"Driver Drowsiness Detection System For Accident Prevention"

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ABSTRACT

According to the recent survey of National Highway Traffic Safety Administration, United States, 30% of the car accidents take place due to driver drowsiness or fatigue. This project addresses this issue by continuously monitoring the drowsiness of the driver with the help of heartbeat sensor and night vision camera. Heartbeat sensor is used to find the variation in heart beat due to drowsiness and night vision camera is used to monitor the eye blinking rate. The driver's heartbeat count and the number of eye blinks are continuously monitored for a period of 2 minutes using a heartbeat sensor and night vision camera respectively. From the measured values, the proposed system mathematically manipulates the drowsiness and fatigue level of the driver. If the driver is found to be drowsy, an alarm by means of a buzzer is given to the driver to alert him not to sleep. Additionally, in case of accidents the information about the location is sent to the ambulance server through the IOT, by the virtue of Vibration Sensor.

KEYWORDS*: - Image Processing, Open CV, Raspberry pi*

1.INTRODUCTION

Vehicles play a vital role in transportation. Transport infrastructure consists of the fixed installations including roads, railways, airways, waterways, canals and terminals such as airports, railways, warehouses, trucking terminals, refueling depots (including fueling docks and fuel stations) and seaports. Vehicles travelling on these networks include automobiles, bicycles, buses, trains, trucks, helicopters, watercraft, spacecraft and aircraft. When compared to airways railways and waterways, accidents mainly happen in roads. The number of people travelling by roads in high and therefore the accident occurring in roads is high. There are many accidents that occur in roads, among those vehicle collisions and falls are the most common causes of fatal injuries.

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2.Literature Review

Driver drowsiness is one of the major causes of traffic accidents. ... During the survey, non-intrusive methods detect drowsiness by measuring driving behavior and sometimes eye features, through which camera based detection system is the best method and so are useful for real world driving situation. In [1], Joe et al proposed a module, which monitors the heartbeat and respiratory rate. It works analysing running windows of one-lead 2 minutes ECG. Once the system starts, it provides an output indicating whether the driver is sleep-deprived or not, thus after 3 minutes, the system detects whether he is suitable for driving or not. The detector evaluates the state of the driver every minute, maintaining the alarm OFF if the driver is identified as awake and triggering the alarm to ON if the driver is identified as drowsy or fatigued. The signal processing and online system algorithms were implemented in MATLAB.

3. METHODOLOGY

The main objective of the project is the detect the drowsiness of the driver in the initial stage by using a camera. Initially, the heartbeat of the driver is recorded for 2 minutes and the average of all the values is taken as a threshold value. If there is any variation in the value, the system turns on the camera and detect the drowsiness level of the driver. If the driver is found to be drowsy, then the driver is alerted using the buzzer. The location of the vehicle, the heartbeat and the level of drowsiness of the driver is sent to the cloud and it stores the information as online black box. If the accident is detected using vibration sensor, the system immediately updates the value to the ambulance server. If the recovery button is pressed within 60 seconds, the system updates that it is a minor accident. If the recovery button is not pressed within 60 seconds, the system updates that the accident is major to the ambulance server.

4.SYSTEM ARCHITECTURE DIAGRAM:

This system works by analyzing the eye movement of the driver and alerting the driver by activating the buzzer when he/she is drowsy. The system so implemented is a nonintrusive real-time monitoring system for eye detection. During monitoring, the system is able to decide whether the eyes were opened or closed.:

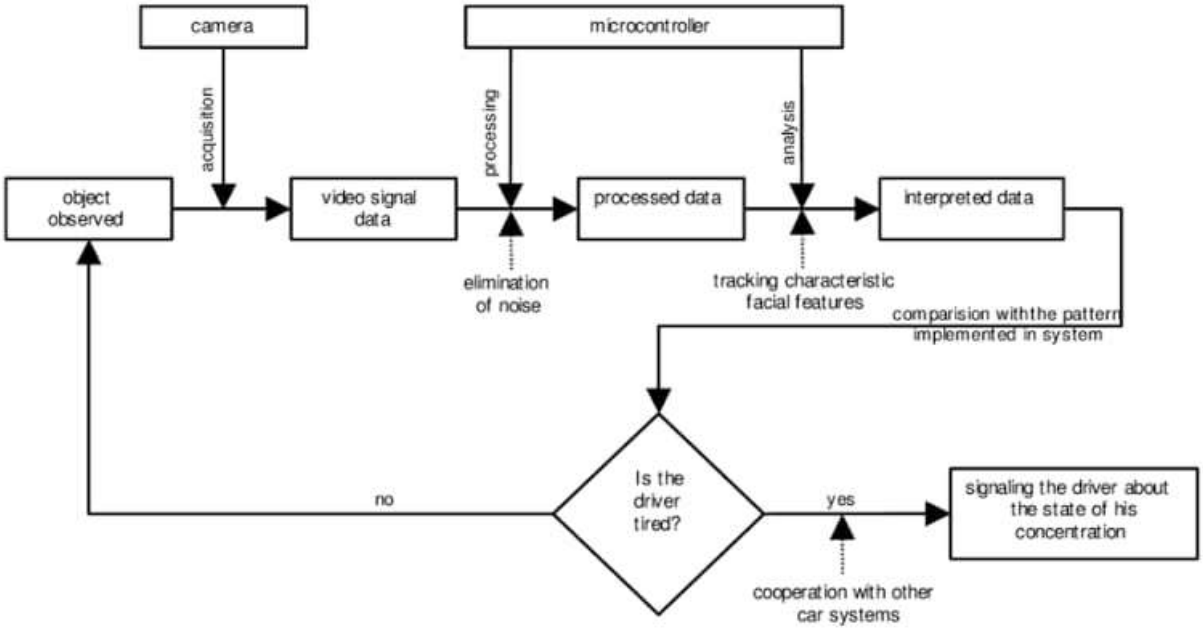

Figure: System Architecture

5. HARDWARE REQUIREMENT

5.1 RASPBERRY PI

Heartbeat Sensor, Raspberry pi 3, GPS Module, Switch, Buzzer, Camera and Vibration sensor and the Software Requirements include OpenCV (Open Source Computer Vision Library) The Programming Languages used are Python and HTML..

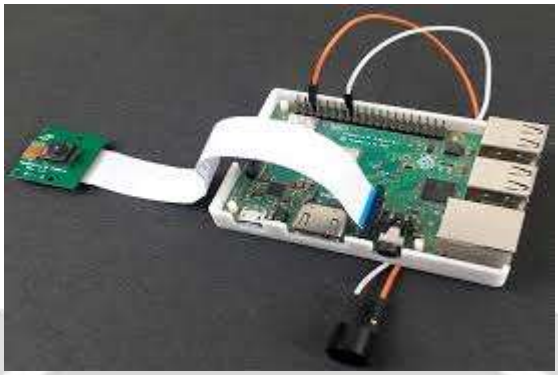

Figure: Raspberry PI

5.2Wi-Fi Module

Wi-Fi Module is SOC with TCP/IP protocol stack integrated which facilitates any microcontroller to access Wi-Fi network. ESP8266 module is cost effective module and supports APSD for VOIP Applications and Bluetooth co-existence interfaces. Technical Specifications: 802.11b/g/n; Wi-Fi Direct, 1MB Flash Memory, SDIO 1.1/2.0, SPI, UART, Standby Power Consumption of <1.0mW.

Figure: WIFI MODULE

5.3 SENSORS

The system consists of eye blink sensor, alcohol sensor, tilt sensor, LDR etc. ... It is used to determine the open or closing of eye of the driver. Hence whenever driver feels sleepy, eye blink sensor detect the closing position of eye and alert the driver by using buzzer and displayed in LCD..

Figure: TEMPERATURE SENSOR-DS18B20

6. FUTURE SCOPE

The future works may focus on the utilization of outer factors such as vehicle states, sleeping hours, weather conditions, mechanical data, etc, for fatigue measurement. Driver drowsiness pose a major threat to highway safety, and the problem is particularly severe for commercial motor vehicle operators. Twenty-four hour operations, high annual mileage, exposure to challenging environmental conditions, and demanding work schedules all contribute to this serious safety issue. Monitoring the driver's state of drowsiness and vigilance and providing feedback on their condition so that they can take appropriate action is one crucial step in a series of preventive measures necessary to address this problem.

7. CONCLUSION

Thus, the drowsiness of the driver is detected in the initial stage and the system alerts the driver. The location of the vehicle is update to the cloud. If there is any accident occurring, it immediately update the location of the accident to the ambulance server as Major or Minor accident. If the recovery switch is pressed within 60 secs of accident detection, it will be considered as minor accident. If the recovery switch is not pressed within 60 secs, it will be considered as major accident. By instantly updating the location, heartbeat and the level of drowsiness of the driver to the cloud as a black box, it make is easy to detect the cause of accident. However, for drowsiness detection high resolution and high frame per second recording camera is need for instant value calculation and detection. In future, in order to make the image more clear and to increase the speed of detection of drowsiness high frames per second camera should be used. To detect the drowsiness during night time, night vision IR based cameras should be used. Further, after drowsiness detection and alerting the driver, the acceleration system, the brake system and the gear system are controlled using the CAN network and the speed of the vehicle can be reduced gradually and the engine can be turned off. Ambulance stations can be implemented in more number of areas for quick response from the server.

8.REFERENCES

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