Smart Accident Prevention Technique by using Brain Wave Signal

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***Abstract-*:- Human life is precious. The fact that the death rates keep on increasing daily basis points to the lack of accident prevention mechanisms. In the field of medical science, recent research has diagnosed abnormalities in the brain. The Electroencephalogram (EEG) is a tool for measuring brain activity which reflects the condition of the brain. EEG is an effective tool to understand the complex behavior of the brain. The scope of this paper is to apply the abnormal EEG signal which will be controlled by the IoT controller in the dashboard which directs to take an instant action to prevent accidents. Once the IoT controller realizes that the EEG signal it is receiving is not like the normal EEG signal(alpha, beta, gamma) the controller understands the imbalanced state of the driver and automatically the car is controlled in such a way such that it slows down, thereby sending horn sound to indicate the forthcoming vehicle, also sends an alert message to the hospital and relatives of the driver. This paper is proposed to develop an automated system for the detection of brain abnormalities**

Keywords: Accident Prevention, Vehicles, wavelet transform, EEG waves, switch ON light, sound Horn, EEG Headset, Alert Message

1. INTRODUCTION

In modern-day, there are a lot of vehicles used by humans and there are no safety facilities in these vehicles but millions of consumers are using these vehicles to move from one place to another. In this system, a brain wave sensor is used to sense whether the driver is conscious or unconscious. If the driver becomes unconscious or sleeps, the EEG signal will intimate the helpline. If this brain wave pulse is a mismatch with the reference pulse the system detects that the driver has become unconscious. The system will then control the vehicle's brake system and automatic sound horn to alert the neighboring vehicles.

Brain Wave Sensor observes the human brain, and Neuro Sky [1] provides Brainwave Headphones to feel it. Electroencephalography (EEG) is a well-established approach enabling for recording of human brain-electrical activity. EEG signals refer to absorb brain activity and they are frequently acquired to address clinical as well as research questions. Many studies in the search field of cognitive neuroscience rely on EEG [2] since EEG hardware is available at relatively low cost. EEG signals also enable us to observe the signal such as attention, speech, or memory operations with millisecond precision. BCI (Brain-computer interfaces) typically make use of EEG signals. The aim is to identify cognitive states from Electroencephalogram signatures in real-time to exert control without any muscular involvement. BCIs typically advantage from a machine learning signal processing approach. The application of BCI (Brain-Computer Interface) is speller systems which provide a communication channel for fully paralyzed individuals e.g., motor imagery BCI systems promise to control prostheses by thought alone, and BCI error monitoring systems have been shown to reliably detect car driver emergency braking intentions even before the car driver can hit a brake automatically, thereby supporting future braking assistance systems. With the help of this EEG Accident prevention system, we can avoid accidents.

Some books survey has been focused on the preprocessing of EEG signals, Feature extraction, Feature selection, and Classification methods. Siuly [1] has proposed a cross correlation-based LS-SVM [6] for improving the classification accuracy of EEG signals. Sabeti m [2] uses the discrete wavelet transform for preprocessing [4] [9] and a genetic algorithm, which is used to select the best features from the extracted features. The two classifiers SVM [4] and LDA are used to classify the EEG signal abnormalities.

Stevenson NJ has introduced the automated system [3] for EEG abnormality in neonates. Multiple linear discriminate classifier is used to classify the EEG abnormality in neonates [7] with HIE [5]. Marcus has presented the time-frequency distributions of EEG signals; here the SVM is used to classify epilepsy from EEG signals. Nandish has introduced the classification of EEG signals based on neural networks. Salih Gunes has discussed that the Fast Fourier Transform for pre-processing. Umut Orhanhas focused the Multilayer preceptor neural network [9] for Electroencephalography signal classification. Parvinnia E [10] has introduced the adaptive method named weighted distance nearest neighbor algorithm is applied for EEG signal classification.

Finding the EEG signals the main goal of the proposed work is to analyze the EEG signal for the detection of abnormalities. This system involves the process such as Electroencephalography signal pre-processing, feature extraction and classification. The first module deals with the EEG signal by the pre-processing method. It can be used to neglect the noises from the signal. The next module extracts the Electroencephalography signal features from the decomposed signal. The selected features are given as inputs to the classification process in EEG.

The classification and method is mainly used to analyze the EEG signal and it classifies the signal into abnormal. It shows framework for the analysis of the EEG signal. This work is implemented by using MATLAB.

2. RELATED WORK

In this paper we are presenting an internet based system entitled abnormal Monitoring System which will help drivers to prevent the accident. This system is based on principle of monitoring brain wave signal of driver continuously using a neuro headset If he/she falls asleep or abnormal form then accident alerting system which send alert message and automatic controlling of the car to avoid the accident. The other technologies that detects the Brain waves monitoring technique, yet it is low cost effective and has a difficult implementation. On the other hand smart accident technique dependent on physiological state of abnormal form and by understanding it, abnormal can be detected and accident can be prevented.

Abnormal form causing accident can be effectively prevented by implementing a smart accident technique system that is efficient enough to take critical decisions during emergency conditions. Major of accident prevention technique come into picture when accident occurred, however the proposed system is equipped with advantage of taking decisions by analyzing the symptoms of accident causing events. Brain wave technique only measures the bravin wave activity level but, EEG technique can be interfaced with a network of sensors in a cost effective manner to provide an efficient accident prevention system. The following key points were considered while estimating the feasibility and wide expansion of IOT based devices. it do some process like will control the vehicle's brake system and automatic horn sound to neighbor vehicles, due to this drowsiness of driver is detected and the accidents can avoid using this IOT system.

3. PROPOSED WORK

In this section this paper describes the architecture diagram for accident preventing system which is using the EEG signal where it sense all the brainwave activity of a human behavior .These EEG signals receives through wireless neuro headset which collects all the brainwave signals and pass it to the filter which allows only the abnormal brain wave signal and it is passed to Dash board where it is having the Bluetooth, in order to react for the abnormal EEG signal which will prevent accident, since the driver loses his control, he is unable to drive the car or to stop the car, because he may feels some sort of health issue like cardiac arrest, which will be in the Dash board of the car of EEG signal are passed to the car's Bluetooth, which collect the signal and pass to the detector which find the condition.

In Fig.1, it shows the measure the ratio of the Gamma, Beta, Alpha, Theta, and Delta. The ratio contained in the abnormal condition is shown.

A] Alpha waves are at a frequency of 8-13 waves per second, and are the typical waves seen in human who are relaxed. These waves are clearest in the occipital lobes (the part of the brain responsible for our sight and seeing).

[B] Beta waves are at frequencies greater than 13 per second. These are often seen in people who are in normal with their eyes open or closed. They are often seen in the frontal lobes (responsible for conscious through and movement) and in central areas of the brain. [C] Theta waves happen between the frequencies of 4-7 waves per second, and are also called slow activity. Theta waves occur during sleep and in human.

They are not obvious in human who are awake.[D] Delta waves are at frequencies up to 4 waves per second. These are the slowest type of wave but have the highest amplitude (strong signal). Delta waves are common in human [E] Gamma waves are at frequencies of 26-100 waves per second. Spikes are fast waves and are called spikes because of their shape on the EEG. Each lasts less than 80 Mili seconds and may be followed by slow delta wave spikes clearly stand out from other brain activity on EEG spike waves happen when one or more brief spikes are followed by slow wave , this happen 3 times per second .

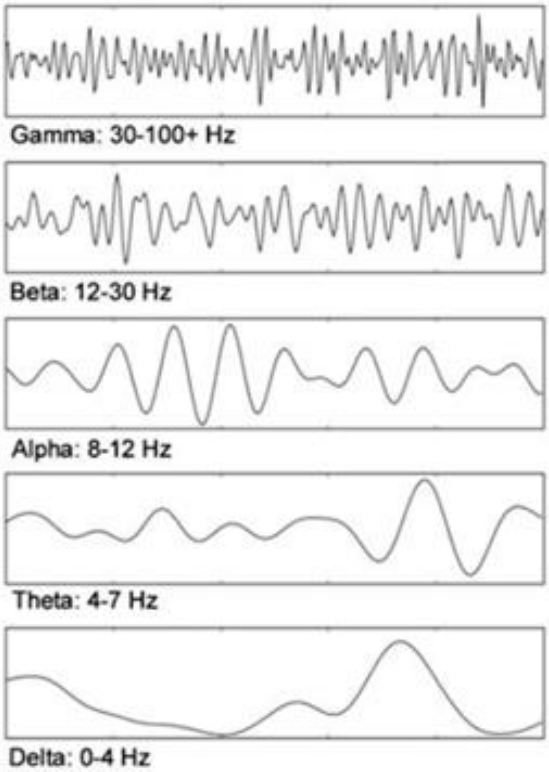

Fig.1 Abnormal Brain Wave Signals

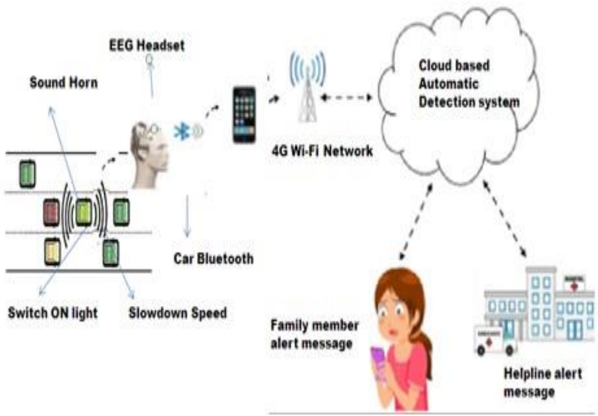

Fig.2 Architecture diagram for Accident Prevention System

It measures all the 5 types of brain, which reflects the condition of the brain. EEG signal is passed to the filter which filter the abnormal Fig.2 if it is a abnormal form then controlled by the IOT controller in the dash board it

ISSN: 2278-0181
ECLECTIC - 2020 Conference Proceedings

follow some procedure by using IOT concept [a] slow speed if the car is running speed of 120 per hour then it automatically reduced and slow the car is stopped suddenly [b] if the person have any pain and abnormal the car will continues the horn sound and light which instruct the other person that car has some problem [c] if it is abnormal form then it send the alert message to the family member which member number have been introduced in alert number [d] it alert the helpline are emergency call near the car which has the problem it will send the information to the hospital these process is do simultaneously

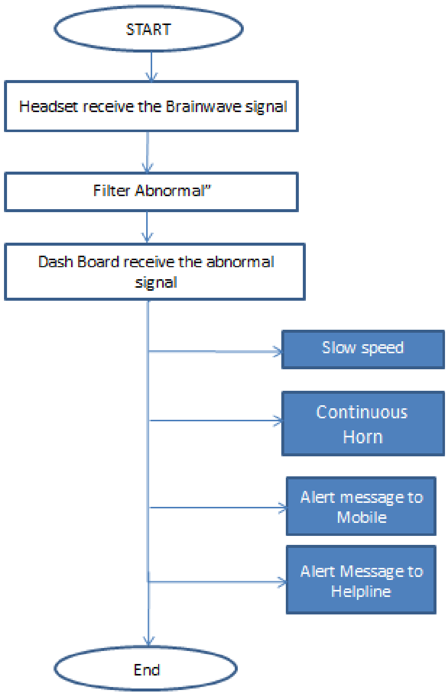

Fig.3 Flowchart for Smart Accident Prevention System

4. CONCLUSION

In order to reduce the death rate due to accident this paper introduces the accident alerting system which send alert message and automatic controlling of the car to avoid the accident. If the person is not in a position to control the vehicle then the accident occurs. To prevent such accidents this paper proposes smart way of controlling the car and directing the car in a safe way by receiving the Brain wave signal , where the dash board of the car is designed with IoT controller , such system take the car by slows down the car and also intimating the alert message to help line , relatives etc.. Slows down the forth coming vehicles understand the status of the driver by receiving the continuous horn and slows the speed limit of the vehicle.

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