INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 4.295
(Volume 5, Issue 2)
Available online at: www.ijariit.com

Drowsy driving warning and traffic collision information system using IoT

Madhan Kumar A.
madhan7kumar22@gmail.com
Panimalar Institute of Technology, Chennai, Tamil Nadu

Kabilan M.
masilamanikabi@gmail.com
Panimalar Institute of Technology, Chennai, Tamil Nadu

Karthikeyan S. B.
sb.karthikeyan98@gmail.com
Panimalar Institute of Technology, Chennai, Tamil Nadu

Sathiyapriya S.
sathiyapriya.anbunathan@gmail.com
Panimalar Institute of Technology, Chennai, Tamil Nadu

ABSTRACT

Driver lassitude induced drowsiness accounts for a major of road accidents. To avoid such accidents, a precautionary system is needed. The idea is to develop driver sleep detection, drunk and drive monitoring system. Digital Image Processing (DIP) technique is used to detect fatigue. Haar cascaded algorithm is used for eye detection. In this paper, a system is proposed to avoid road accidents using the alert system along with collision information system. IOT module is used to get location information and to send messages. Wi-Fi module is used to update location information in the server.

Keywords— *Haar cascade algorithm, DIP, IOT, Wi-Fi*

1. INTRODUCTION

In today's world, most people can afford to buy cars and bikes, as it becomes one of the most important and useful things. As vehicle count is increasing, it also leads to heavy traffic and accidents. Nowadays vehicle riding has become very painstaking, as accidents are now frequent in many places. There are many reasons for the accident; one of the reasons is drowsy driving. Drowsy driving can lead to

Serious accidents. Other major reason is drunk and drive. This is not only unsafe for the drivers, but also for others who travel on the road.

In India, more than 150,000 people are killed each year in traffic accidents year which is about 10% of road crash fatalities worldwide. That's about 400 fatalities a day and far more than developed auto markets like the US. In 2017 As many as 1,47,000 people died on Indian roads in 4,64,000 accidents as per the reports of the Ministry of Road Transport and Highways. According to the reports, drowsy driving was responsible for 72,000 crashes, 44,000 injuries and 800 deaths. Drunk and Drive is also responsible for many accidents, claiming more lives. As per National statistics, an average of nearly 12,000 people dies every year.

The main objective of this system is to detect the drowsy state of the driver and to create a warning to the driver. Drowsiness detection can reduce accidents due to this problem. For this more efficient technologies must be used. Accurate detection of eyes must be done to identify the driver's condition. Gas sensors can detect whether the driver is drunk. Constant Observation of eyes and alcohol gas in the air can be used to avoid accidents.

2. EXISTING SYSTEM

In the existing system, ECG and EEG sensor based Drowsiness detection is implemented and sensors are suitable in laboratory monitoring. But during driving, it's not suitable as it connected to the driver body. So there is no comfort to the person during driving and the sensor value may vary depending upon light intensity. It produces less accurate results.

Goggles with Eyeball sensor also used for drowsiness detection, but it is not comfortable to use while driving.

3. PROPOSED SYSTEM

In the proposed system, Drowsy driving detection and Drunk and drive detection is used to avoid accidents. In addition to that Traffic collision information system is also used.

3.1 Drowsiness Detection

Drowsiness detection is detecting the eyes of the driver. The camera is used for detection instead of eyeball sensors, which is used in the older method. It detects the driver's eyes and sends the information to raspberry pi 3 which process the information.

3.2 Drunk and drive and Smoke detection

This system uses Gas sensors to detect whether the driver is drunk or smoking. Gas sensors react to the gases present, thus changes in the concentration of molecules at the gaseous state are updated. It reacts to the breath of the driver; if Ethanol or

carbon monoxide is detected then it sends the information to the system to perform the further process.

3.3 Warning system

Warning system helps the driver to wake from the drowsy state while driving. In this system, Buzzer and Vibrator are used for warning the driver. If the driver is detected in the drowsy state, then the system alerts the driver using the buzzer. If the driver didn't wake up then vibration is given in the driver's wrist using a vibrator. If it continues, then the relay will cut-off the motor.

3.4 Intimation system

An Intimation system is used to send the emergency message about the accident location and to update in the server. The accident is detected using a vibration sensor. This system includes the IOT module and Wi-Fi module.

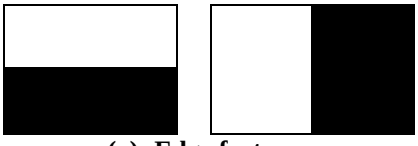
4. HAAR CASCADE ALGORITHM

Haar Cascade is a Machine learning Object detection algorithm used to identify specific objects in an image. It is used to locate facial expressions in an image. So it is mainly used for Face Detection. In Haar Cascade algorithm, the system is provided with several numbers of positive images (face) and Negative images (images excluding faces), and the feature selection is done along with the classifier training and integral images.

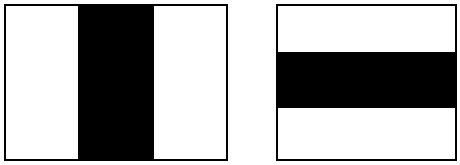
In general, three kinds of features are used in which the value of two rectangle features is the difference sum of the pixels within two rectangle regions. The regions have the same size and shape.

It is either horizontally or vertically adjacent. The three rectangular features are computed by taking the sum of two outside rectangles and then subtracted with the sum in the centre rectangle. The four rectangle feature computes the difference between the diagonal pair of rectangles.

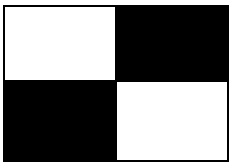
(A) Edge Features
(B) Line Features
(C) Four-Rectangle Features



(a): Edge features



(b) Line features



(c) Four rectangle features

Fig. 1: Face detection using Haar cascade-openCV

The sum of pixels in the white rectangles is subtracted from the sum of the pixels in the grey rectangle.

5. BLOCK DIAGRAM

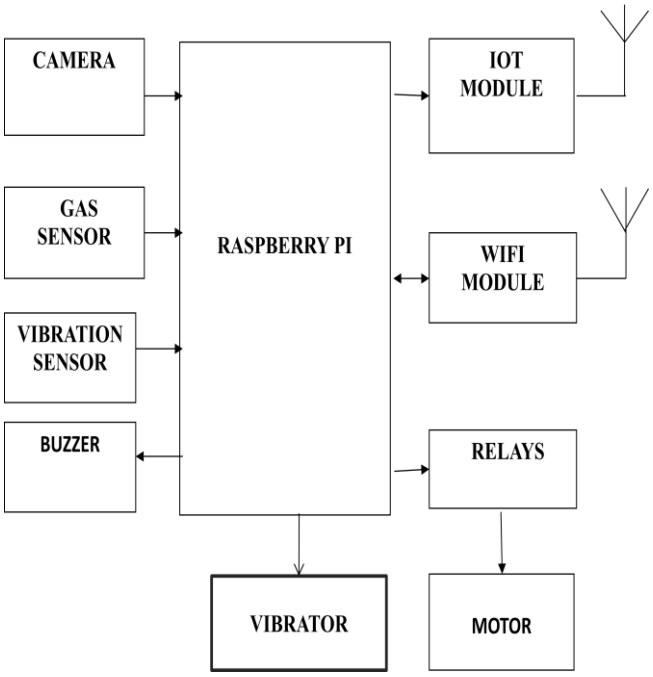


Fig. 2: Block Diagram

5.1 Description

In this system, Raspberry Pi acts as the main processing unit. Raspberry Pi is simply a single board computer. Raspberry Pi can be used as a proper desktop computer or used to build smart devices. In this Raspberry Pi, 3 models is used. 16GB SD card is inserted in Raspberry Pi 3. This acts as a hard drive for the Raspberry Pi. Linux OS is used for it. A 5V power supply is required for Raspberry Pi 3. Camera, Gas sensor, Vibration sensor acts as input units. Buzzer, vibrator and Motor act as output units. IoT module and WI-FI module acts as an intimation unit.

Fig. 3: Face detection

When the driver is riding, the camera continuously monitors the driver's eyelid movement. If eyelids are closed for some time, it is an indication for the drowsy state. The camera detects it by using Haar cascade algorithm which is implemented using Open CV python. After detection alert sound is produced by the buzzer to wake the driver from the drowsy state. If the driver is unable to react to the alarm sound, then the vibrator on the driver's wrist will produce vibration. This will make the driver awake.

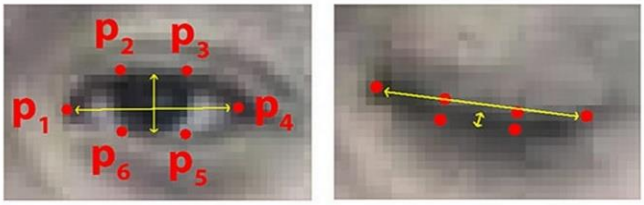


Fig. 4: Eye landmarks when the eye is open (left), eye landmarks when the eye is closed (right)

The Gas sensor is used for driver monitoring of drink and drive. It is also used to detect smoke. The Gas sensor detects the driver's breath for any traces of alcohol content. If the driver's breath consists of ethanol, then the information is updated in the server. After that, the relay will cut off the motor, which stops the vehicle. If an accident happens vibration sensor detects it. Then the IOT module is used to send information about the accident location in the form of Message. Wi-Fi module will update the location information and the captured image in the server. This sums up the working of Drowsy Driving Warning and Traffic Collision Information System.

6. FLOW CHART

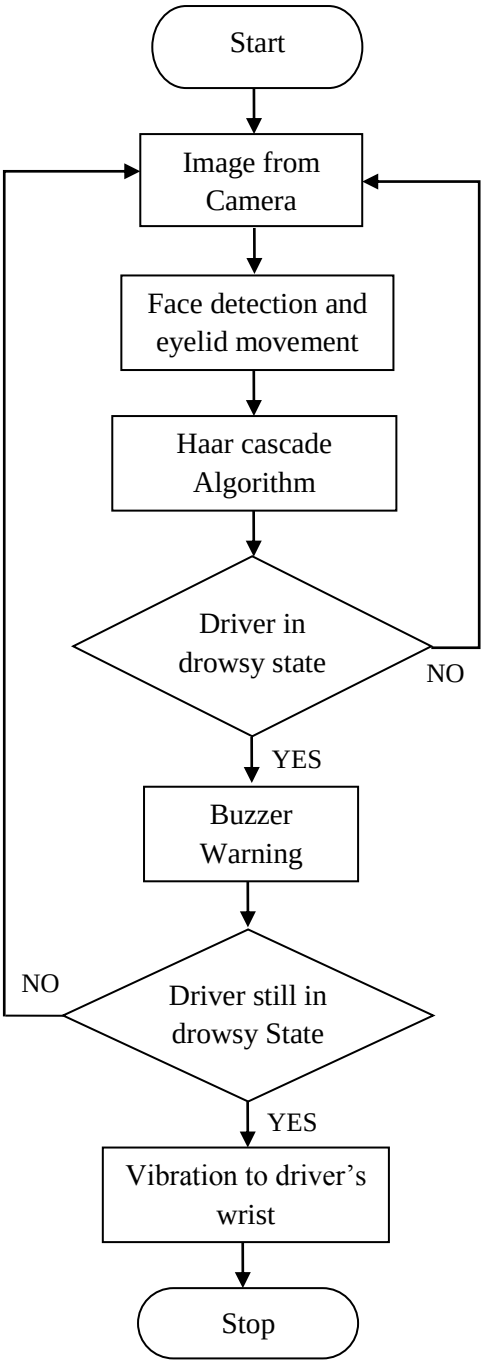


Fig. 5: Flow chart for drowsiness detection

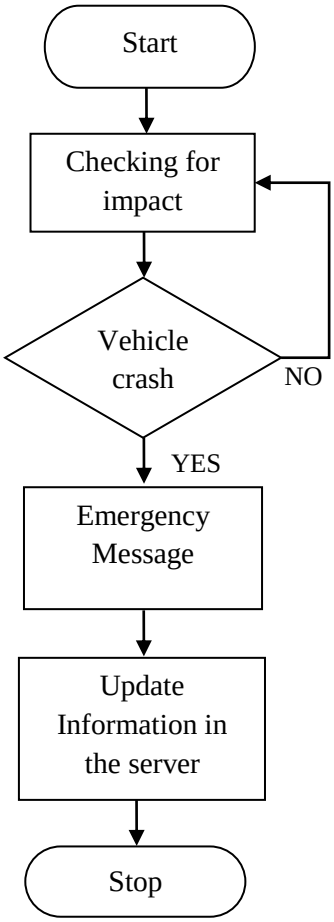


Fig. 6: Flow chart for accident detection

7. OUTPUT AND RESULT

The camera, sensors, buzzer, IOT module, vibrator, relay, motor and raspberry pi are integrated with the board**.** The following figure describes the final output of the system.

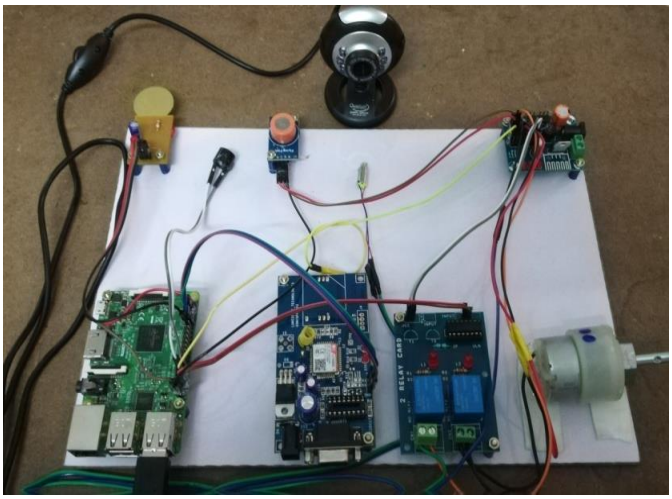


Fig. 7: Final outcome

8. CONCLUSION

Accidents happen due to driver's fault. A Minor Human error can lead to huge accidents and can claim many lives. By taking precautions, this problem can be avoided. This system will help to reduce accidents related to drowsiness and drunken driving. This system is more helpful for truck drivers and taxi drivers. This will help drivers to avoid such accidents, thereby saving many lives.

9. REFERENCES

[1] Liang-Bi Chen; Ke-Yu Su; Yu-Ching Mo; Wan- Jung Chang; Wei-Wen Hu; Jing-Jou Tang; Chao-Tang Yu "An Implementation of Deep Learning based IoV System for Traffic Accident Collisions Detection with an Emergency Alert Mechanism" 2018 IEEE 8th International Conference on Consumer Electronics - Berlin (ICCE-Berlin).

[2] Eric Juwei Cheng ; Ku-Young Young; Chin Teng Lin "Image-based EEG signal processing for driving fatigue prediction"2018 International Automatic Control Conference (CACS).

[3] Md. Yousuf Hossain; Fabian Parsia George "IOT Based Real-Time Drowsy Driving Detection System for the Prevention of Road Accidents" 2018 International Conference on Intelligent Informatics and Biomedical Sciences (ICIIBMS) Year: 2018, Volume: 3.

[4] Ipshita Chatterjee; Isha; Apoorva Sharma "Driving Fitness Detection: A Holistic Approach For Prevention of Drowsy and Drunk Driving using Computer Vision Techniques"2018 South-Eastern European Design Automation, Computer Engineering, Computer Networks and Society Media Conference (SEEDA_CECNSM).

[5] B. Mandal, L. Li, G. S. Wang and J. Lin, "Towards Detection of Bus Driver Fatigue Based on Robust Visual Analysis of Eye State," in IEEE Transactions on Intelligent Transportation Systems, vol. 18, no. 3, pp. 545-557, March 2017.

[6] B.M. Kusuma Kumari; P. Ramakanth Kumar "A survey on drowsy driver detection system" 2017 International Conference on Big Data Analytics and Computational Intelligence (ICBDAC).

[7] Nadir N. Charniya; Vivek R. Nair"Drunk driving and drowsiness detection" 2017 International Conference on Intelligent Computing and Control (I2C2).

[8] Álvaro González, Luis M. Bergasa, and J. Javier Yebes "Text Detection and Recognition on Traffic Panels From Street-Level Imagery Using Visual Appearance" IEEE TRANSACTIONS ON Intelligent transportation systems, vol. 15, NO. 1, February 2014.

[9] Hang-Bong Kang "Various Approaches for Driver and Driving Behavior Monitoring: A Review" 2013 IEEE International Conference on Computer Vision Workshops.

[10] Minoru Sakairi "Water-Cluster-Detecting Breath Sensor and Applications in Cars for Detecting Drunk or Drowsy Driving" IEEE Sensors Journal Year: 2012, Volume: 12, Issue: 5.

[11] D. Das, S. Zhou, and J. D. Lee, "Differentiating alcohol-induced driving behaviour using steering wheel signals," IEEE Transactions on Intelligent Transportation Systems, vol. 13, no. 3, pp. 1355-1368, 2012.

[12] Yuan Wenduo; Song Dong "Modeling and Simulation of Traffic Alert and Collision Avoidance System" 2009 4th IEEE Conference on Industrial Electronics and Applications.

ABBREVATIONS

DIP : Digital Image Processing,
IoT : Internet of Things
Wi-Fi : Wireless Fidelity

