GIRYO: A Novel Approach to Detecting and Tracking Chronic and Episodic Migraines With Commercial EEG and Stimulated Non-Invasive Neuromodulation for Long-Term Treatment Purposes

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Migraines are a debilitating neurological condition that impacts over one billion people across the globe, but not enough research or developments on the treatment of migraines have been done. Neuromodulation devices are too expensive and inaccessible. Additionally, migraine tracking is only possible through one time monitoring using MRI and CT technology. Through Giryo, a portable neuromodulation device that incorporates electroencephalography (EEG) tracking and detecting, patients will be able to have access to an affordable, patient - centered, and long -term treatment focused way to address this chronic condition. This project consisted of a prototype, the connected app, and a code for testing. After thorough research and survey feedback, both the app and model were completed. The prototype focused on patient comfort and range of abilities to assist in migraine treatment. The app had a variety of capabilities to properly track migraine data for both the patient and their medical professional. To test this device without human experimentation, a code was developed to detect migraines and their phase based on the patient's average EEG bands that were collected from public databases. From this data, 87% of the 30 trials were accurately predicted by the code. The other 13% "inaccuracy" was more useful due to overlapping phases that could only be detected through real - time tracking. Therefore, this device was thoroughly proven to function properly with the implemented coding. Giryo is portable, accessible, and wide-ranging. It can not only treat pain through nerve stimulation but also contains early detection and long - term tracking abilities. This device could help millions of people around the world who have to struggle through episodic and chronic migraines.

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