PennState College of Engineering | BERNARD M. GORDON LEARNING FACTORY

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Non-invasive Neurostimulatory device to improve mobility in Parkinson's Disease

Overview

Near one million people in the US are currently living with Parkinson's Disease. Deep brain stimulation has been a validated treatment for decades, but this procedure requires invasive deep brain electrode placement surgery. Our team was tasked to create a non-invasive deep brain nuerostimulatory device to increase mobility in Parkinson's Disease patients.

Objectives

Our objective was to improve mobility in Parkinson's Disease patients by building a non-invasive transcranial alternating and direct current brain stimulatory device and to validate that it can transmit a meaningful electrical stimulation to the brain.

Approach

- Speak with sponsor about device expectations and needs
- Participate in weekly advisor and sponsor meetings to ensure constant communication
- Research existing devices, patents, and technologies
- Identify engineering specifications, generate device concepts, select concept that meets device criteria
- Perform computational simulations to pinpoint the most optimal electrode placement in the cap
- Purchase necessary equipment for circuitry housing, cap, and head phantom
- Generate prototypes for the head phantom, circuitry, and housing
- Develop a testing plan for using the head phantom and other electrical stimulation tests
- Perform tests and analyze data to quantify success of device

Outcomes

- The Penn State Center of Biodevices is delivered a neurostimulatory device that has been validated to provide 2 mA of current to the brain
- Testing on the head phantom shows alternating current in the alpha wave and beta wave region is more effective in simulation the brain than direct current