# Matthew R. O'Shaughnessy

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## Education

**Ph.D. Electrical and Computer Engineering** 2016 – 2021
Georgia Institute of Technology
Center for Machine Learning
Advisors: Mark Davenport, Christopher Rozell
Thesis: *Structure and causality in understanding complex systems*

**M.S. Mathematics** 2016 – 2019
Georgia Institute of Technology

**B.S. Electrical Engineering** 2012 – 2016
Georgia Institute of Technology
Highest Honors

## Honors

**Finalist**, Presidential Management Fellowship (declined) 2022
**National Defense Science & Engineering Graduate Fellowship** 2017 – 2021
(acceptance rate ~5%; total value >$250k)
**Selected Fellow**, ScienceATL Science Communication Fellowship 2021
**Winner**, Georgia Tech International Affairs Paper Competition 2021
**Nominee**, Cleaver Outstanding Ph.D. Dissertation Proposal Award 2020
**Selected Fellow**, Sam Nunn Security Program 2019 – 2020

## Industry 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

**M. O'Shaughnessy**, M. Davenport, and C. Rozell, "Distance Preservation in State-Space Methods for Detecting Causal Interactions in Dynamical Systems," *Submitted*, February 2022.

**M. O'Shaughnessy**, L. Tournas*, W. Johnson*, C. Rozell†, and K. Rommelfanger†, "Neuroethics Guidance Documents: Principles, Indicators, and Implementation Strategies," *Submitted*, February 2022.

**M. O'Shaughnessy**, D. Schiff, L. Varshney, C. Rozell*, and M. Davenport*, "What Governs Attitudes toward Artificial Intelligence Adoption and Governance?," *Submitted*, December 2021.

S. Alagapan, ..., **M. O'Shaughnessy**, ..., H. Mayberg*, and C. Rozell*, "Cingulate Dynamics Track Depression Recovery with Deep Brain Stimulation," *Submitted*, September 2021.

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.

**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**

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

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.

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.

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.

**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.

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.

**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.

**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.

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**

**M. O'Shaughnessy**, "Structure and Causality in Understanding Complex Systems," *Ph.D. Thesis*, Georgia Institute of Technology, October 2021.

**M. O'Shaughnessy**, "Security Implications of Machine Learning Enabled Disinformation," to appear in *M. Kosal, ed., Innovate for Future Threats: Disruptive Innovation Efforts and Uses of the Technology Environment by State and Non-state Actors*, 2021.

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

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.

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.

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**

**M. O'Shaughnessy**, G. Canal, M. Connor, M. Davenport, and C. Rozell, "Methods for Generating and Providing Causal Explanations of Artificial Intelligence Models and Devices Thereof." International Patent Application PCT/US2021/038884. Filed June 2021.

**Editorials / Commentary**

**M. O'Shaughnessy**, "Will Machine Learning Supercharge Disinformation?" *The Cipher Brief*, September 2, 2020.

**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**

| | |
|---|---|
| Alec Helbling* | 2020 – Present |
| Miguel Garcia* | 2019 – 2020 |
| Mark Faingold | 2019 – 2020 |
| Jason Palmer | 2019 – 2020 |

*Awarded Georgia Tech President's Undergraduate Research Award

**Undergraduate Teaching Assistant** 2013 – 2016
Recitation instructor, CS 1371 (Computing for Engineers) (*6 semesters*)
Senior TA and Tech Team lead, 2015–2016

**Reviewer Service**

IEEE Transactions on Signal Processing, 2018, 2019, 2020, 2021
IEEE Wireless Communication Letters, 2020
SIAM Journal of Applied Dynamical Systems, 2021
Workshop on Signal Processing with Adaptive Sparse Structured Representations (SPARS), 2019
Georgia Tech President's Undergraduate Research Award, 2016 – 2020

**Service at Georgia Tech**

**Chair, Graduate Student Senate**, GT Student Government Association, 2021
**Graduate Student Senator**, GT Student Government Association, 2020
**Committee Member**, GT Technology Fee Advisory Committee, 2020 – 2021
**Organizer**, Children of the Norm Group Meeting, 2019 – 2020
**Mentor**, School of ECE Graduate Student Organization, 2019
**Member**, Center for Signal & Information Processing Student Activities Committee, 2017 – 2019
**Website Developer**, GT Center for Signal & Information Processing, 2018
**ECE Section Editor**, The Tower Undergraduate Research Journal, 2015 – 2016

**Other Activity**

**Co-chair**, IEEE-USA AI Policy Subcmte. on Democratic Use of AI, 2021 – Present
**Member**, IEEE-USA AI Policy Committee, 2020 – Present
**Member**, MD4SG Working Group on Algorithms, Policy, and Law, 2021 – Present
**Member**, Working Group on Designing Mechanisms for Fairness and Transparency in Mediated Markets, Fall 2021
**Member**, IEEE Cmte. on Concentration of Power from AI Systems, Spring 2021

**Participant**, IEEE-USA Congressional Visit Day, 2021
**Guest Lecturer**, *Machine learning in 90 minutes*, Georgia Tech MBA Class, 2020
**Selected Fellow**, Sam Nunn Security Program (GT School of International Affairs), 2019 – 2020