Chaotic desynchronization of neural populations with non-pulsatile inputs

A method to identify stimulation parameters for desynchronizing a set of neurons.

IP Status: US Patent Issued ; **Application #:** 9,352,155

Applications

- Deep brain stimulation

Technology Overview

Researchers at the University of Minnesota have developed **a method for finding an energy-optimal stimulus to induce desynchronization for a neural population.** This technology advances the field of deep brain stimulation (DBS) by using desynchronization of neurons with stimuli that 1) requires less power allowing the pacemakers' battery to last longer, 2) reducing the effect on other parts of the brain, and 3) reducing the likelihood of adaptation by the neurons.

This method uses optimal control theory to simultaneously optimize for minimum energy usage and maximum Lyapunov exponent (a measure of the rate of separation of two trajectories that are initially close together). The resulting optimal or near optimal DBS stimuli can be used to chaotically desynchronize a population of neurons. In short, a patients' physiological response to stimuli is used to determine the optimal stimulus for desynchronizing the neurons. Alternatively, this new method could also be used to optimally synchronize a population of neurons.

Phase of Development

TRL: 2
Concept.

Desired Partnerships

This technology is now available for:
- License
- Sponsored research
- Co-development

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Researchers

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Technology ID

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Category

Life Sciences/Health IT
Life Sciences/Medical Devices
Life Sciences/Neuroscience
Software & IT/Health IT

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