

Matthew R. O'Shaughnessy

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RESEARCH INTERESTS Machine learning, causal inference, compressed sensing and low-dimensional structure in inference, dynamics and dynamical systems

EDUCATION **Ph.D. Electrical & Computer Engineering** August 2016 — Present
Georgia Institute of Technology, Atlanta, GA
Supported by NDSEG Fellowship, 2017–2021
Co-Advisors: Prof. Mark Davenport, Prof. Christopher Rozell
Thesis: “Structure, Causality, and Dynamics in Statistical Inference”

M.S. Mathematics December 2019
Georgia Institute of Technology, Atlanta, GA

B.S. Electrical Engineering May 2016
Georgia Institute of Technology, Atlanta, GA
Designations: Highest Honors, Research Option, Co-op Option

WORK EXPERIENCE **MIT Lincoln Laboratory** Summer 2016
Open and Embedded Systems Group (102)

Georgia Tech Research Institute Summer 2014, Spring 2015, Fall 2015
Electro-Optical Systems Lab (*full time, three semesters*)

Boeing Company Summer 2015
DSP Algorithms Group, Boeing Satellite Systems

JOURNAL PUBLICATIONS [J3] **M. O'Shaughnessy**, G. Canal, M. Connor, M. Davenport, and C. Rozell, “Generative Causal Explanations of Black-Box Classifiers,” *Submitted*, June 2020.

[J2] P. Brown, **M. O'Shaughnessy**, C. Rozell, J. Romberg, and M. Flynn, “A 17.8 MS/s Compressed Sensing Radar Accelerator Using a Spiking Neural Network,” *Submitted*, 2020.

[J1] **M. O'Shaughnessy**, M. Davenport, and C. Rozell, “Sparse Bayesian Learning with Dynamic Filtering for Inference of Time-Varying Sparse Signals,” *IEEE Transactions on Signal Processing*, December 2019.

CONFERENCE PUBLICATIONS [C7] G. Canal, M. Connor, J. Jin, N. Nadagouda, **M. O'Shaughnessy**, C. Rozell, and M. Davenport, “The PICASSO Algorithm for Bayesian Localization via Paired Comparisons in a Union of Subspaces Model,” in *Proc. IEEE Int. Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Barcelona, Spain, May 2020.

[C6] P. Brown, **M. O'Shaughnessy**, C. Rozell, J. Romberg, and M. Flynn, “A 17.8MS/s Neural-Network Compressed Sensing Radar Processor in 16nm FinFET CMOS,” in *Proc. IEEE Custom Integrated Circuits Conf. (CICC)*, Boston, MA, March 2020.

[C5] **M. O'Shaughnessy**, M. Davenport, and C. Rozell, "Dynamical System Implementations of Sparse Bayesian Learning," in *Proc. IEEE Int. Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, Guadeloupe, West Indies, December 2019.

[C4] G. Canal*, **M. O'Shaughnessy*** (equal contribution), C. Rozell, and M. Davenport, "Joint Estimation of Trajectory and Dynamics from Paired Comparisons," in *Proc. IEEE Int. Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, Guadeloupe, West Indies, December 2019.

[C3] **M. O'Shaughnessy**, M. Davenport, and C. Rozell, "Robust Incorporation of Signal Predictions into the Sparse Bayesian Learning Framework," In *Proc. IEEE Workshop on Signal Processing with Adaptive Sparse Structured Representations (SPARS)*, Toulouse, France, July 2019.

[C2] **M. O'Shaughnessy** and M. Davenport, "Localizing Users and Items from Paired Comparisons," In *Proc. IEEE Int. Workshop on Machine Learning for Signal Processing (MLSP)*, Vietri sul Mare, Salerno, Italy, September 2016.

[C1] R. Ortman, D. Carr, R. James, D. Long, **M. O'Shaughnessy**, C. Valenta, and G. Tuell, "Real-time, Mixed-mode Computing Architecture for Waveform-resolved Lidar Systems with Total Propagated Uncertainty," in *Proc. SPIE Defense and Commercial Sensing*, Baltimore, Maryland, April 2016.

OTHER TECHNICAL PUBLICATIONS

[O5] **M. O'Shaughnessy**, "Security Implications of Machine Learning Enabled Disinformation," in *Innovate for Future Threats: Disruptive Innovation Efforts and Uses of the Technology Environment by State and Non-state Actors*, May 2020.

[O4] **M. O'Shaughnessy**, "Localizing Embeddings for Recommendation Systems using Binary Paired Comparisons," *Undergraduate Thesis*, Georgia Institute of Technology, May 2016.

[O3] G. Tuell, D. Carr, N. Guida, **M. O'Shaughnessy**, "Strategies for Mitigating Sea Surface Effects in the Workflow of Deployed Topo-Bathy Lidar Systems," *Technical Report to NOAA*, September 2015.

[O2] G. Tuell, D. Carr, N. Guida, **M. O'Shaughnessy**, "On the Relationship between Resolution of Sea Surface DEMs and Accuracy of Refracted Angle based on Analysis of Empirical Data," *Technical Report to NOAA*, July 2015.

[O1] G. Tuell, D. Carr, N. Guida, **M. O'Shaughnessy**, "Procedures and Algorithms for Raytracing Lidar Measurements Through an Irregular Sea Surface," *Technical Report to NOAA*, May 2015.

PATENTS

[P1] **M. O'Shaughnessy**, G. Canal, M. Connor, M. Davenport, and C. Rozell, "Generative Causal Explanations of Black-Box Classifiers." U.S. Provisional Patent Application No. 63/043,331. Filed June 2020.

EDITORIALS AND COMMENTARY

[E2] **M. O'Shaughnessy**, "Will Machine Learning Supercharge Disinformation?" *The Cipher Brief*, to appear.

[E1] **M. O'Shaughnessy**, "Opinion: Deporting International Students if Classes Go Online Hurts U.S. Colleges and Economy," *The Atlanta Journal-Constitution*, July

9, 2020.

TEACHING EXPERIENCE

Undergraduate Student Supervision

Mark Faingold, Miguel Garcia*, Jason Palmer

2019 — 2020

Opportunity Research Scholars (ORS) program

*Awarded Georgia Tech President's Undergraduate Research Award (PURA)

Undergraduate Teaching Assistant

August 2013 — May 2016

Recitation instructor, CS 1371 (Computing for Engineers)

(6 semesters)

Senior TA and Tech Team lead, 2015–2016

AWARDS

National Defense Science & Engineering Graduate (NDSEG) Fellowship, 2017—2021
Fellow, Sam Nunn Security Program, 2019—2020

Georgia Tech President's Undergraduate Research Award, 2015

3rd Place, Opportunity Research Scholars Poster Contest, 2014

2nd Place, Opportunity Research Scholars Poster Contest, 2013

Kelley Family Music Scholarship, 2013

National Merit Scholarship, 2012—2016

Zell Miller Scholarship, 2012—2016

Georgia Tech Dean's List; Faculty Honors, 2012—2016

REVIEWER SERVICE

IEEE Transactions on Signal Processing, 2018, 2019, 2020

IEEE Wireless Communication Letters, 2020

SIAM Journal of Applied Dynamical Systems, 2020

Workshop on Signal Processing with Adaptive Sparse Structured Representations (SPARS), 2019

Georgia Tech President's Undergraduate Research Award, 2016, 2017, 2018, 2019, 2020

OTHER SERVICE

Guest Lecturer, *Machine learning in 90 minutes*, Georgia Tech MBA Class, 2020

Organizer, Children of the Norm Group Meeting, 2019 — Present

Mentor, School of ECE Graduate Student Organization, 2019

Website Developer, GT Center for Signal & Information Processing, 2018

Member, Center for Signal & Information Processing Student Activities Committee

ECE Section Editor, The Tower Undergraduate Research Journal, 2015–2016

Treasurer, Society for Photonics & Optics, Georgia Tech Student Chapter, 2015