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: Research Option, Co-op Option, Highest Honors

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

TEACHING EXPERIENCE

Undergraduate Research Mentor August 2019 — May 2020
Mark Faingold, Miguel Garcia, and Jason Palmer
Georgia Tech Opportunity Research Scholars (ORS) program
Project: Exploring the latent space of generative models using paired comparisons

Undergraduate Teaching Assistant August 2013 — May 2016
Recitation instructor — Georgia Tech CS 1371 (Computing for Engineers)

JOURNAL PUBLICATIONS

[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, M. Davenport, and C. Rozell, "The PICASSO Algorithm for Bayesian Localization via Paired Comparisons in a Union of Subspaces Model," to appear 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," to appear 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

[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.

AWARDS

National Defense Science & Engineering Graduate (NDSEG) Fellowship, 2017—2021
Fellow, Georgia Tech 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

IEEE Transactions on Signal Processing
Workshop on Signal Processing with Adaptive Sparse Structured Representations (SPARS)
IEEE Wireless Communication Letters
Georgia Tech President's Undergraduate Research Award

SERVICE

Organizer, Children of the Norm Group Meeting, 2019 — Present
Website Developer, GT Center for Signal & Information Processing, 2018
Mentor, School of ECE Graduate Student Organization New Graduate Student Mentorship Program, 2019
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