Smart Parkinson's Strap: To Dynamically Detect and Mitigate the Tremors of Parkinson's Patients

Sridhar, Anushka (School: Plano East Senior High School)

In the United States alone, there are one million people who have Parkinson's disease. There is no known cure for Parkinson's and very few treatments out there that target the disease's symptoms. However, whole-body vibration therapy has been shown to have a temporary positive impact on Parkinson's patients, but it is expensive and not easily accessible. This project aims to design a prototype that will detect the onset of tremors in Parkinson's patients, use that information to turn on a vibrating wristband, log the information, and send it out to a caregiver or doctor via a smartphone. A prototype was built and prepared for testing, using readily available electronic resources such as raspberry pi and an accelerometer. For test-data collection, data from the accelerometer was used to determine the onset of tremors by sampling the change in acceleration every 0.2 seconds (or 5Hz, frequency of tremors). Data with the accelerometer was collected on 2 participants (limited due to Covid restrictions). The best threshold to determine the onset of tremors was a change in acceleration of 1.8 over ten consecutive measurements (2-second interval). The Raspberry Pi was programmed to activate the relay switch when this threshold was met. Then the data was logged and sent to a Smartphone for use by a caregiver or doctor. The vibrating band's effectiveness was confirmed by testing on 11 Parkinson's patients (pre-Covid) and found to improve the quality and speed of penmanship. This inexpensive device (~$40) can significantly improve the quality of life for Parkinson's patients.

Awards Won:
Second Award of $2,000