David Zoltowski

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EXPERIENCE

Stanford University **Jul. 2022 – Present**
Postdoctoral Scholar, Department of Statistics *Palo Alto, CA*

- Performing interdisciplinary research in computational neuroscience and machine learning
- Created and applied multiple statistical approaches for the analysis of large-scale neural datasets
- Developed algorithms for parallelizing nonlinear sequence models and applied these approaches to speed up MCMC sampling by an order of magnitude on GPUs
- Received Wu Tsai Interdisciplinary Postdoctoral Scholarship

Facebook Reality Labs **Jul. 2020 - Oct. 2020**
Research Scientist Intern *Menlo Park, CA*

- Contributed to the development of non-invasive, EMG-based neural interfaces
- Developed machine learning algorithms and architectures in PyTorch for decoding intent from EMG activity

Princeton University **Sep. 2016 - Aug. 2017**
Research Assistant with Professor Jonathan Pillow *Princeton, NJ*

- Performed statistical modeling of neural activity recorded during decision-making

EDUCATION

Princeton University **Sep. 2017 - May 2022**
Ph.D. in Neuroscience, Graduate Certificate in Statistics & Machine Learning *Princeton, NJ*

- Advised by Professor Jonathan Pillow
- Published papers in computational neuroscience & machine learning in *Neuron*, *NeurIPS*, *ICML*, among others
- Developed and applied multiple statistical approaches for analyzing neural recordings
- Proposed a new Monte Carlo gradient estimation method via differentiation of slice sampling

University of Cambridge **Sep. 2015 - Aug. 2016**
M.Phil. in Engineering *Cambridge, UK*

- Modeled behavioral datasets and studied machine learning, advised by Professor Máté Lengyel

Michigan State University **Aug. 2011 - May 2015**
Bachelor of Science, Electrical Engineering *East Lansing, MI*

- **GPA: 4.0/4.0**; Board of Trustees' Award for Top Graduating GPA, Churchill Scholar, Goldwater Scholar
- Performed research that led to 3 engineering conference publications and a paper in *IEEE Trans. Biomedical Eng.*
- Varsity swimming & diving team for 4 years, 2 year team captain, NCAA Academic All-American (2nd team)

SKILLS

- **Programming:** Python, Matlab, Julia, version control (Git)
- **Machine Learning Libraries:** JAX, PyTorch, TensorFlow
- **Scientific Computing:** Pandas, Scikit-learn, Matplotlib, Weights & Biases

SELECTED PUBLICATIONS - Full List on Google Scholar

- **David Zoltowski***, Skyler Wu*, Xavier Gonzalez, Leo Kozachkov, Scott Linderman. "Parallelizing MCMC Across the Sequence Length." *Under review* (2025).

- Christopher Versteeg, Jonathan D McCart, Mitchell Ostrow, **David Zoltowski**, and others. "Computation-through-Dynamics Benchmark: Simulated datasets and quality metrics for dynamical models of neural activity." *bioRxiv* (2025).
- Francis R. Willett, Jingyuan Li, Trung Le, Chaofei Fan, Mingfei Chen, Eli Shlizerman, Yue Chen, Xin Zheng, Tatsuo S. Okubo, Tyler Benster, Hyun Dong Lee, Maxwell Kounga, E. Kelly Buchanan, **David Zoltowski**, Scott W. Linderman, Jaimie M. Henderson. "Brain-to-Text Benchmark '24: Lessons Learned." *arXiv:2412.17227* (2024).
- Amber Hu, **David Zoltowski**, Aditya Nair, David Anderson, Lea Duncker, and Scott Linderman. "Modeling Latent Neural Dynamics with Gaussian Process Switching Linear Dynamical Systems." *Advances in Neural Information Processing Systems* (2024).
- Julia C Costacurta, Shaunak Bhandarkar, **David Zoltowski**, and Scott W Linderman. "Structured flexibility in recurrent neural networks via neuromodulation." *Advances in Neural Information Processing Systems* (2024).
- Orren Karniol-Tambour, **David Zoltowski**, E. Mika Diamanti, Lucas Pinto, David W. Tank, Carlos W. Brody, and Jonathan W. Pillow. "Modeling state-dependent communication between brain regions with switching nonlinear dynamical systems." *International Conference on Learning Representations (ICLR)* (2024).
- Michael Bukwich, Malcolm G. Campbell, **David Zoltowski**, Lyle Kingsbury, Momchil S. Tomov, Joshua Stern, HyungGoo R. Kim, Jan Drugowitsch, Scott W. Linderman, and Naoshige Uchida. "Competitive integration of time and reward explains value-sensitive foraging decisions and frontal cortex ramping dynamics." *bioRxiv* (2023).
- **David Zoltowski**, Diana Cai, and Ryan P. Adams. "Slice Sampling Reparameterization Gradients." *Advances in Neural Information Processing Systems* (2021).
- Felix Pei, Joel Ye, **David Zoltowski**, Anqi Wu, Raeed H. Chowdhury, Hansem Sohn, *Benchmark Track* Joseph E. O'Doherty et al. "Neural Latents Benchmark '21: Evaluating latent variable models of neural population activity." In *Thirty-fifth Conference on Neural Information Processing Systems Datasets and Benchmarks Track (Round 2)*. 2021.
- Stephen Keeley, **David Zoltowski**, Mikio Aoi, and Jonathan Pillow. "Modeling statistical dependencies in multi-region spike train data." *Current Opinion in Neurobiology* 65 (2020): 194-202.
- **David Zoltowski**, Jonathan Pillow, and Scott Linderman. "A general recurrent state space framework for modeling neural dynamics during decision-making." *International Conference on Machine Learning (ICML). PMLR,* 2020.
- Stephen Keeley, **David Zoltowski**, Yiyi Yu, Spencer Smith, and Jonathan Pillow. "Efficient non-conjugate Gaussian process factor models for spike count data using polynomial approximations." *International Conference on Machine Learning, pp. 5177-5186. PMLR,* 2020.
- **David Zoltowski**, Kenneth Latimer, Jacob Yates, Alexander Huk, and Jonathan Pillow. "Discrete stepping and nonlinear ramping dynamics underlie spiking responses of LIP neurons during decision-making." *Neuron,* 2019.
- **David Zoltowski** and Jonathan Pillow. "Scaling the Poisson GLM to massive neural datasets." *Advances in Neural Information Processing Systems* (2018).
- Arash Mahyari, **David Zoltowski**, Edward Bernat, and Selin Aviyente. "A tensor decomposition based approach for detecting dynamic network states from EEG." *IEEE Transactions on Biomedical Engineering*, 2017.

SELECTED TALKS

- Statistical Analysis of Neural Data (SAND). June 2025.
- Cosyne Workshop, Reconstructing Dynamical Systems from Neural Data. March 2024.
- Asilomar Conference on Signals, Systems, and Computers. Nov. 2023.
- Society for Neuroscience (SFN), Neuronal Mechanisms of Decision Making Nanosymposium. Nov. 2022.

ACADEMIC SERVICE

- Reviewer for *NeurIPS* (2019 top 400 reviewer, 2022-2025), *ICML* (2022, 2025), *AISTATS (2020-2021)*
- Mentor, Stanford Undergraduate Honors Thesis (2023)

GENERAL INTERESTS

- AI & Science, Interpretability, Running, Swimming, Hiking, Traveling