

Neural Motor prosthesis Prototype for the Restoration of Motor Function in Spinocerebellar Ataxia



Health & Wellness

Biomedical and Genetic Engineering

Opportunity

Spinocerebellar ataxia (SCA) affects 5 per 100,000 people worldwide. There are many Ataxia Foundations and Organizations to support patients and fund Ataxia research around the world. Recently, Merck launches a \$US55 million initiative to examine RNA-based therapy on Ataxia), Voyager Therapeutics, brought in a \$US100 million program in advancing an adeno-associated virus gene-based therapy from Genzyme, is actively searching for SCA cure and developing new drugs.

The global market for developing treatment for SCA was valued at about \$US14 billion in 2011 and project to have \$US23.5 billion in 2017. In Nov 2016, Biohaven Pharmaceuticals has secured a \$US80 million funding from investors to develop a glutamate modulator to treat SCA including three clinical trials in the pipeline. We see a huge unmet need for developing SCA treatment, and we want to fill the gap.

Technology

SCA is a neurodegenerative disease characterized by motor function deficits. Deep brain stimulation (DBS) has been widely used in treating neurodegenerative diseases with motor deficits such as Parkinson's disease. We use cerebellum as an unexplored DBS target site to deliver patterned neural spike trains to restore motor function deficit in SCA mice assessed by a battery of animal behavior tests. We develop a real-time hardware programmable gate array (FPGA)-based cerebellum stimulator prototype to detect and restore abnormal gait cycle based on electromyography activities of muscles. Close-loop cerebellum stimulator is triggered only when an abnormal gait cycle is detected to avoid excessive stimulation results in a more durable device with fewer side effects, when compared with traditional DBS that produces continuous stimulation to patients.

Advantages

- Reduce unnecessary stimulations and side effects
- Low power
- High computational speed within milliseconds in a real-time manner.

IP Status

Patent granted

Technology Readiness
Level (TRL) ?

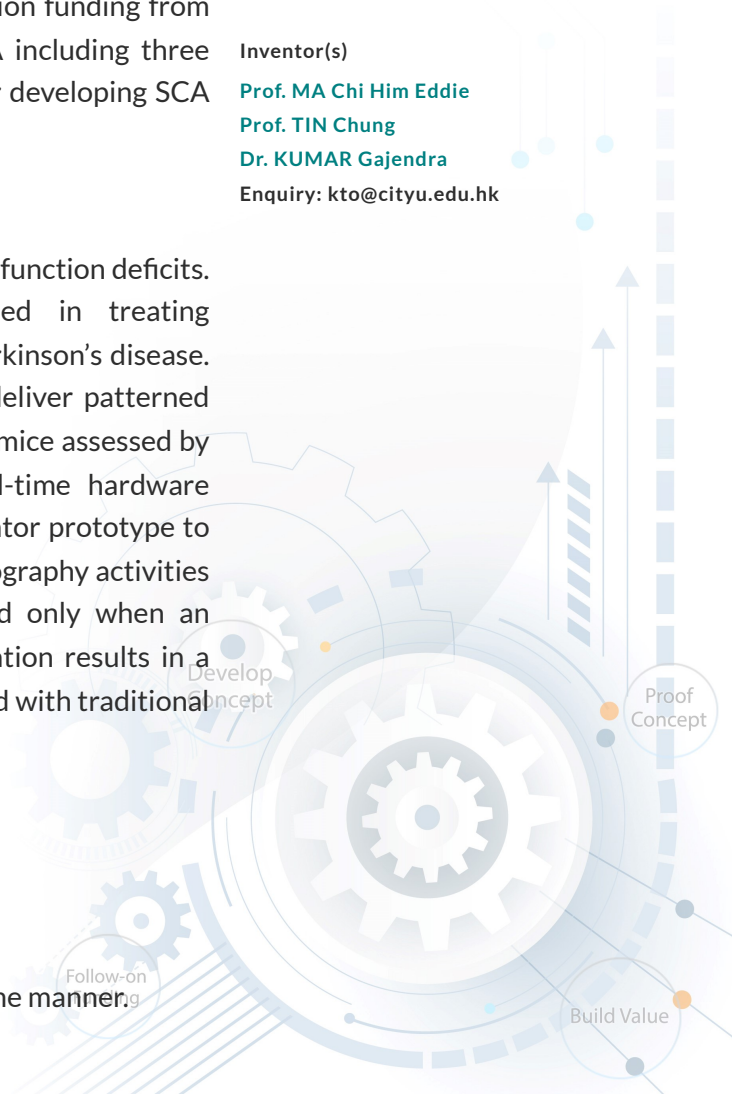
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Applications

- Implantable microchip devices (FPGA-based) using EMG as stimulation biomarker (trigger) in Ataxia.
- It will benefit patients suffering from SCA, Parkinson's disease (PD), Alzheimer's disease, essential tremor, and epilepsy.

