Erik J. Peterson, PhD

Contact Information

E-mail: erik.exists@gmail.com *Webpage:* http://robotpuggle.com

About me

I am interested in curiosity as a mathematical idea, for use in machine learning and to predict, and influence, human behavior. I am interested in applied work as well. Curiosity and reinforcement learning in robots, drones, and design. Academically I also study computation in the brain's other electrically active cells, astrocytes.

Recent Experience

Carnegie Mellon University - Pittsburgh, PA
Research Fellow (Research Scientist) **2018 - Present**
I developed a theoretical account of curiosity and applied it to both machine and deep learning applications, and used it to predict human (and other animal's) behavior. This work has applications in aiding human-agent teams, multi-agent systems, robotics, automated drone flight, and in automated design.

Kernel, LLC - Los Angeles, CA
Senior Research Scientist **2017 - 2018**
I was the technical lead building a *real-time* system for complex spatio-temporal field shaping, in deep brain stimulation. This project blended biophysical modelling, with deep neural networks, and led to 400,000 fold speed up (a 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 verified our theoretical predictions using detailed biophysical modelling, and experimental data. This project required extensive use of information, and compression theory. I also co-lead development of a python tool to analyze electrophysiological data, which is starting to see widespread use in the neuroscience community.

Education

Colorado State University, Fort Collins, CO
Ph.D, Psychology **2012**
M.S., Psychology **2009**

California Polytechnic State University, San Luis Obispo, CA
B.S., Chemistry and Biochemistry; Minor, Philosophy **May 2004**

Programming

- pytorch

Projects

Public Talks & Press

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).