

# Seminar

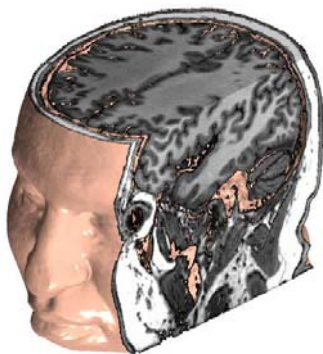
CENTER FOR  
ADAPTIVE NEURAL SYSTEMS

## Simulating Large-Scale Model of the Human Brain

**Eugene M. Izhikevich, PhD**

### Abstract:

I will describe simulations of the most detailed model of a mammalian brain: It has 6-layered cortical structure, 3 thalamic nuclei, 21 types of spiking neurons with dendritic compartments, short-term and long-term synaptic plasticity, and the white matter anatomy of the human brain. To break the human brain size record, a variant of the model having  $10^{11}$  (one hundred billion) neurons and almost  $10^{15}$  (one quadrillion) synapses was simulated on a cluster of 27 computers. It took 50 days to simulate 1 second of the model. I will describe what we learned from such models and what we need to proceed further.



Eugene M. Izhikevich is a Senior Fellow in Theoretical Neurobiology at The Neurosciences Institute in San Diego, CA, where he studies theoretically and experimentally dynamics of neurons. He is interested in biologically plausible models of the nervous system with the view to understand how the brain works. His contributions span from simple models of spiking neurons and networks to biologically plausible models of reinforcement learning and computational models of consciousness.

Dr. Izhikevich's book "Dynamical Systems in Neuroscience" (MIT Press, 2007) was best seller during the 2006 Society for Neuroscience Annual Meeting. Dr. Izhikevich is the editor-in-chief of Scholarpedia (<http://www.scholarpedia.org>), the free peer-reviewed encyclopedia, which hosts Encyclopedia of Computational Neuroscience and Encyclopedia of Computational Intelligence.  
webpage: <http://www.izhikevich.com>

**Location and Time:**  
Biodesign Auditorium, ASU  
April 13, 2007  
1:30pm-2:30 pm

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*"designing adaptive engineered systems to promote adaptation in neural systems"*

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