

Matthew R. O'Shaughnessy

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RESEARCH INTERESTS

Machine learning, causal inference, low-dimensional structure.
Public policy, AI policy, human information processing.

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: “Causal methods for understanding complex systems”

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 Satellite Systems Summer 2015
DSP Algorithms Group

JOURNAL PUBLICATIONS

[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,” *IEEE Journal of Solid State Circuits*, September 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

[C9] **M. O'Shaughnessy**, G. Canal, M. Connor, M. Davenport, and C. Rozell, “Generative Causal Explanations of Black-Box Classifiers,” to appear in *Proc. Advances in Neural Information Processing Systems (NeurIPS)*, Vancouver, BC, Canada, December 2020 (Acceptance rate 20.1%).

[C8] A. Willats, **M. O'Shaughnessy**, K. Johnson, and C. Rozell, “When are Open- and Closed-Loop Control Needed for Causal Inference in Neural Circuits?,” in *Proc. NeuroMatch 3.0*, Online, October 2020.

[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 PUBLICATIONS

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

[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/ COMMENTARY	[E2] M. O'Shaughnessy , "Will Machine Learning Supercharge Disinformation?" <i>The Cipher Brief</i> , September 2, 2020.	
	[E1] M. O'Shaughnessy , "Opinion: Deporting International Students if Classes Go Online Hurts U.S. Colleges and Economy," <i>The Atlanta Journal-Constitution</i> , July 9, 2020.	
TEACHING EXPERIENCE	Undergraduate Student Supervision	
	Alec Helbling	2020 – Present
	Miguel Garcia ^{†*}	2019 – Present
	Mark Faingold [†]	2019 – 2020
	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	
	Principal Violist, Georgia Tech Symphony Orchestra, 2014	
	Kelley Family Music Scholarship, 2013	
	Georgia Tech Dean's List; Faculty Honors, 2012 – 2016	
	National Merit Scholarship, 2012 – 2016	
	Zell Miller Scholarship, 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 – 2020	
OTHER ACTIVITY	Committee Member , IEEE-USA AI Policy Committee, 2020 – Present	
	Chair, Graduate Student Senate , GT Student Government Association, 2021	
	Graduate Student Senator , GT Student Government Association, 2020	
	Committee Member , GT SGA Strategic Assessment and Navigation Cmte., 2020	
	Committee Member , GT Technology Fee Advisory Committee, 2020 – 2021	
	Participant , NAGPS Virtual Legislative Action Days, Fall 2020	
	Guest Lecturer , <i>Machine learning in 90 minutes</i> , 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	