Erik J. Peterson, PhD

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About me

I'm a scientist and engineer with expertise in artificial intelligence, reinforcement learning, neuroscience, and natural computation. In industry and academia I have designed and led high-risk, high-reward research at the intersection of biology, engineering, and computing.

Recent Experience

Pastuer Labs - New York, NY
Senior Research Scientist **2022 - Present**
I am building artificial intelligence models of multiscale physical systems for use in production. Theoretical research on causation in complex physical systems. "Simulation intelligence" methods for physical computation.

Carnegie Mellon University - Pittsburgh, PA
Research Scientist **2018 - 2022**
I developed a mathematical accounts of play and curiosity for use in deep reinforcement learning (Github) and multi-agent systems (Github). I established new fundamental limits for astrocyte computation.

Kernel, LLC - Los Angeles, CA
Research Scientist **2017 - 2018**
I was the technical lead building a system for complex spatio-temporal field shaping in deep brain stimulation. This project blended biophysical modeling with deep neural networks and led to 400,000 fold speed up – a key requirement for *real-time* use.

U.C. San Diego - San Diego, CA
Postdoctoral Fellow **2014 - 2017**
I conducted theoretical research on the coding properties of neural oscillations. I also co-lead development of a python tool to analyze electrophysiological data which has found widespread use in the neuroscience community.

Education

Colorado State University, Fort Collins, CO
Ph.D, Psychology
California Polytechnic State University, San Luis Obispo, CA
B.S., Chemistry and Biochemistry; Minor, Philosophy

Programming

Python
Core ML - Linear models to deep neural networks - {*pytorch*, *jax*, *sklearn*} **Expert**
R
Core DS - Visualization, analysis, and statistical testing - {*tidyverse*} **Expert**

Press & Public Talks

Brain's 'Background Noise' May Hold Clues to Persistent Mysteries, *Quanta Magazine*, 2021.
Build Your Own Brainwaves, *Nerd Nite*, Los Angeles, Feb 2018.
Conflicted Data Science, *Open San Diego*, San Diego, Feb, 2016.
In Theory You're Paying Attention, *Ignite*, San Diego, Nov 2016.

Select publications

Donoghue T*, Haller M*, **Peterson EJ***, et al, Parameterizing Neural Power Spectra into Periodic and Aperiodic Components, *Nature Neuroscience* 23 1655-1665 (2020). [*]: Co-first.

Peterson EJ & Verstynen T, Curiosity eliminates the exploration-exploitation dilemma, *bioRxiv* 671362v8 (2020).

Peterson EJ, What can astrocytes compute?, *bioRxiv* 465192 (2021).

Peterson EJ & Lavin A, Physical computing for materials acceleration platforms, Matter 5, 3586-3596 (2022).