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A Proposed System for Vehicle Monitoring, Accident Detection and Prevention using IOT

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Abstract: The rate of vehicular accidents in our country is keep on getting increased mainly because of driver's carelessness. Drowsiness and alcoholic state of the driver are the main reasons among them. Drowsiness can be detected using eye-blink sensor and alcoholic state can be detected using alcohol detection sensor. In spite of this prevention, if accident occurs, the situation can be analyzed by the use of vibration sensor and the message can be sent to the emergency services through Internet Of Things (IOT). This will be beneficial in the places where there will be no network.
Keywords: Drowsiness, alcohol detection, prevention, detection, IOT

I. INTRODUCTION

Driver's carelessness is the effect of not having enough rest or irregular period of sleep duration. The legal range of alcohol content present in the blood varies based on the type of the vehicle. If the driver drives a taxi or a heavy load vehicle then the range should be under 0.02g or if the vehicle be of personal use then the range should be under 0.05g. Based on this, concerned actions can be taken to avoid accidents. In the event of accidents, the depth of the situation can be analyzed using vibration sensor. Places like forest areas, uninhabited areas do not have any signal to pass the message to emergency services and relatives. This can be overcome using Internet of things (IOT) which makes it possible even in the difficult situations.

II. WORKING

A. Prevention

As the proverb "Prevention is better than cure", it is best to prevent the vehicular accidents than to detect it. The number of road accidents that has been currently occurring are because of over speed and this can also be detected so that the speed can be maintained at the safe zone.

B. Detection

As we apply this technique, the accident rate will gradually decrease down to 90%. The balance 10% of the accidents is caused due to engine failure, break failure etc. These kinds of accidents cannot be detected using the current sensor. Therefore, this comes under future enhancements. But these accidents can be detected using vibration sensor and in case of any fire accidents the fire extinguishing sensor greatly helps to put out the fire.

III. RELATED PAPER WORKS

A. Crashes And Fatalities Related To Driver Drowsiness/Fatigue

This paper is based on the survey of accidents which has been caused due to drivers' drowsiness. For the purposes of this report, these terms are considered synonymous. Principal data sources are the NHTSA General Estimates System (GES) and the Fatal Accident Reporting System (FARS), although these data files are acknowledged to have limitations for quantifying this type of crash causal factor. Most data provided are for the five-year period 1989-93. Findings from other studies of the incidence of drowsiness/fatigue in crashes are reviewed. Finally, overviews are provided of NHTSA programs underway to help provide better data to assess this traffic safety problem and more importantly, to develop effective countermeasures. Sleepiness is different from fatigue because fatigue can be cleared by taking some rest, but sleepiness can occur in spite of getting good sleep.

B. Road Environment And Driver Fatigue

We distinguish between fatigue caused by the demands of the driving task itself (see Hancock & Desmond, 2001) and the traditional standard approach which mainly links fatigue to sleep deprivation. Fatigue can be caused by two sources: (1) the initial state of the driver before starting the drive or (2) the characteristics of the drive and the road environment; both sources can accumulate. For the purpose of the presentation, we provide empirical data on road conditions and driver fatigue from a series of three experiments conducted by the first author at the University of Ben-Gurion (see Oron-Gilad, 2003; Oron-Gilad, et al., 2001). These are examined in relation to the adaptability model of Hancock and Warm (1989). The most important and consistent results of the three

experiments reflect fatigue in driving performance in different road environments. These findings indicate that drivers are flexible in their way of handling fatigue over time. They can adopt different strategies to offset their decrease in performance by focusing on critical elements of each type of road. Understanding this dependency of fatigue symptoms on road conditions is particularly relevant for designers of technological countermeasures for fatigue as well as future road systems.

C. Correlation Between Electrode-Tissue Impedance And Motion Artifact In Biopotential Recordings

Health monitoring is one of the major parts for prevention of accidents and this paper is about monitoring the pulse of the heart through (ECG) electrocardiogram. By this method we can detect the pulse rate of the individual and act upon it based on its range. Here we use wet and dry electrodes to reduce the artifacts caused due to noise or motion caused by the individual. This gadget can detect up to 10 different types of arrhinias. Rechargeable lithium battery has been used to provide the power source. This system enables simultaneous monitoring of ECG and ETI. The integrity and reliability of the recordings are low due to motion artifacts. The frequency of the injected current is 2.2 KHz only. The signal from the AFC is somewhat noisy for the events where the wet electrodes are used. The usage of low-pass filtering is not possible for real world situations.

D. Fatigue, Sleepiness, And Performance In Simulated Versus Real Driving Conditions

The prime cause for the accidents to occur is the driver's drowsiness. Here the author is going to study about fatigue and sleepiness both in simulated and real time driving. Sleepiness is different from fatigue because fatigue can be cleared by taking some rest, but sleepiness can occur in spite of getting good sleep. Previous research of sleepiness in simulated driving shows results of different range compared to real time driving. This is because compared to real time driving simulated driving lacks many characteristics that the real time driving has, which makes the driver sleepier. Let us compare and study the result. The real time characteristics can be implemented using this method, which plays a important role in sleepiness. The discomfort caused by the simulated driving can be eliminated. We can analyze the performance of the drivers for long range of time with equal range of sleep and rest provided. The time taken to experiment is much larger compared to simulated driving. The sleep schedule has to be strictly followed to execute this method. The volunteers used for this experiment has to tested for various illness before undergoing this experiment.

E. Evaluation Of Dynamics Of Forehead Skintemperature Under Induced Drowsiness

Temperature measured from our body distinctively indicates the health of the individual and here the author is going to measure the sleepiness or drowsiness of the driver while driving by inducing non-contact and noninvasive method. This method can be induced because the author is going the read the heat signatures of the forehead skin without using any sensors. The forehead temperature is mainly measured because the tympanum temperature (TT) which is the core temperature used to measure the brain activity. Thus, the FHT can be used to detect the drowsiness without any sensors. The drowsiness can be measured at the early stage using heat signatures. There is no inconvenience to the drivers during drowsiness detection. The FHT range varies for every individual which makes it difficult to detect the drowsiness. As the temperature in the environment varies the temperature of the body also varies which makes it inefficient. The FHT range will vary for a drastic range during the sick conditions.

F. Eeg-Based Drowsiness Estimation For Safety Driving Using Independent Component Analysis

Electro encephalogram (EEG) is mainly use to detect the problems in the process of sending the signals through electrical activity and here the author has used this to detect the drowsiness of the drives along with ICA. The ICA is mainly used to study the signal independent of the noise present in the channel. Here the author has combined the use of both to detect the drowsiness of the driver while driving. In this method accurate and quantitative assessments can be made with the alertness level of drowsiness. The usage of virtual reality simulated driving with the EEG give nonintrusive and accurate measurements. By using ICA, we can extract only the signal without the noise in it, which gives more accurate reading. The EEG is accompanied with inverse problem which creates a spatial activity of electrical signals which makes it difficult to detect drowsiness. The results and measurements vary for every individual which makes it infeasible.

G. Determining Mechanical And Electro Myographical Reaction Time In A Bci Driving Fatigue Experiment

Brain computer interface is main used in medical field to monitor the brain activity and is also used in game field to automatically control the moves with the thoughts, without any activity. This BCI is used here to monitor the fatigue and also to control the mechanical movements of the vehicle. The EMG is used along with the BCI to measure the signals produced by the brain muscles with which drowsiness and mechanical activity can be detected. The reality and the efficiency are high using EMG and BCI. It gives a real-time environmental feel so that the problems faced in the real time also can be justified. It monitors the information sent through the nerves accurately and does appropriate actions. There is a chance of nerve damage while implementing EMG due to

needle method of information collection. There may be occurrence of inaccuracy in the actions due to simultaneous orders given by the nervous system.

H. Correlation Between Driving Errors And Vigilance Level:Influence Of The Driver's Age

In this paper the author has explained about the occurrence of fatigue, loss of vigilance drowsiness leads to accident. The driver's performance is monitored and maintained based on the driver's age. In a experiment the drivers are classified into three categories as 20-30, 40-50 and 60-70. These drivers are made to drive the vehicle for about 350km. The vigilance level was evaluated using electro encephalo graph (EEG) recording. Depending upon the age categories consider only part of the driving error which has the cause of drowsiness. EEG can record up to sampling rates above 20,000 Hz. Hardware costs are significantly lower. Signal-to-noise ratio is poor. The neural activity that has ben measured is of poor type.

I. Generalized Eeg-Based Drowsiness Prediction System By Using A Self-Organizing Neural Fuzzy System

In this paper the creator has clarified about that we can foresee driver's tiredness by summed up EEG-based Neural Fuzzy framework. Sleepy state observing framework has been actualized as a causal factor for the wellbeing driving issue, particularly when the driver nodded off or occupied in driving. We found that the electroencephalogram (EEG) control range changes were very corresponded with the driver's conduct execution. A summed up to screens and foresee the driver's-tired state we use EEG-based Self-sorting out Neural Fuzzy framework. There are two laziness expectation models, subject-reliant and summed up cross-subject indicators are utilized and the investigation for framework execution examination. In addition, the proposed EEG-based Self-arranging Neural Fuzzy framework can be summed up. Broadly utilized continuously applications MLPNN is quick task and simplicity of usage. SVR is ensured optimality. The SVR, MLPNN, and RBFNN give a decent framework execution. The downside of SVR is confinement in speed and size both in preparing and testing.

J. Design Of A Fatigue Detection System For High-Speed Trains Based On Drivervigilance Using Awireless Wearable Eeg

In this paper the author has explained about the railway safety, is important for the vigilance of the driver this is not being include in the safety management system (SMS) for high-speed train safety. Using a wireless wearable electroencephalograph, we can monitor train driver vigilance for high speed train safety. 8-channel wireless wearable brain-computer interface (BCI) device acquires the driver brain EEG signal under high speed train driving conditions. There are three main parts (1) a wireless wearable EEG collection; (2) train driver vigilance detection; and (3) early warning device for train driver conditions. If fatigue is detected and early warning device begin to work. The Vehicle-behavior-base technology provides a non-invasive method for the driver. Driver vigilance using wireless wearable EEG. Good performance in driver vigilance. The drawbacks of BCI are high cost, low speed, and lack of better sensor modality.

K. Efficacy Of Drivers' Fatigue On Road Accident In Selected Southwestern States Of Nigeria

The study examines the causes and effects of driver's fatigue on road crashes in south-western Nigeria. The study was carried out in the administrative seats of Oyo and Ogun states of Nigeria with the aid of structured questionnaires which were administered on 325 respondents in the study area using simple random sampling approach. The collected data were analyzed using multiple regression models. The study revealed that, duration of driving, stress, sleep deficit, alcohol contributed significantly to the causes of driver's fatigue both at 5% and 10% significant levels. And that it is pertinent on them to plan their journeys in such a way that it will include regular rest, break of at least 15 minutes at every two hours.

L. Vehicle-Based Drowsy Driver Detection: Current Status And Future Prospects

Logical help for the achievability of this countermeasure idea is given by research appearing l Drowsy drivers regularly don't "drop off' immediately. Rather, there is a first time of quantifiable execution decrement with related psycho physiological signs. l Drowsiness can be recognized with sensible exactness utilizing driving execution estimates, for example, "float and-snap" controlling and variances in vehicle parallel path positional the utilization of immediate, unpretentious driver psycho physiological checking (e.g., of eye conclusion) could conceivably improve languor discovery essentially. The imagined vehicle-based driver sleepiness identification framework would consistently and inconspicuously screen driver execution (and "smaller scale execution, for example, minute controlling developments) and driver psycho physiological status (specifically eye conclusion). A second-organize test for drivers in the circumstance of conceivable languor.

IV. CONCLUSION

The techniques that have been already used in the existing systems and the techniques used by other researchers do have some limitations and these can be overcome mostly by our project using the technology called IOT. Even though most of the limitations have already been solved, there are some future enhancements that need to be done to make the project to be more enhanced.

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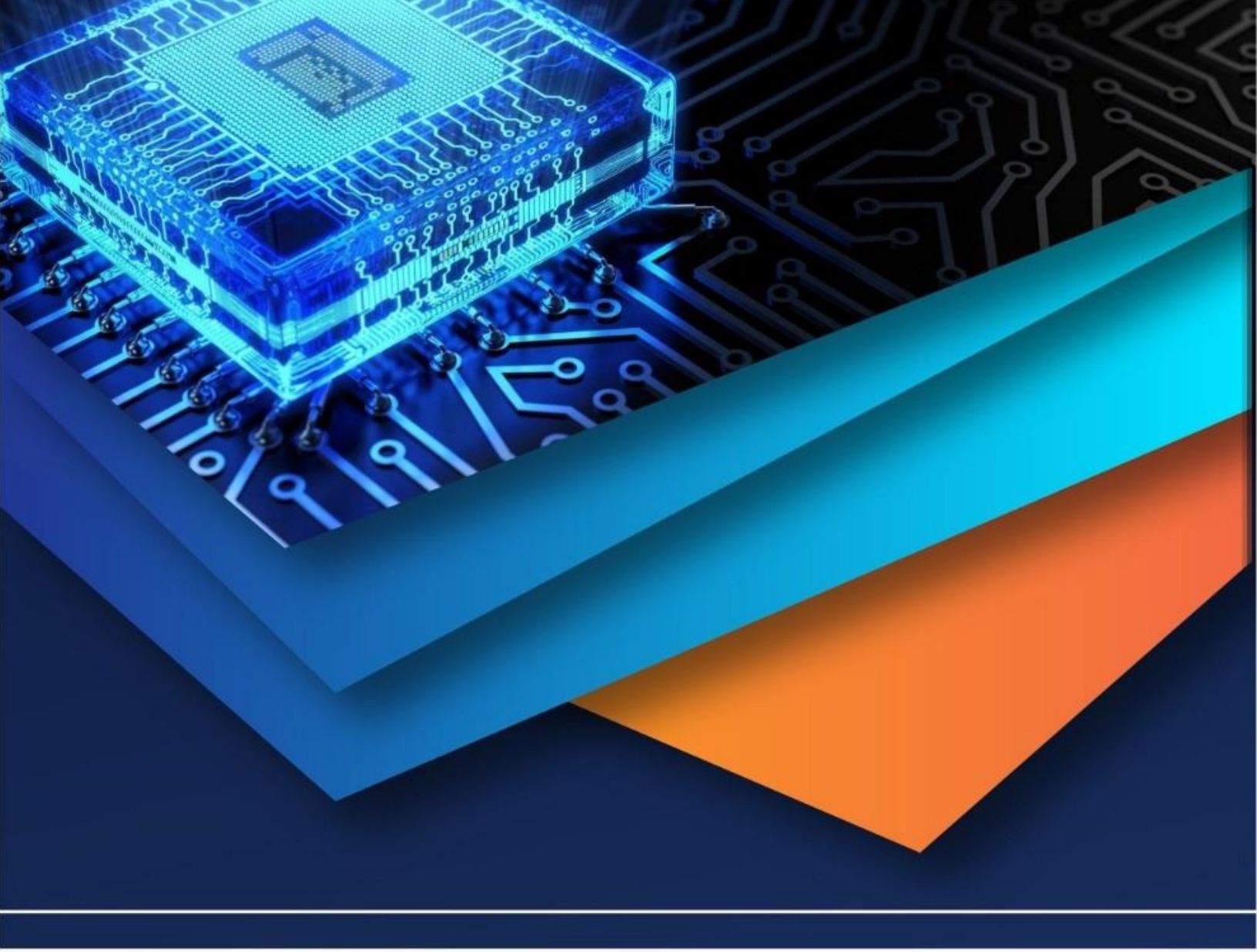

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