

Wireless Brain Computer Interface Streams Control Command

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ABSTRACT

Our brain continuously generates electrical signals when it functions, as the cellular and molecular constituents of the brain (neurons) communicate with one and another. At a micro level, they generate a wide range of frequencies that scientists have concluded that these frequencies relate to specific mental states. For example, a person's brain produces delta waves while sleeping, whereas when a person is alert and awake and concentrating hard on something then his brain will generate beta waves. The core purpose of our study was to design a Brain Computer Interface using Neurosky Mindwave Headset that could measure the electrical signals which are produced by neural activity of our brain and control the mobility device. This was attained by acquiring the attention level of a person which was extracted using algorithms as brain generates mixed waveform in the shape of EEG.

INTRODUCTION

Brain computer interface (BCI) is subfield of Human Computer Interface (HCI). The most important function of BCI is to acquire signals from the most complicated organ of the body part called "Brain". This device is used to collect brain signals in order to interpret the EEG and later use it to control the devices according to Human Mind. Traumas and sudden accidents may lead a person to some neural and muscular damages, and most often it directly affects the human muscular activity which is also being controlled by our nervous system and that brain damage can cause partial or full loss of body movements. Recent upgradation in brain computer interfacing technology have introduced latest opening for the evolution of a wheelchair that fully focus on interface for such patient's thoughts. Considering these facts this paper explores BCI design for brain controlled wheelchair, which contain three different stages: Signal acquisition that has a good quality signal, signal processing, knowledge discovery and classifying them into different control and incorporating them to the wheelchair.

RESEARCH METHODOLOGY:

Signals which are generated from the Brain in the form of EEG are sensed by the dry electrode of Neuro Sky Head Set placed at forehead. The raw EEG is picked up by the dry electrode and sent to the TGAM, which is located at the back of the headset. Here signal is processed in order to reduce the noise and attenuation. The signal from that Module is sent to the LabVIEW through Bluetooth under IEEE standard 802.15, from headset for further processing where our raw signal is received, filtered and different waves of EEG is divided into individual wave. There are several waves that are merged in EEG which are generated due to different human behaviors like meditation results in Alpha Wave whereas, Beta Wave is characterized by attention level. Hence, there are different types of waves which generate according to our state. The wave with which we are dealing with is "Beta Wave SPECTRUM" which is generated according to our attention level and Blink strength. LabVIEW processes the raw EEG by using Neuro Sky toolkit, where EEG features are extracted, filtered and then is used to control the Hardware interfaced via Arduino. Blink strength is used to switch the mode of the device whereas Beta wave is extracted to maintain the continuity of the device.

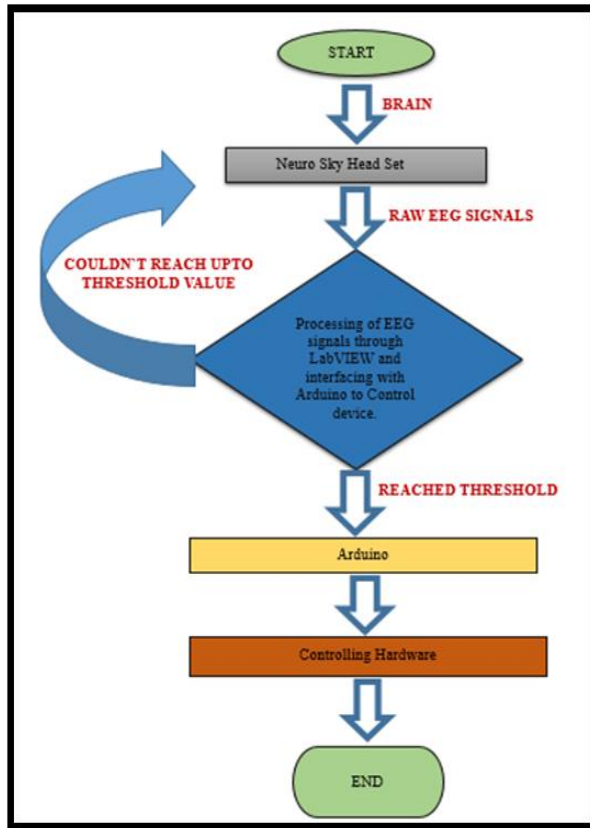


Fig 1: Block Diagram

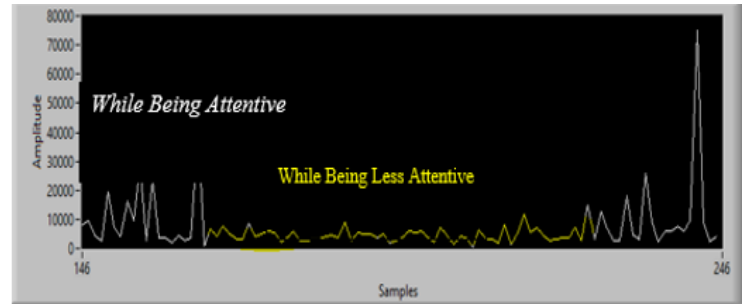


Fig. 4: Beta Wave Spectrum

Beta wave

CONCLUSION AND FUTURE WORKS

By using BCI system we can aid the peoples who are disables who are unable to perform their regular functions. It provides them with the feeling of independence and help them remain motivated towards life. Different Brain signals, recording methods and signal processing calculations are used by these systems. BCIs are able to operate different devices that may aid many disables. BCI system use the

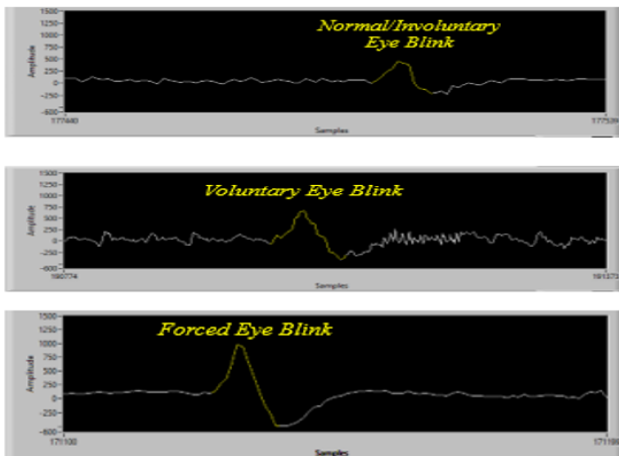


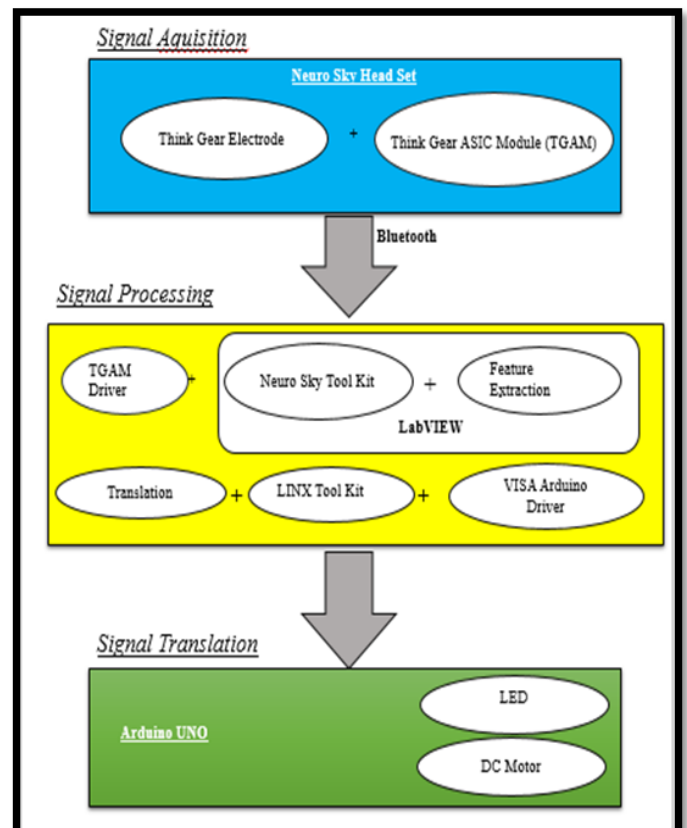
Fig 2: Flow chart

Fig.3: Eye blink

RESULTS AND DISCUSSION:

Eye Blink Strength

According to output graph shown in figure.9 Normally, eye blink spectrum has amplitude of 400 to 800 micro volts. So, according to that we assigned the limit to control the mode of the device depending upon blink strength, if it crosses the range of 850 microvolts.



Brain waves as raw that are to be processed to perform our intended task by the system.

The aim of our project is to find out how effectively our Brain waves can be used in order to generate a command or any action, so that the person who is unable to move with their own will can move just by thinking and generated Brain Waves will itself control the device. Our system particularly uses the Beta Waves and an Eye Blink Strength together in order to control the Continuity and mode of the Wheel Chair. Advance research on brain-computer interface (BCI) – also known as the 'mind-machine' interface – is becoming so important and vast, that will surely have led to the creation of a whole new symbiotic relationship between man and machine. Our goal is to easy to study the brain and its function and to innovate and develop the medical tools for treatment and diagnosis of nervous system. BCI helps to exploiting on many type of areas. For example, signal processing, computer science, machine learning cognitive and system neuroscience, neurosurgery, traumatic disorder, neurodevelopment, neurodegenerative. Our purpose is that to innovate and create the new Neuro Technologies. This system is very useful to treat the patients who has suffered throughout their life from paralysis and the neurological diseases like Parkinson's, schizophrenia, Alzheimer Etc. and can provide therapy for anxiety and post-traumatic pressures. Different type of Miniature devices like miniature optical devices can be engrafted to transform the photoreceptors into practicable cameras for the brain

ACKNOWLEDGEMENT

This work was financially supported by Institute of Biomedical Engineering and Technology, Liaquat University of Medical and Health Sciences, Pakistan.

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