Utilization of Artificial Intelligence Assisted Brain-Computer Interface to Allow Patients with Motor Impairments or Paralysis to Regain a Range of Mobility

Mo, Cindy (School: President Theodore Roosevelt High School)
Liang, Freddie (School: President Theodore Roosevelt High School)

The purpose of the project was to create a brain-computer interface headset prototype capable of allowing patients with motor impairments and paralysis to regain a range of mobility utilizing the Applied Program Interface, Keras artificial intelligence. According to the 2017 Disability Statistics Compendium, 6.7% of the American population were diagnosed with ambulatory disabilities. These motor disabilities prevent patients from performing daily activities and living a normal, independent life. Electroencephalography (EEG) electrodes were programmed to collect and record the electrical activity of the brain to a Raspberry Pi which transmits the data to be displayed on OpenBCI Graphical User Interface (GUI) which shows the data in graphs and sequences. Softwares were used to display the data collected from each sensor and converted the EEG data into Fast Fourier Transform (FFT) data which were used to train a 1D convolutional neural network. The AI processed data and also determined which thoughts were correlated with certain sequences. Python was used to program the prototype of a Spinal Cord Stimulator (SCS) to output voltages at different locations to simulate how Spinal Cord Stimulation would work inside a patient with ambulatory disabilities. EEG data were collected and commands were issued out to the SCS to stimulate a certain part of a patient's body which then allows a patient to move; therefore, we were able to conclude that it is possible to utilize EEG to control the bodies of disabled patients with motor impairments.

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