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Vehicle Accident Detection and Driver Surveillance

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ABSTRACT: An advanced vehicle monitoring and tracking system is proposed and designed for the aim of monitoring the vehicles when it is in the motion, in order to provide safety and security to the passengers. Most of the accidents occur due to the carelessness of the driver or due to any health issues to the driver and also if any accident occurs, the recovery team finds it difficult to identify the particular spot to reach there. Due to the delay, most of the people die in the accidents. To overcome this, Global Positioning System (GPS) and Global System for Mobile Communication (GSM) for vehicle tracking and monitoring purpose is used by using SIM800 module in this proposed method. The GPS provides present site of the vehicle, GPRS sends the tracked information to the server and therefore to the owner of the vehicle. This method is deployed within the interior of the vehicle whose location is to be determined and it is viewed in the web. The proposed system takes care of the traveller's safety by using sensor to find the status of the driver.

KEYWORDS: GPS, Tracking of vehicle, safety and security enhancement, GSM.

I.INTRODUCTION

The number of accidents on the roads is increasing. This can be reduced by the use of modern technology. In most cases, the accident of the vehicle can be caused by a person's negligence or his or her health. The delay in the ambulance arriving to pick up the injured person is also a cause of death. The proposed method is used to reduce the death in accidents and to keep track of the vehicle. To track the vehicle's movement Global Positioning System (GPS) is used and to send messages to the hospital and the person's relatives SIM800 Global System Mobile communication (GSM) model is used. The GPS provides the present site of the vehicle; (GPRS) General Pack Radio Service sends the tracked information to the server and sends the information to the relatives of the driver. The proposed system takes care of the traveller's safety by using the sensors to find the health of the driver. This method is deployed within the interior of the vehicle and a web page is created to know where the vehicle is and to know the activities of the person who is driving.

Today with exponential increase in population has led to exponential increase in vehicles. Many new companies introduce new vehicles in the market with latest and advanced features. For these features they offer heavy charges. But we observe that, after paying such a heavy amount, still few of these features are weak especially in safety of vehicle and driver. Those weaknesses are not capable of reducing crimes like vehicle theft, misuse etc. and are increasing day by day. Another major thing is the increase in vehicle accidents and there isn't such a feature which will help in surveillance of drivers. Due to rapid increase in vehicles, there is an exponential increase in crime and accidents hence it has become a challenge for governments to limit such crimes especially from professional thieves.Nowadays Wireless Sensor Networks (WSN) has been applied in various domains like weather monitoring, military, home automation, health care monitoring, security and safety etc. The vehicle system is placed inside the vehicle which detects the accident location by means of sending a message. With the help of GPS and GSM modules, anywhere in the vehicle is traced. The driver fatigue is detected using computer vision. The driver fatigue is determined by the frequency of eye blinking and head tilting and the drowsiness level is calculated by RaspberryPi3 along with a camera.

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In this project, to designing and development of vehicle accident detection and as well as driver surveillance using Raspberry pi 3. BP sensor, Heart beat sensor, Gas sensor and MEMS sensor, these sensors are used to monitor the health condition of the driver during driving. When the driver sleeps / feels drowsy, the buzzer raises an audible alarm inside the vehicle to alert the driver. At the time of accidents, messages will be sent to registered mobile numbers and to hospital. This will help to monitor the physical state of the driver at regular intervals during their driving and to identify the drowsiness state of the driver.

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II.LITERATURE SURVEY

Fabian Parsia George and Md. Yousuf Hossain [1] In the present time, drowsy driving has become one in every of the most important problems with the traffic collision. In this paper, the proposed system is absolutely non-intrusive and real-time. Our proposed system used the attention closure ratio as input parameter to detect the drowsiness of the driver. If the attention closure ratio deteriorates from the standard ratio, the driver is alerted with the help of a buzzer. For our system, a Pi camera is employed to capture the images of the driver's eye.

Gupta. N, Najeeb. D [2] This paper using electrocardiogram (ECG) monitoring in wearable computing systems for addressing drowsiness detection while driving. A system incorporating an off-the-shelf wearable ECG monitor and a prototype of a mobile application for finishing up the information analysis and computation is described.

Anusha Syed Musthak Ahmed.A [3] In advanced vehicle monitoring and tracking system is proposed and designed for the purpose of monitoring the vehicles. The GPS sends the tracking information to the server and thus an alert message generated is transmitted to the owner of the vehicle. Hence, if the driver drives the vehicle on the wrong path then the alert messages are going to be sent from the proposed system to the vehicle's owner mobile and also then also the warning sound is produced by Buzzer. The proposed system takes care of the traveler's safety by using Alcohol sensor to find the status of the driver and Temperature sensor to monitor vehicle Engine Temperature to avoid sparking of the vehicle them by preventing from the disaster.

Oraan Khunpisuth, Taweechai Chotchinasri [4] This describes the statistics for the rate of injury or death as the result of a car accident rising and to devise a way to alert drowsy drivers in the act of driving. Therefore, this study attempted to handle the problem by creating an experiment so as to calculate the level of drowsiness. The frequency of head tilting and blinking of the eyes was accustomed determine whether or not a driver felt drowsy.

III.ACCIDENT DETECTION

Raspberry pi 3 model B is a tiny credit card size computer and it is low cost. The advanced microcontroller/microprocessor which is the raspberry pi. This is the major controlling device in our project. Raspberry pi has some different versions. We use the Raspberry pi module 3, because it has high specifications when compared with other versions. And the python software was comfortable with the Raspberry pi 3 version only. The Raspberry pi 3 is a series of small single-board computers.The MCP3008 is an 8-Channel 10-bit ADC IC, so it can measure 8 different analog voltages with a resolution of 10-bit. It measures the value of analog voltage from 0-1023 and sends the value to a microcontroller or microprocessor through SPI communication. It can operate on both 3.3V and 5V and hence it can be used with 5V microcontroller as well as with 3.3V systems like the Raspberry Pi. It uses the SAR method to convert the Analog voltage to digital value. The MCP3008 connects to the Raspberry Pi using a SPI serial connection. It can use either the hardware SPI bus, or any four GPIO pins and software SPI to talk to the MCP3008. A digital camera was used to capture real time images. It acquires a real time image periodically to detect the drowsiness of the person. The capturing image is given to the raspberry pi for further processing for eye detection. We will be using OpenCV for gathering the images from the camera and feeding them into a Deep Learning model which can classify whether the person's eyes are 'Open' or 'Closed'.

GPS systems are used in military applications and by emergency crews to locate people in need of assistance. Vehicle tracking systems GPS-based navigation systems can provide us with turn by turn directions and very high speed. To strengthen the notification phase, it notifies the contacts of the driver/passenger, such as family members, about the accident through sending SMS messages that comprise the location where the accident is happening.When the notification is sent, the emergency crews should contact the web server, through the internet, for requesting the notification of the web page. The emergency responders use a web browser to retrieve and display the accident

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notifications.Piezo buzzers are used across many major industries as a means for audible identification or alert. In our proposed system it detects the drowsiness effectively. If the driver's eye remains closed for more than a certain period of time, then the driver is said to be drowsy and an alarm sound is generated to wake up the driver.A 9V DC motor is used. The DC motor converts direct current electrical energy into mechanical energy. In our project DC motor (or) Engine starts when the driver enters the car. Immediately if the alcohol consumption of the driver exceeds the alcohol limit, then the motor stops.

IV.DRIVER SURVEILLANCE

Here, sensors which is used to monitor the health condition of the driver while driving. Blood Pressure can be measured both by invasive and non-invasive methods. In the non-invasive method, no piercing is required and is easy to use. Blood Pressure Sensor is used to measure the blood pressure using the non-invasive method. It is similar to a sphygmomanometer but instead of the mercury column, a pressure sensor is used to detect the blood pressure.ADXL335 is a Breakout board based on 3 axis ADXL335 IC from Analog Devices. The Accelerometer Module requires no external devices and works on 5V power supply. It can be directly interfaced to the ADC of a microcontroller without any external components. Heartbeat Sensor fitting and - play heart - rate sensor for Arduino. It can be used by understudies, craftsmen, creators, and engineers who need live heart-rate information into their activities. It can be utilized by understudies, craftsmen, competitors, producers, and diversion and versatile designers who need to effortlessly fuse live heart-rate information into their tasks.

Heartbeat Sensor includes intensification and clam or cancelation hardware to the equipment. It's discernibly speedier and less demanding to get solid heartbeat readings. Heartbeat Sensor works used 3V or 5V Arduino. The sensor cuts onto a fingertip or ear cartilage and attachments directly into raspberry pi with some jumper links. MQ2 gas sensor module detects gases like iso-butane, propane, alcohol, cigarette, smoke, and LNG. This sensor works on 5V DC Voltage. Sensor provides an analog output based on alcohol concentration. The sensor has an exceptional sensitivity and faster response time. A digital camera was used to capture real time images. It acquires a real time image periodically to detect the drowsiness of the person. The capturing image is given to the raspberry pi for further processing for eye detection. We will be using OpenCV for gathering the images from the camera and feeding them into a Deep Learning model which can classify whether the person's eyes are 'Open' or 'Closed'. GPS systems are used in military applications and by emergency crews to locate people in need of assistance. Vehicle tracking systems GPS-based navigation systems can provide us with turn by turn directions and very high speed.

GSM uses narrowband TDMA, which allows eight simultaneous calls on the same radio frequency. GSM modem is used for transmitting and receiving. A GSM module was implemented to send the SMS to the relative or person close to the driver so that person knows the condition and suggest to stop the car immediately. To strengthen the notification phase, it notifies the contacts of the driver/passenger, such as family members, about the accident through sending SMS messages that comprise the location where the accident is happening. When the notification is sent, the emergency crews should contact the web server, through the internet, for requesting the notification of the web page. The emergency responders use a web browser to retrieve and display the accident notifications. Piezo buzzers are used across many major industries as a means for audible identification or alert. In our proposed system it detects the drowsiness effectively. If the driver's eye remains closed for more than a certain period of time, then the driver is said to be drowsy and an alarm sound is generated to wake up the driver.A 9V DC motor is used. The DC motor converts direct current electrical energy into mechanical energy. In our project DC motor (or) Engine starts when the driver enters the car. Immediately if the alcohol consumption of the driver exceeds the alcohol limit, then the motor stops.

V.RESULT AND DISCUSSION

The computer software vision based embedded technique is used to monitor the driver's health condition. Prototype of drowsiness detection system was designed using Raspberry Pi hardware and coded in python language. The system reports the information to the emergency responses including the results of the rider's geographical position with latitude and longitude values, which helps to find the accurate location using Google maps.

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DROWSY DETECTION:

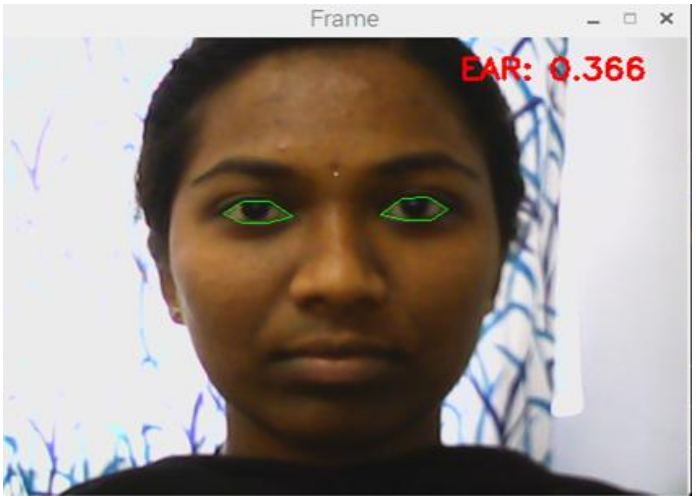

Fig 1Eye in open condition

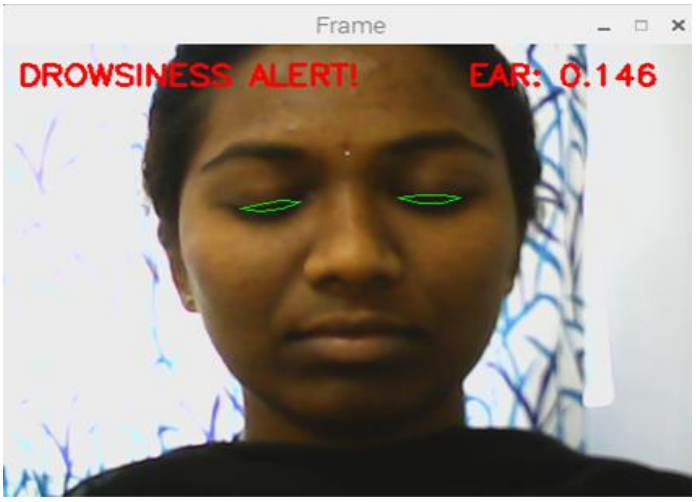

Fig 2Eye in closed condition

HEALTH MONITORING:

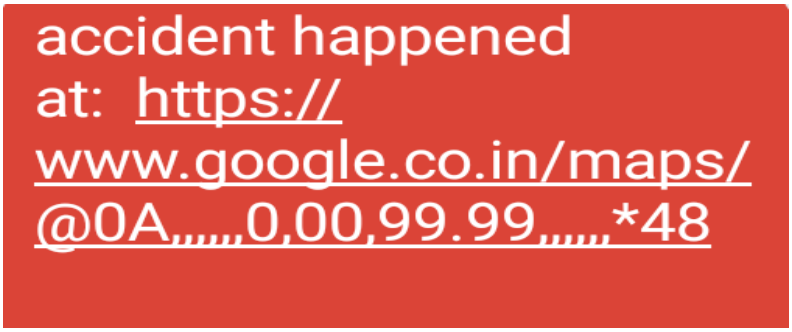

Fig 3 Message received on the phone - Accident Happened

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Fig 4 Message received on the phone - Health Problem

VI.CONCLUSION

There are several intrusive and non-intrusive methods to implement driver drowsiness detection system and monitoring the driver's health condition making the intimation on Webpage. From the study and design of planned work it's clear that usage of raspberry pi and open CV is even a lot appropriate for this Specific application in terms of size, cost and power requirement. Driver drowsiness detection is designed mainly to keep the driver awake while driving to avoid the accident due to sleepiness and sensors are used to monitor the driver's health condition. The alert signal is generated from an embedded device to awake the driverfrom a sleepy state. The Pi along with the Raspbian camera is used to calculate the drowsiness of the driver in real time. Frequent detection of eye blinking and head tilting is measured properly and it helps to indicate drowsiness. When he/she reaches the maximum threshold, the driver will be alarmed by a loud warning that will wake up the driver from the sleep state and in case of emergency the SMS will be sent to the registered number.

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