

# Mind Controlled Automation System with EEG

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**Abstract**—Bio potentials generated from brain is known as EEG signal. Electroencephalogram or EEG signals are related to the electrical activity of our brain and it tracks the brain wave pattern. Our brains generate 16 different amounts of voltage signals at different states of our mind. There are different mind states like Concentration, Meditation, Attention and etc. Our project is mainly focused on measuring the Concentration, Meditation and Attention level using Neurosky Mindwave. Using LabVIEW programming we are able to manipulate those signals levels of concentration, meditation and attention to control electronic devices.

**Index Terms**— Electroencephalogram, Automated Motion, Bio Feedback, LabVIEW, Neurosky, Brainwaves

## 1 INTRODUCTION

THE inner motions and operations done by human brain always been a point of interest in scientific community. Generation of complex thoughts, emotions, feelings, human reponses in different situations, body part movement, muscle operation, stress management are done by human brain.

Different signals of different amplitude and frequency are generated inside human brain. These signals are alpha wave, beta wave, gamma wave, theta wave, delta wave. These frequencies determine the current state of condition the brain is underlying now. Different functions within the body are controlled by different areas of the brain. Different functions such as sensory perception, motor commands, spatial reasoning, thoughts, and language is controlled by the outermost layer of the brain. This layer is often termed as the neocortex. The voltage levels and frequency of the signals emerging from the neocortex of a person change slightly with the change of the level of attentiveness or with the change in the state of mind. A method known as electroencephalography (EEG), which uses dozens of electrodes connected across the scalp, is used to measure these signals accurately as they occur across the neocortex. These signals can then be used for multiple clinical purposes, measuring a person's level of stress, different kind of automation and controlling electronic devices. However there are some disadvantages to EEG systems. The EEG signal is subjected to noise attenuation. As EEG signal has very poor signal to noise ratio, accurate measurements can take a long to record. Also, expensive electrodes and adhesive materials are also required to achieve a connection that will accurately record the desired brain signals.

## 2 EEG (ELECTROENCEPHALOGRAM)

It is a continuously generated signal alongside growth of clinical analysis, management of neurological and physical irregularities of brain, Electroencephalogram appliances are protected with many outfits, correct electrodes and memory for much extended time recordings. Electroencephalogram apparatuses may be combined with neuron imaging structures such as functional magnetic resonance imaging (fMRI).

## 3 ACQUIRING EEG

A Single-channel wireless Electroencephalogram bio-sensor is there for capture the electrical signals with the help of Neurosky. Ground and reference electrodes are the next minor equipment, which is placed on the earlobe. A potential, which is offered sensory information about the brain waves response at a specific latency at a specific time. Any event is responded by a P300 signal after every interval of 300ms. In this paper or in this project EEG was used for acquired signals (brain signals). EEG is mainly focused on acquiring the brain electrical activities and EEG signals are characterized by rhythmic activity. Each band has a different level of rhythmic waves.

## 4 METHODOLOGY OF PROPOSED SYSTEM

1. Hardware requirement for EEG Acquisition: For EEG acquisition, the Neurosky Headset is the obvious choice for EEG signal acquisition. Neurosky measures the signal from the forehead and wirelessly sent EEG information to PC. This uses Bluetooth technology. The scale of EEG signal in PC varies between 0-100. A suitable attention, meditation or relaxation level threshold should be set by the programmer. If acquired EEG exceeds the threshold value, it will further activate any household loads.

2. Analysis in LABVIEW: After completion of the signal acquisition of both the types of bio signal, are analysed in LabVIEW. In this project a GUI continuously runs and communicates with the NI-DAQ through USB connection and a Neu-

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rosky Mindwave Headset through Bluetooth connection. EEG signal is acquired by DAQ Assistant VI with proper settings. For the filtering purpose IIR type Butterworth filter is chosen due to its linear response. Threshold should be readjusted every time of experiment in order to rectify signal level variation from one man to another. In parallel EEG signal from the Neurosky Mindwave is captured and analysed in LABVIEW to extract the attention level of an individual. As the attention level can vary from person to person thus a user defined threshold is allowed to set which then can be compared with the incoming signal and thus forward movement of the motorized system can be controlled.

## 5 CONCLUSION

In this paper EEG signal is extracted to control remotely some electronic devices or some home appliances. The EEG signal is extracted using Neurosky with wireless technology and acquired the signal at LABVIEW DAQ. This signal through LABVIEW is used to control home appliances and other electronic devices. This methodology certainly directs us to a new way towards automation technology.

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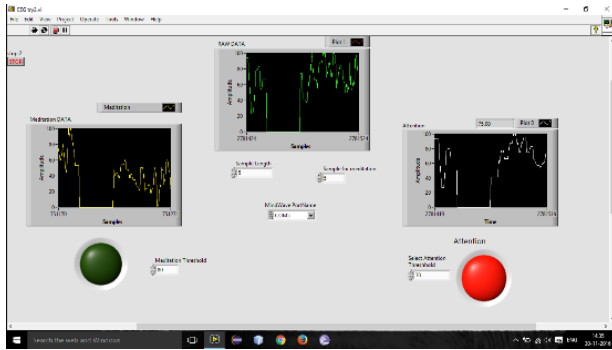


Fig. 1. VI Output: Red LED turns on.

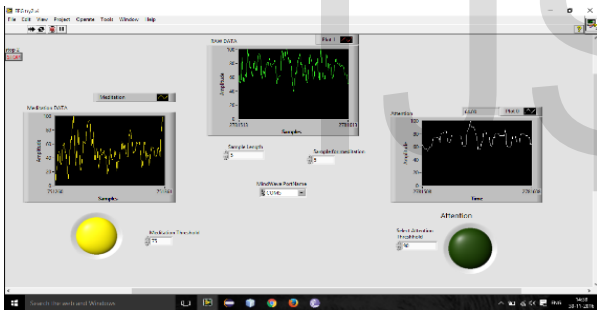


Fig. 2. VI Output: Yellow LED turns on.



Fig. 3. Snapshot of used Neurosky