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REAL TIME DRIVER'S DROWSINESS DETECTION USING SPMOS S.O.D.I

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Abstract - *Accidents are more due to the driver's drowsiness; it has been recorded that more than 40% of chances that accidents occur while the driver's is in drowsiness state. It's very important that the driver must be in alert state while driving the car. This is also observed in software implementation using OpenCV and Support Vector Machine (SVM) classifier. In this we used eye aspect ratio to calculate the threshold. We are proposing this method to avoid accidents while driving using s.p.m.o.s. In this method, the device checks the eye blink counts and converts the number of counts in each frame to check the persons average blink time and make sure the drive is conscious.*

Key Words: OpenCV, Support Vector Machine classifier, eye aspect ratio, threshold, s.p.m.o.s, eye blink

INTRODUCTION

Every year many accidents are occurred all around the world in different ways and conditions. When it comes to night driving or long driving hours, the driving gets dangerous because of drowsiness. It is a state where people tend to get sleep without their knowledge. In India about 1.5 lakhs of road accidents are occurred according to the record and in them almost 30% to 40% of occurred are due to drowsiness. To avoid such casualties, we are proposing the driver drowsiness detection to decrease accidents.

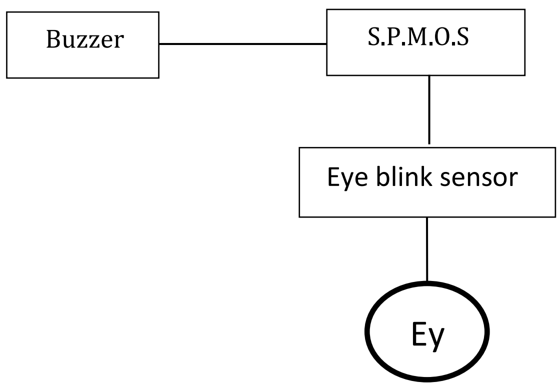
LITERATURE REVIEW

There are many processes to detect the driver's drowsiness some of them are

1. Eye closure-based drowsiness
   In this model using machine learning model and neural networks models the camera in the car detects the eye closure aspect ratio. The aspect ratio is determined by the distance between the eye upper and lower lids. The distance is determined, and the person's state is determined.
2. Vehicle position lane monitory: -
   In this model there are cameras and sensors placed in the front of the car to check the lane while driving then the person is not following the lane in any pattern or going in zig zag way then the alarm will on saying that the person is not driving the car in correct way.
3. Drivers eye closure and yawning model: -
   In this model the drivers face is monitored by a camera. It is also equipped with machine learning techniques and it detects the modulations, face gestures and the cameras are placed to detect the lane so that to make sure the driver is in normal state because while driver is in drowsy the driver will not follow the lane. This model is also implemented in some cars there is some symbols on the dashboard. When the driver is missing the lane and it shows the red coffee symbol indicating that the driver should take some rest or take coffee. When the driver is yawning the other symbol shows up to take long rest.
4. Eye closure using a low-cost EMG: -
   In this model the eye closure rate is determined by using 3 electrodes which are placed at the ends of eye lids or on the glass so that we the person closes the eyes then the current flows through them. Because of time lag from the data this model is not possible to use in real time.

METHODOLOGY

Block diagram:



Components of the device are:

1. Eye blink sensor

The eye blink sensor is an analog device that counts the number of blinks. The device emits IR rays when they are hit with objects they return back. This device has the distance proximity to 5cm so, when the person blinks the then it sends the analog signal which we convert into number of counts for the first minute and after that blink to blink obtained by which we can assume that the person is in which state.

Fig -1: Eye Blink Sensor

2. System Onboard Development Interface (S.ODI)

Framework Onboard Development Interface (S.ODI) is a Development board with Dual Micro-control-units coordinated with all system availability highlights and numerous installed sensors for Engineering understudies and hobbyists. It contains onboard mixed with Wifi Module, Bluetooth Module not at all like Arduino sheets with independent modules that expand unpredictability of utilization. The ON and OFF condition of the framework can be controlled in the board itself to stay away from board harm.

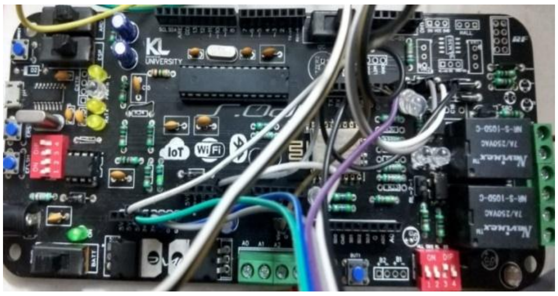


Fig -2: System Onboard Development Interface

3. Blink IOT Application

Blynk is a Platform with IOS and Android applications to control Arduino, Raspberry Pi and the preferences over the Internet. It is an advanced dashboard where you can manufacture a realistic interface for your task by essentially moving gadgets. It is an equipment rationalist IoT stage with white-name versatile applications, private mists, a gadget the executives, information examination, and AI. It joins a cloud stage with applications that put things, individuals, and information at the core of business activities.

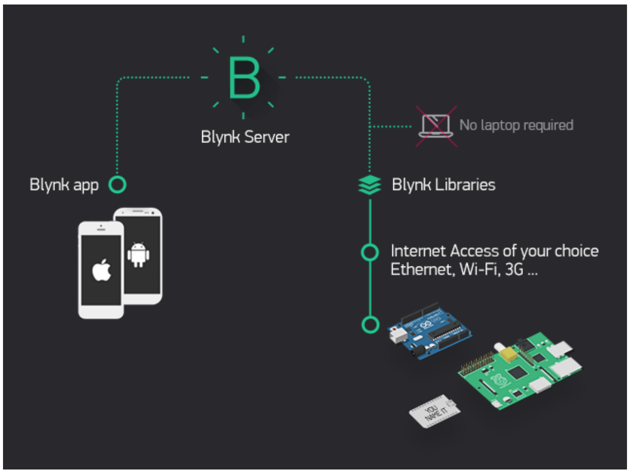


Fig -3: Blink IOT Application

4. Buzzer

5. S.P.M.O.S

This device operates the buzzer, eye blink sensor and smoke detector. It stores the data and counts the blinking time and when the time exceeds or very less than the average time it sends voltage to the buzzer.

RESULT

Once when we have our eye regions, we can apply the eye aspect ratio to determine if the eyes are closed. If the eyes have been closed for a sufficiently long enough period of time, we can assume that the user is at risk of falling asleep and sound an alarm to grab their attention.

Following cases are covered in this project

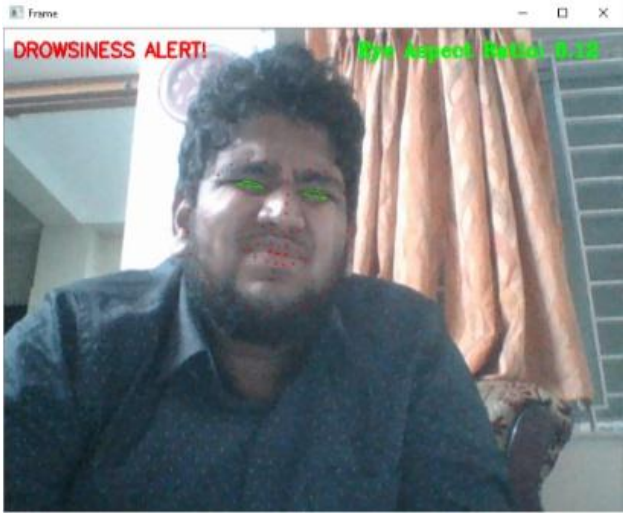
1. If the eyes of the driver are closed for a threshold period of time then it is considered that the driver is feeling sleepy and the corresponding audio alarm is used to make the driver awake.
2. If the mouth of the driver remains opened for a certain period of time then it is considered that the driver is yawning and corresponding suggestion are provided to the driver to overcome drowsiness.
3. If the driver doesn't keep eyes on the road, this is observed using facial landmarks and the corresponding alarm is used to make the driver awake.

All this functionality is implemented and a small LED screen is used to display the message.

The output of drowsiness detection is of two types. The first one is the frames are displayed with a circle around the irises (if detected). And the second one is a 'beep' sound produced if eyes were detected as shut for too long (8 frames, 30 frames per sec >= 0.25 second).

In the above stage we can notice the output as the driver is awake. The model used in this classification is DLib and support vector machine. Eye aspect is used to determine the state of the driver drowsiness stage.

As the eye aspect ratio is 0.36 this implies the state that the driver is awake.



In this stage we can notice the output as the driver is drowsiness state. The eye aspect is used to determine the state of the driver drowsiness stage. As the eye aspect ratio is 0.12, this implies the state that the driver is drowsiness mode. When the eyes of the driver are closed for a threshold period of time then it is considered that the driver is feeling sleepy and the corresponding audio alarm is used to make the driver awake.

CONCLUSION

This study reveals the fact that semi-closed state has an important role in detecting drowsiness and defining three states instead of two states increases the accuracy of the drowsiness detection method proposed. We are discarding about 20% of the frames in eye state estimation process. The proposed system can be used for variety of applications. One of them is heavy duty vehicles for example trucks. Also it can be used for commercial vehicles. Another application is passenger vehicles. Many people use public transport facility for travelling. That is, in 20% of the frames, right and left neural networks do not agree. We do not use that 20% in drowsiness prediction. That's why; we are planning to increase this rate as a future study.

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