Systems and Methods for Deep Brain Stimulation Using Beta Burst Feedback

Existing implantable neurostimulators treat a variety of neurological disorders via open-loop stimulation and are typically non-rechargeable where invasive surgery is necessary to replace the device. To addresses this concern, this technology is an open-loop brain stimulator with real-time communication. This device offers a long battery life, limiting invasive surgery and provides a new method for calculating deep brain stimulation.

Technology ID

BDP 8655

Category

Software/Other

Selection of Available Technologies

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What is the Problem?

What is the problem?

Implantable neurostimulators are becoming established methods of treating a variety of neurological disorders. However, these current medical devices are open-loop, which means they stimulate at constant intensity independent of symptom severity. Most of the shortcomings of these devices come from the open-loop nature of the implanted devices. These deep brain stimulator devices are typically non-rechargeable, and so must be replaced when the battery dies. This requires an invasive surgery to replace the device. Battery life is reduced by the open-loop nature. Constant stimulation reduces battery life, and may even lead to undesired side effects from unnecessary stimulation.

What is the Solution?

The solution is a closed-loop deep brain stimulator. This is done by incorporating sensors and having real-time communication to the implanted neurostimulator. This could result in lower power dissipation over the time and reduced side effects from unneeded stimulation. This closed loop deep brain stimulation device is currently being developed for the management of essential tremor. The team has demonstrated systems capable of using a variety of sensors including inertial measurements, electromyography and neurostimulator electrode readings. This sensed data is used to modify stimulation within the limits pre-set by a clinician, thus resulting in a closed-loop system. This technology utilizes a new method for calculating the duration of bursts that will be used for closed-loop deep brain stimulation control.

What is the Competitive Advantage?

Current deep brain stimulators are open-loop and thus are always stimulating the brain regardless of the severity of the symptoms, which can vary significantly. This constant stimulation decreases battery life, meaning that invasive brain surgery to replace the battery is

needed more often. Additionally, the unnecessary constant brain stimulation may lead to side-effects. The competitive advantage is a longer battery life than the competitors, limiting how often invasive brain surgery needs to occur. The closed loop deep brain stimulator will allow patients with Parkinson's to achieve a consistent gait.

Patent Information:

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