapolis, Minnesota, October 2008.
- “Sparse spectral unmixing,” *Computational Imaging VI at SPIE Electronic Imaging*, San Jose, California, January 2008.
- “Compressive signal processing,” *MADALGO Summer School on Data Stream Algorithms*, Aarhus, Denmark, August 2007.
- “Compressive sensing: A new approach to data acquisition,” *Mitsubishi Electronic Research Labs (MERL)*, Boston, Massachusetts, July 2007.
- “The Johnson-Lindenstrauss lemma meets compressed sensing,” *Sparse Approximation Workshop*, Princeton, New Jersey, November 2006.