Deep Brain Stimulation Settings Optimization Algorithm

Technology #20150160

Learn about more groundbreaking discoveries at www.research.umn.edu/techcomm
Aids Current Steering to Electrode Arrays

A unique algorithm quickly and accurately determines optimal stimulation settings for deep brain stimulation (DBS) electrode arrays. The algorithm generates a patient-specific "grid," representing a target tissue to be activated, by compiling brain geometry and lead-specific geometry data. It then determines a maximum activation function value for each point on the grid and uses an optimization method to calculate optimal stimulation settings. By steering current through a deep brain stimulation array (DBSA), clinicians may be able to more effectively treat symptoms of Parkinson's disease, essential tremor, dystonia, severe obsessive-compulsive disorder and other neurological and neuropsychiatric disorders.

Patient-Specific Stimulation Settings

Standard DBS stimulation settings for diseases like Parkinson's and essential tremor consist of only four electrodes. However, DBS electrode arrays arranged along and around one or more DBS leads increase current steering capability. Patient-specific stimulation settings generated by this algorithm do not present programming challenges. Conventional programming methods require extensive planning and empirical adjustment, taking into account a patient's unique brain anatomy. Other computational approaches may be impractical with existing clinical equipment. This optimization algorithm generates stimulation settings that recognize therapeutic "hot spots" specific to each patient.

BENEFITS OF OPTIMIZATION FOR PROGRAMMING DEEP BRAIN STIMULATION ELECTRODE ARRAYS:

- Programming can be completed in less than an hour
- Based on individual patient brain geometry data and lead geometry data (e.g., from MRI or CT scans)
- Simple to implement and use
- Patient specific vs. consulting databases of accumulated patient data

Phase of Development: Proof of concept
Deep Brain Stimulation Array

Inventors

Matthew Johnson, PhD
Associate Professor, Biomedical Engineering, College of Science and Engineering

Edgar Pena

YiZi Xiao

IP: UM Docket 20150160

For additional information, contact

Doug Franz
Technology Licensing Officer
exprlic@umn.edu
612-624-0869

Learn about more groundbreaking discoveries at www.research.umn.edu/techcomm