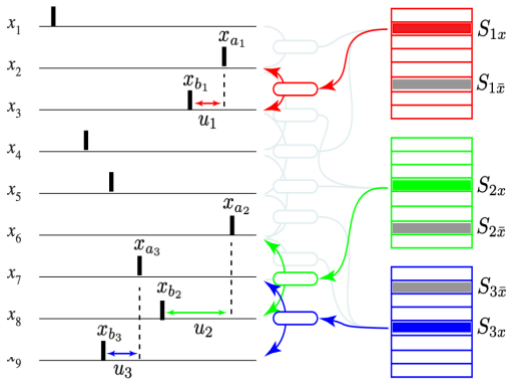
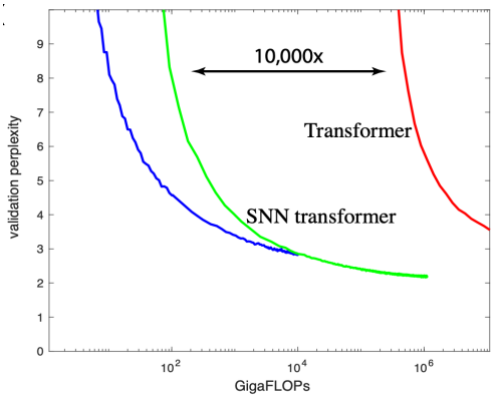
Computational Neuroscience Seminar

Spiking Manifesto





Eugene Izhikevich

SpikeCore, California

Tuesday, January 27, 2026
4:00pm - 5:30pm
Fung Auditorium, Powell-Focht Bioengineering Hall
University of California San Diego

Zoom: https://ucsd.zoom.us/j/2888083696

Abstract: Practically everything computers do is better, faster, and more power-efficient than the brain. For example, a calculator performs numerical computations more energy-efficiently than any human. Yet modern AI models are a thousand times less efficient than the brain. These models rely on large artificial neural networks (ANNs) to increase representational capacity and require GPUs to perform large-scale matrix multiplications. In contrast, the brain's spiking neural networks (SNNs) exhibit factorially explosive encoding capacity and compute through the polychronization of spikes rather than explicit matrix–vector products, resulting in lower energy requirements. This manifesto proposes a framework for understanding popular AI models in terms of spiking networks and polychronization, and for interpreting spiking activity as nature's way of implementing look-up tables. This suggests a path toward converting AI models into a novel class of architectures with much smaller size yet combinatorially large representation capacity, offering the promise of a thousandfold improvement in performance. https://arxiv.org/abs/2512.11843

Biography:
Founder and CEO of SpikeCore, San Diego, CA
Founder and Chairman of the Board of Brain Corp, San Diego, CA
Founder and Editor-in-Chief of Scholarpedia - the peer-reviewed encyclopedia
Advisory Board and Affiliate, Institute for Neural Computation
Council of Advisors, Jacobs School of Engineering
Father of two UCSD graduates

Organized by:
Institute for Neural Computation: http://inc.ucsd.edu
Department of Bioengineering: http://be.ucsd.edu

Hosted by:
Gert Cauwenberghs, gcauwenberghs@ucsd.edu
Terry Sejnowski, tsejnowski@ucsd.edu