Amanda Merkley

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Education

Carnegie Mellon University *Pittsburgh, PA*

PhD Electrical Engineering *August 2021 - present*

- Advisor: Dr. Pulkit Grover

Colorado State University *Fort Collins, CO*

BS Computer Engineering, BS Mathematics *May 2020*

- GPA: 3.97 (*magna cum laude*)

Research Experience

Carnegie Mellon University - Dept of Electrical & Computer Engineering *Pittsburgh, PA*

Advisor: Dr. Pulkit Grover *August 2021 - Present*

- Develop variational autoencoder models to quantify latent indirect influences and interactions between neural populations
- Develop a theoretical framework for modeling latent representations of communication, applied to mouse spiking data
- Statistical analysis to quantify effects of deep brain stimulation on functional networks in invasive human recordings
- Identify high-order interactions and information in human neural data during conflict processing with Stroop task
- Design and run cognitive experiments on over 20 human epilepsy patients implanted with intracranial depth electrodes

Massachusetts Institute of Technology - Center for Brains, Minds, & Machines *Boston, MA*

Advisor: Dr. Nancy Kanwisher *June 2019-August 2019*

- Designed and ran experiments to study object permanence, analyzed MEG data in 5 human subjects

Colorado State University - Dept of Electrical & Computer Engineering *Fort Collins, CO*

Advisor: Dr. Sourajeet Roy *September 2017-January 2019*

- Studied uncertainty quantification of carbon nanotube circuits using polynomial chaos

Publications

S. Jaffee, N. Gupta, D. Kramer, D. M. Kusyk, J. Valeriano, **A. Merkley**, T. Kite, S. Arora, P. Grover, and A. C. Whiting. "Stereo-electroencephalography in the setting of a preexisting deep brain stimulation device: illustrative case." Journal of Neurosurgery: Case Lessons, 2025.

C. Goswami and **A. Merkley**. "Analytically deriving partial information decomposition for affine systems of stable and convolution-closed distributions." Advances in Neural Information Processing Systems, 2024.

A. Merkley and P. Grover. "Understanding neural population communication with latent channels." Allerton Conference on Communication, Control, and Computing, 2024.

A. Merkley, A. Y. Nam, Y. K. Hong, and P. Grover. "Message-relevant dimension reduction of neural populations." IEEE International Symposium on Information Theory, 2024.

Y. Li, S. Bhatnagar, **A. Merkley**, D. Weber, and S. Roy. "A predictor–corrector algorithm for fast polynomial chaos-based uncertainty quantification of multi-walled CNT interconnects." IEEE Trans on CPMT, 9(10), pp. 1963-1975, 2019.

S. Bhatnagar, **A. Merkley**, R. Berdine, Y. Li, and S. Roy, "Variability-aware performance assessment of multi-walled carbon nanotube interconnects using a predictor-corrector polynomial chaos scheme," in 2018 IEEE EDAPS, 2018.

Industry Experience

Western Digital Corporation *Longmont, CO*

ASIC Development Engineer *June 2020 - June 2021*

- Verification of servo processor in enterprise hard drive ASIC using SystemVerilog and UVM

Presentations

October 2024. *Characterizing high-order interactions during conflict processing in patients with epilepsy*. Poster: Society for Neuroscience 2024, Chicago, IL.

September 2024. *Understanding neural population communication with latent channels*. Talk: Allerton 2024, Urbana-Champaign, IL.

July 2024. *Message-relevant dimension reduction of neural populations*. Talk: ISIT 2024, Athens, Greece.

June 2023. *Computing unique information for Poisson sources*. Poster: Decomposing Multivariate Info in Complex Systems, Dresden, Germany.

January 2023. *Estimating the existence of unique information in the barrel cortex*. Poster: Biophysics & Quant Bio in the AI Era, Pittsburgh, PA.

Awards & Fellowships

2025 **URA-Sandia Grad Student Summer Fellowship**, Oak Ridge Inst. for Science & Education
Waibel Presidential Fellowship, Carnegie Mellon University, School of Computer Science

2023 **Exemplary Qualifying Exam Performance**, Carnegie Mellon University, ECE Department

2022 **NSF GRFP**, National Science Foundation
Fritsch Family Fellowship, Carnegie Mellon University, ECE Department

2021 **NIH T-32 Neural Interfacing Traineeship**, National Institutes of Health

2019 **Astronaut Scholarship**, Astronaut Scholars Foundation
Goldwater Scholarship, Goldwater Foundation
Richard E. Merwin Student Scholarship, IEEE Computer Society

Service & Teaching

Summer 2024 **Summer Internship Mentor**, Mentored 2 undergraduate students

July 2024 **ISIT 2024 Neuroscience + Information Theory Workshop**, Workshop co-organizer

Spring 2024 **Teaching Assistant**, Information Theory Measures (18-753)

2021-2023 **ECE Graduate Organization**, Carnegie Mellon University, Treasurer

2017-2019 **IEEE Colorado State University**, Colorado State University, President