Matthew R. O'Shaughnessy

Carnegie Endowment for International Peace
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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

Employment

Carnegie Endowment for International Peace July 2022 – Present
Visiting Fellow, Technology & International Affairs Program

Georgia Tech School of Electrical & Computer Engineering 2016 – 2022
Graduate Research Fellow, Machine Learning Center

MIT Lincoln Laboratory Summer 2016
Intern, Open and Embedded Systems Group (102)

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

Boeing Satellite Systems Summer 2015
Intern, DSP Algorithms Group

Honors

Open Philanthropy Technology Policy Fellowship 2022 – 2023
Presidential Management Fellowship (declined) 2022
Nat'l Defense Science & Engineering Graduate Fellowship 2017 – 2021
(acceptance rate ∼5%; total value >$250k)
ScienceATL Science Communication Fellowship 2021
Winner, Georgia Tech International Affairs Paper Competition 2021
Nominee, Cleaver Outstanding Ph.D. Dissertation Proposal Award 2020
Sam Nunn Security Program Fellowship 2019 – 2020

Journal Publications

M. O'Shaughnessy, D. Schiff, L. Varshney, C. Rozell*, and M. Davenport*, "What Governs Attitudes toward Artificial Intelligence Adoption and Governance?," Forthcoming in *Science and Public Policy*, April 2022.

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.

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

Other Activity

Co-chair, IEEE-USA AI Policy Subcmte. on Democratic Use of AI, 2021 – Present
Chair, Graduate Student Senate, GT Student Government Association, 2021
Member, IEEE-USA AI Policy Committee, 2020 – Present
Member, MD4SG Working Group on Algorithms, Policy, and Law, 2021 – Present
Graduate Student Senator, GT Student Government Association, 2020
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