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A Survey on Brain Controlled Car Using EEG

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ABSTRACT

Thought is major human movement, which can be perceived by investigating brain signals. Electroencephalography (EEG) is an electrophysiological observing technique to record electrical action of the cerebrum. EEG measures voltage variances resulting from ionic current inside the neurons of the mind for which the EEG signals are isolated into frequency bands that are generally good indicators for different states and types of activities. EEG is a capable instrument for following mind changes amid various periods of life. EEG investigations, including both resting state and occasion related incitement conventions, might be valuable to redress the quantity of neurological issue and irregularities. Appraisal of feelings, which are typically self-revealed. Such sort of self-announced evaluation may be erroneous, and even conflicting. Electroencephalography (EEG) is said to be a non-intrusive cerebrum machine interface, which make utilization of neurophysiological signs from the mind to outside machines without surgery. The less-intrusive EEG signals, caught from the central nervous system, have been used for investigating emotions.
Keywords: Electroencephalogram (EEG), NeuroSky headset, BCI

I. INTRODUCTION

An electroencephalogram (EEG) is a recording of the electrical potentials which are generated by the brain on the scalp. Due to the relative simpler technology and smaller time constants when compared to other non-invasive methods. EEG has become a powerful means for monitoring brain activity for which observable changes occur in EEG depending on task performed by a subject. Based on this fact, new communication system between brain and a computer has evolved, in which the information support is the EEG pattern, voluntarily generated by the user and independent of any muscular activity. One of the applications of the EEG for machine interfacing is rehabilitation research area. A system that allows us to translate in real-time the electrical activity of the brain in commands to control devices in real time.

The electroencephalogram (EEG) is a recording of the electrical action of the cerebrum from the scalp. The recorded waveforms mirror the cortical electrical movement. Signal Intensity is represented as EEG movement which is very little, measured in microvolts (mV). The principle frequencies of the human EEG waves are:

Delta: It has a frequency of 3 Hz or below for which it has a tendency to be the most noteworthy in amplitude and the slowest waves. It is ordinary as the prevailing beat in newborn children up to one year and in stages 3 and 4 of sleep. It might happen centrally with subcortical injuries and all in all conveyance with diffuse sores, metabolic encephalopathy hydrocephalus or profound midline sores. It is normally most noticeable frontally in grown-ups (e.g. FIRDA - Frontal Intermittent Rhythmic Delta) and posteriorly in kids e.g. OIRDA - Occipital Intermittent Rhythmic Delta).

Theta: It has a frequency of 3.5 to 7.5 Hz and is named "moderate" movement. It is superbly ordinary in kids up to 13 years and in sleep yet irregular in conscious grown-ups. It can be viewed as an indication of central subcortical sores; it can likewise be seen in generalized distribution in diffuse issue, for example, metabolic encephalopathy or a few occurrences of hydrocephalus.

Alpha: It has a frequncy in the vicinity of 7.5 and 13 Hz. It is typically best found in the back districts of the head on every side, being higher in amplitude on the prevailing side. It shows up when shutting the eyes and unwinding, and vanishes when opening the eyes or alarming by any instrument (considering, computing). It is the real musicality found in typical relaxed grown-ups. It is available amid the greater part of life particularly after the thirteenth year.

Beta: Its action is "quick" action. It has a frequency of 14 and more noteworthy Hz. It is typically observed on both sides in symmetrical distribution and is most obvious frontally. It is highlighted by narcotic mesmerizing medications particularly the benzodiazepines and the barbiturates.

II. METHODS AND MATERIAL

Literature Survey

Mamta S et al. [2016] elaborated "Stress detection and Reduction using EEG signal" that detected and reduced the stress using EEG signals introducing the interventions into the system. Authors used the k-means clustering method to measure the perceived stress which divided the subjects into different categories and estimate the stress level. The method they proposed was useful in developing products which were helpful for human stress reduction. The success of this research was expected to help in reducing time consumption and human power in determining best solution for stress management.

S. Y. Cho and A. P. Vinod K. W. E. Cheng[2009] presented an idea of building a Brain-Computer Interface (BCI) based control for next generation electric wheelchairs .The aim is to explore the area of research on (BCI) based control to potentially develop a next generation of electric wheelchair which was able to benefit to paralyzed patients. This EEG interfacing development controlled a wheel chair through a skid steering method. The mechanical part including the conventional steering can be eliminated. It also used differential speed that controlled the propulsion and turning. The system they defined was neat, low cost and high dynamic performance; it can be used for stoke patent or disabled patents.

Jia-Lien Hsu et al. [2014] proposed an evidence-based and personalized model for music emotion recognition. In the model construction and training phase, authors constructed two predictive and generic models (both models were trained by artificial neural network). With having the generic model and the corresponding individual difference, authors constructed the personalized model H by the projective transformation.

F´abio theoto rocha and Carlos Eduardo Thomas [2014] described Brain Mapping and Interpretation of Reading Processing in Children Using EEG and Multivariate Statistical Analysis. Authors proposed number of causes which children tend to experience on the phonological route the most common disturbance in this cognitive task. Using two sample groups of children with and without reading difficulties and their corresponding EEG signals were captured during the reading processing. A set of techniques that investigated such disturbance by generating whole brain mappings based on the entropy of each EEG electrode and non-supervised and supervised multivariate statistical analyses models.

III. RESULTS AND DISCUSSION

As a result, in this work, we would like to explore bio-signals that are associated with affecting states, and to propose an evidence-based and personalized approach to recognize emotion. We consider a representative and noninvasive physiological signals, EEG, to perform emotion recognition. The report represents that there is a specific relationship between brain waves and emotion. Brain wave recordings are distinguishable for every individual for which EEG is used in more places because hardware cost of EEG is significantly lower than other techniques. Also EEG has very high temporal resolution, on the order of milliseconds rather than seconds. Comparing to other techniques, EEG is most preferable because EEG can be recorded near the patient's bed. By reducing the number of electrodes needed, it also means cheaper EEG headset can be used to diagnose various disorders. Electroencephalography (EEG) is an electro physiological monitoring method to record electrical activity of the brain. If it can be used for controlling a car we can make a remarkable change in the transportation filed. Nowadays brain controlled wheelchairs are available. With a step ahead of that we are revealing the possibilities of EEG in the field of

transportation. The car is created to inspire all disabled people in the society to have the confidence to drive the car. The cost of the device is highly accessible, and their computing power allows a variety of practical applications to be created.

Table I. Survey on Brain Computer Interface

S.No	Authors	Year	Title	Research Findings
1	MRS. MAMTA S. KALAS, DR B.F.MOMIN	2016	Stress Detection and Reduction using EEG Signals	EEG stress detection technique and record done by using cluster based analysis method.
2	S-.Y. CHO A. P. VINOD K.W.E. CHENG	2009	Towards a Brain-Computer Interface Based Control for NextGeneration Electric Wheelchairs	Presented an idea of building a Brain Computer interface (BCI) based control for next generation electric wheelchairs.
3	F´ABIO THEOTO ROCHA AND CARLOS EDUARDO THOMAZ	2014	Brain Mapping and Interpretation of Reading Processing in Children Using EEG and Multivariate Statistical Analysis	Presented Brain mapping using two sample groups of children with and without reading difficulties and their corresponding EEG signals
4	JIA-LIEN HSU, YAN-LIN ZHEN, TZU-CHIEH LIN, YI-SHIUAN CHIU	2014	Personalized Music Emotion Recognition using Electroencephalography (EEG)	Proposed an evidence based and personalized model for music recognition using EEG.

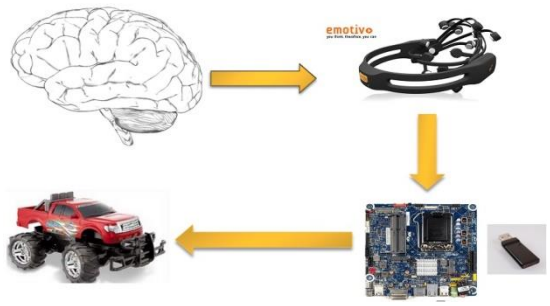

Figure 1. Brain controlled car using EEG signals

IV. CONCLUSION

EEG measures voltage fluctuations coming about because of ionic current inside the neurons of the cerebrum. EEG is most often used to diagnose epilepsy and diagnosis for focal brain disorders. EEG also is a convenient tool for psycho physiological research when the subject has to perform some behavioural tasks or is out of laboratory. EEG can track brain changes during different phases of life without disturbing an individual. In our daily life we face many health problems because of the environmental changes for which we often depend on hospital. Most of the neural disorders are recognized and detected by EEG. This paper summarized some of the research findings on EEG.

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