

Nick Alonso

MACHINE LEARNING RESEARCHER

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Research Interests

I am interested in building machines that learn and store memories as efficiently as people do. Previous and current research projects include developing bio-inspired learning algorithms and neural network memory models that perform efficient, continual, lifelong learning.

Education

University of California, Irvine

Irvine, CA

PHD COGNITIVE SCIENCE

2023

- Advisors: Jeff Krichmar and Emre Neftci
- Dissertation: 'An Energy-based Approach to Learning and Memory in Artificial Neural Networks'
- GPA: 4.0

Georgia State University

Atlanta, GA

MA NEUROPHILOSOPHY

2019

- GPA: 4.0

University of Michigan, Ann Arbor

Ann Arbor, MI

BS COGNITIVE SCIENCE (FOCUS COMPUTATION), BS PHILOSOPHY

2017

- GPA: 3.73

Papers

IN REVIEW OR FORTHCOMING

Alonso, N., & Krichmar, J. (Forthcoming). A Sparse Quantized Hopfield Network for Online-Continual Memory. *Nature Communications*

Alonso, N., Krichmar, J., & Neftci, E. (Forthcoming). Understanding and Improving Optimization in Predictive Coding Networks. *Proceedings of the AAAI conference on artificial intelligence* (Selected for oral presentation)

PUBLISHED

Alonso, N., Millidge, B., Krichmar, J., & Neftci, E. O. (2022). A Theoretical Framework for Inference Learning. *Advances in Neural Information Processing Systems*, 35, 37335-37348.

Wang, F., **Alonso, N.**, & Teeter, C. (2022). Combining Spike Time Dependent Plasticity (STDP) and Backpropagation (BP) for Robust and Data Efficient Spiking Neural Networks (SNN) (No. SAND2022-16962). Sandia National Lab.(SNL-NM), Albuquerque, NM (United States). (Technical Report)

Alonso, N., & Neftci, E. (2021). Tightening the Biological Constraints on Gradient-Based Predictive Coding. In *International Conference on Neuromorphic Systems 2021* (pp. 1-9).

Professional Experience

- current **Research Scientist**, Zyphra
- 2020-2023 **Graduate Student Researcher**, UC-Irvine
 - 2022 **Engineering Intern**, Cognitive and Emerging Computing, Sandia National Labs
- 2017-2019 **Brain and Behavior Fellow**, Neuroscience Institute, Georgia State University
 - 2017 **Engineering Operations Intern**, Thales Aeronautics
 - 2017 **Undergraduate Research Assistant**, Cognitive Architecture Lab, University of Michigan, Ann Arbor
 - 2016 **Undergraduate Research Assistant**, Lee Lab, University of Michigan Ann Arbor

Awards, Fellowships, & Grants

- 2022 **Neurips Scholar Award**, Neurips Conference, Travel Funding
- 2017-2019 **Brain and Behavior Fellowship**, Georgia State Neuroscience Instit., Merit-based, full funding for Master's
- 2016 **James B. Angell Scholar Award**, Univ. of Mich., Full tuition scholarship for achieving all A's 2+ semesters
- 2014 **Excellence in the Discipline Award - Philosophy**, William Rainey Harper College, Merit-based award given to one student per school year

Presentations

- 2024, 'Understanding and Improving Optimization in Predictive Coding Networks' (Talk) - AAAI
- 2022, 'A Theoretical Framework for Inference Learning' (Poster) - NeurIPS
- 2022, 'Deriving STDP from Backpropagation through Time' (Poster) - Spiking Neural Networks as Universal Function Approximators (SNUFA)
- 2021, 'Tightening the Biological Constraints on Gradient-Based Predictive Coding' (Talk) - International Conference on Neuromorphic Computing
- 2019, 'Can Cyborgs Tell Us Whether AI are Conscious?' (Talk) - Minds and Machines Conference, Cambridge University