Enabling Verbal Communication Through a Novel Usage of Brain-Computer Interfaces for the Differently Abled

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Introducing an innovative solution to a long-standing problem: Aphasia. This debilitating condition, commonly suffered by stroke victims, severely impairs verbal communication abilities by damaging the Broca's area of the brain. Current solutions for Aphasia are inefficient or only available to the affluent, leaving millions of people struggling to communicate effectively. That's why this project proposes a revolutionary approach - using a low-cost electroencephalography (EEG) device-based brain-computer interface (BCI) to translate a user's inner dialogue into words in real-time. To make this vision a reality, a low-cost EEG device was developed and found to be 6 times less expensive than any current EEG device on the market. A machine learning (ML) model was trained using the EEG data to create a BCI that accurately translates thoughts into speech. Two stages of testing were conducted to analyze the effectiveness of the device: a proof-of-concept and a final solution test. Both tests showed average accuracy rates above 80%, demonstrating the viability of BCI research in developing lower-cost verbal communication devices. Not only does this innovative technology enable those with Aphasia to communicate effectively, but it also has the potential to assist patients with any verbal disability. This breakthrough has the power to transform the lives of millions of people, democratizing communication.

Awards Won:
Third Award of $1,000