

Mozes Jacobs

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EDUCATION

- **Harvard University** 2023 - 2028 (expected)
Ph.D. Computer Science | Advised by Prof. Demba Ba | Kempner Institute Graduate Fellowship Cambridge, MA
- **University of Washington** 2018 - 2022
B.S. Computer Science | Advised by Prof. Rajesh Rao | GPA: 3.99 / 4.00 Seattle, WA

PUBLICATIONS AND PREPRINTS

- [1.] **Jacobs, M., Budzinski RC., Muller L., Ba D., Keller TA. (2025). [Traveling Waves Integrate Spatial Information Intro Spectral Representations](#). To appear at the *ICLR 2025 Re-Align Workshop*.**
- [2.] **Jacobs, M., Budzinski RC., Muller L., Ba D., Keller TA. (2025). [Traveling Waves Integrate Spatial Information Through Time](#).**
- [3.] **Jacobs, M., Brunton BW., Brunton SL., Kutz JN., Raut RV. (2023). [HyperSINDY: Deep Generative Modeling of Nonlinear Stochastic Governing Equations](#).**
- [4.] **Jacobs, M., Jiang LP., Rao RP. (2022). [Gradient Original Predictive Coding](#). Undergraduate senior thesis.**

PROFESSIONAL EXPERIENCE

- **CRISP Group** 2023 - Present
Graduate Research Assistant | Advisor: Demba Ba Cambridge, MA
 - **Traveling Waves for Object Centric learning** Designed convolutional recurrent models that utilize traveling waves for global spatial information integration, employing spectral decomposition to enhance receptive fields and outperforming local feed-forward networks on visual semantic segmentation tasks.
 - **Object-Centric Learning** Developing object-centric vision models for scene understanding that can decompose images into individual entities.
 - **Dynamic Slot Attention** Created an extension to Slot Attention enabling dynamic slot number selection via integration of Dirichlet process mixture models.
 - **Relational Reasoning** Analyzed relational comprehension in large-scale vision-language models, such as CLIP.
- **Allen Institute | AI Institute in Dynamic Systems** 2022 - 2023
Shanahan Foundation Predoctoral Fellow | Advisors: J. Nathan Kutz, Steve Brunton, Ryan Raut Seattle, WA
 - **HyperSINDy** Developed *HyperSINDy*, a probabilistic framework for modeling stochastic dynamics via a deep generative model of sparse governing equations. *HyperSINDy* takes advantage of hypernetworks and amortized variational inference to provide uncertainty quantification for stochastic dynamical systems.
- **Neural Systems Lab** 2019 - 2022
Undergraduate Research Assistant | Advisor: Rajesh Rao Seattle, WA
 - **Gradient Origin Predictive Coding** Developed *Gradient Origin Predictive Coding* for next-frame prediction and video generation by merging predictive coding theories of cortical function from neuroscience and Bayesian approaches to deep learning.
- **Noble Lab** 2020 - 2022
Undergraduate Research Assistant | Advisor: Bill Noble Seattle, WA
 - **PASTIS Optimization and Logging** Helped develop *PASTIS*, a Poisson-based algorithm that infers 3-D chromatin structures from Hi-C contact maps. Created workflow scripts and reduced memory cost of the *PASTIS* algorithm.
- **Center for Neurotechnology** 2020.06 - 2020.08
Undergraduate Research Fellow Seattle, WA
 - **Probabilistic Representations in the Brain** Analyzed electrophysiology data collected by Neuropixels probes to study neural representations of uncertainty in the mouse brain.

AWARDS

- **Kempner Institute Graduate Fellowship** 2023 - Present
- **Shanahan Foundation Predoctoral Fellowship** 2022
- **Burkhardt Family Endowed Scholarship** 2020, 2021
- **Gary A. Kildall Endowed Scholarship** 2019
- **Boeing Scholarship** 2018

SKILLS

- **Technical Skills** Python | PyTorch | scikit-learn | HuggingFace | Java
- **Relevant Coursework** Intro to Probability | Machine Learning | Big Data Systems | HCI