A Low-Cost Approach to EEG based Mind-Controlled Prosthetic Arm Using Brain-Computer Interface

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In this project, a prosthetic arm was developed using an alternate communication pathway to enable movement in amputees. A brain-computer interface was established, providing the opportunity for the control of external devices using EEG signals. Although prosthetics have developed over the years, they still have several issues. The main objectives of this project included lowering the cost of prosthetic arms, using noninvasive technology, and analyzing the effectiveness of motor imagery. Prosthetics can range anywhere from 5,000 to 50,000 dollars. The prosthetic arm was designed using 3D printing technologies, therefore reducing the cost to $200. Most current prosthetics that effectively use EEG signals to decode neural activity, involve invasive technology or surgeries to implant chips under the scalp to record EEG data. To solve this issue, a headset was used to measure the data as an alternative. A standardized communication pathway protocol is adhered to when the prosthetic is used. First, the EEG signals are recorded. Once they have been interpreted, the data is sent to an Arduino through a Bluetooth interface. The Arduino then rotates servo motors in the prosthetic arm based on the EEG levels and therefore pulls the fingers of the arm.

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