A Vehicle Accident Detection and Driver Surveillance

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Abstract: Perpetual increase in the number of deadly traffic accidents around the world are often considerably minimized if contemporary proficiency is integrated inside of the car towards observe the fitness of the driving force on consistent interims over the vehicle running and precautionary measures predictably taken for the safety of all anxious personnel, either within the vehicle or outside. The Raspberry Pi controller constantly records every one of the parameters of the vehicle based on the heartbeat, drowsiness and the level of alcohol consumption of the driver, for anticipation and recognition of mishap. In the unfortunate case of occurrence of an accident, the details and location of the vehicle is intimated to the emergency contacts via message immediately in order to seek first aid so as to prevent the avoidable loss of lives.

Keywords: Accident prevention, raspberry pi, sleep detection, heart rate monitoring, alcohol consumption level detection.

1. Introduction
The modernizations in the industry over the past decay are revolutionize vehicles as much powerful, safer, easy for driving and controlling, high proficient in energy and further environmentally approachable. Almost all the accidents instigated nowadays in cars are primarily because of the fatigue driver [1,2]. The aim of the present work, implements a prototype of driver drowsy caveat scheme. The main emphasis are going to hire on the system design, which resolve precisely and consistently view the eye blinking (open and close) state of the driver. This detection is often done employing a categorization of images of eyes and also the face and head movement using accelerometer module.

Apart from falling asleep on wheels, other causes for accidents include heart attack or alcohol consumption. We have also made a warning system to continuously monitor the heart rate and alcohol consumption levels of the driver and intimate the emergency contacts on any unfortunate situations.

2. System Analysis
A. Existing System
The available accident detection systems in automobiles are only post-accident response systems such as air bags. They fail to track collision and pre-damage status. Also monitoring the physical condition
of the driver is missing [3,4,5]. There is no automatic means of reaching out for immediate help or first aid in the occurrence of an accident. There is no such accident prevention technologies in use.

B. Proposed System
The proposed accident prevention system alerts the driver when he is about to fall asleep. This system also continuously monitors the heart rate and alcohol consumption levels of the driver and intimates the emergency contacts in case of any abnormalities such as a heart attack and provides them his location details.

3. Module Description
A. Architecture of Accident Prevention System

Fig.1. Architecture of the accident prevention system

Fig.1 shows the architecture of the proposed accident prevention system. The alcohol sensor, MQ-135 comprises a perception layer inside alumina micro tubes, a tin dioxide layer and an element at the tube-shaped case the very best sensor aspect is covered by a chrome steel net and thus the posterior grips the terminals for connection. Fig.2 shows the MQ-135 circuit diagram.

Fig.2. MQ-135 Circuit Diagram

The pulse sensor possesses two surfaces, on the primary surface consist of the light-emitting diode (LED) and ambient light sensor. Subsequently, on the succeeding surface such as the circuit is connected. The LED is fixed over a vein during a physical body similar that of ear tip or fingertip, though, it is situated on top of a layer directly. When the LED is situated on the vein and it starts blinking. As the heart is pumping, there will be a blood flow inside of the veins. If the blood flow is detected, the ambient light sensor will collect additional light as they are replicated by the blood flow. The key perception is the engine starts only the seat belt of driver is buckled, which remainsthe driver to wear the seat belt essential to run the car. The caption is that, the information will be communicated from the heartbeat detector attached with the seatbelt and heart of the driver, only then the microcontroller can allow the driver to twitch vehicle engine. Heartbeat sensor will persistently identify the heartbeat level of the driver. As the heartbeat level of the driver energizes an anomalous level at that time the information will direct to proprietor (car), nearby sanatorium and
policeman by means of GSM or IOT. If the information about the abnormality of the driver is reached to the proprietor, he can able to halt the vehicle spontaneously from anywhere over the GSM or IOT. The Raspberry pi is a single microcontroller (computer) board of MasterCard size can be operated for several tasks. Raspberry pi acts as a heart of the system by which the message transfers to diversified devices within the system. With the help of GPS module, the situation is often communicated to the tracking system to shield the geographical coordinates of the area.

To detect drowsiness, image processing technique is employed using the camera to read the driving force's countenance and alerting the driver with a buzzer if he loses his focus. Image processing is completed using Open CV software toolkit.

The communication unit comprises of the Global System for Mobile (GSM) and Global Positioning System (GPS). The communication unit is used for transferring the data regarding the position of the vehicle and the condition of the person are all communicated via this unit.

4. Methodology

The design of accident detection and reporting system is established on Raspberry pi and GPS module. Once vehicle encounters an accident, subsequently the accident should be identified by sensor. The sensor are often used as a crash detection of the vehicle through and after crash consistent with the project, while a vehicle encounters an accident, a Heartbeat sensor will perceives the signal and transfers to Raspberry pi microcontroller. Immediately the microcontroller conveys the signal to GPS module with the present position co-ordinates values such as longitude (N or S), latitude (E or W) and also the microcontroller communicates the alert information to nearest emergency medical service (EMS) or loved one over GSM modem with GPS parameter values. The EMS will provide instantaneous medical action at accident location and victim can acquire the speedy treatment as possible. Engine stops the vehicle spontaneously on the alcohol is identified by Gas sensor. Within the subsequent, it collects message from its neighbours, and routines the knowledge mutually to form the selection.

5. Results and Discussions

The prototype of the driver accident detection system was tested and all the various parts were found to be functional.

(1) The wakefulness of the test user was monitored continuously by the image processor and the alarm was set on when the eyes of the test user remained closed.
(2) The heartbeat of the test user was monitored continuously and the output was accessed. When it is abnormal, a message intimation was sent to the emergency contact number.
(3) The different alcohols levels of various test users are detected successfully by the alcohol sensor.

Fig.3-5 shows the hardware implementation, SMS output and mail output of the proposed concept.

Fig.3. Hardware Implementation
6. Conclusion

The vehicle accident detection System is an essentially a tool anticipated by the present work used to prevent the drivers lifetime, who remain constantly driving the vehicle (car) and aren’t ready to get sufficient sleep. Several accidents happen especially within the developing countries such as India everywhere the quantity of the on road vehicles rises per annum. The anticipated scheme defends the driving force from misfortune moment which may happen due to fatigue of the driving force. The anticipated scheme is reasonable as related to former schemes existing in the luxurious cars. Habitually, one among the foremost essential and active feature of the system is to create the practical readiness to identify as the attention is shut or open, whenever vehicle driver lonely closing the eyes and that point sound alert system is activated.

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