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DRIVER DROWSINESS DETECTION SYSTEM

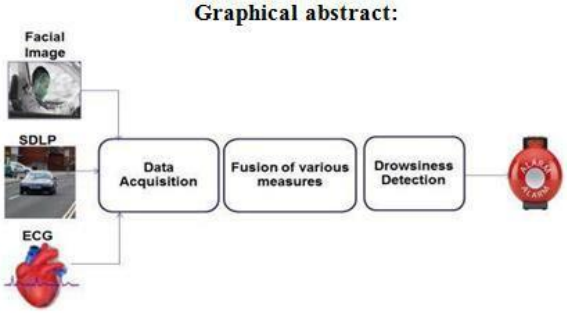
Abhishek K. V[1], Vivek Katta[2], A Anurag Rao[3], Krishna H.M[4], Saritha A. N[5]

Abstract- Drowsy Detection systems have helped in the implementation on multiple driving safety applications. In this paper, a system has been proposed, which can notify the driver or the specified person in any case of any emergency. This system helps in avoidance of accidents and act as an aid for the driver of the mobile vehicle. The System identifies the drivers face and judges whether he is drowsy or not and act accordingly with an alert or an alarm in the car. The sensor measures for detection are believed to give more accurate data compared with face recognition of the driver or steering measures, because the sensor measures minimize the number of fake alarms and maintain accuracy rate for detection, which makes the system more accurate.
Keywords- person drowsiness detection; traveller protection; face detection; vehicle protection; Countermeasures; Road safety; Sensor learning;

1. INTRODUCTION

According to obtained statistical data, more than 13 lakh citizens cause for death was road accidents and 20 to 50 lakh people suffer minor contusion due to road accidents [15]. Based on police reports, the National Highway of INDIA (NHI) that a total of 100,000 vehicle crashes each year are the direct result was fatigue. Sixteen Indians died in road accidents every hour according to the latest data by Indian Crime Bureau Records in 2013. According to the Global Road Safety Report 2015, total 141,826 people were killed and approximately five million people injured in India because of fatigue. However this number is not properly estimated because all accidents are not reported to the police. In the India every year approximately 100, 00 crashes occur due to fatigue estimated by National Highways of India [21].

Graphical abstract:



Somnolent is a middle stage between sleepy and semi sleep. It is a stage of reduced alertness or weak towards any job being done. The outcome of drowsiness and distraction is when driving not able to take decision on driving it is related of lack of concentration [1][23]. Thus, drowsiness is dangerous in situations, where a driver's loss of alertness and which might lead to road accidents.

In Detection System, one of the main factor is it reduces the accidents and increases the passenger safety. The technology available around will help the passenger in the car and the driver to have a safe journey .The system might not be accurate but it can reduce the risk of the accident.

2. LITERATURE SURVEY

As this work includes Intelligent Driver System, Face recognition, steering angle control, ECG usage, Image capturing. In the existing models which satisfy the requirements of our project, it can be noticed that there are distinct individual models to detect those respective properties. Hence in this project, it's planned to integrate face recognition, where the drowsiness detection will be done with the help of four different factors which are eye detection, steering angle sensor, microwave sensor and ECG sensor. This project can be classified as more efficient as the above sensors have individual properties which

[1]Undergraduate Students, Dept. of Computer Science and Engineering, BMS College of Engineering, Bangalore, Karnataka, India
[2] Undergraduate Students, Dept. of Computer Science and Engineering, BMS College of Engineering, Bangalore, Karnataka, India
[3] Undergraduate Students, Dept. of Computer Science and Engineering, BMS College of Engineering, Bangalore, Karnataka, India
[4] Undergraduate Students, Dept. of Computer Science and Engineering, BMS College of Engineering, Bangalore, Karnataka, India
[5] Assistant Professor, Dept. of Computer Science and Engineering, BMS College of Engineering, Bangalore, Karnataka, India

haven't been used together and when integrated together it gives a much more accurate analysis of driver drowsiness detection. The following modules are used to integrate this system.

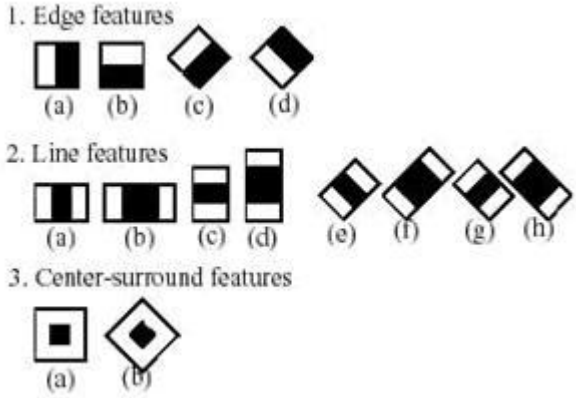
2.1 Face Recognition

The system uses the camera sensor for the face detection. A web Cam will be used to detect the coordinates of the face. Also, it is analyzed by raspberry pi . Several methods for face detection & eye detection will be implemented.

2.1.1Haar Cascade Classifier

This will be used as an initial tool for face detection because it is one of most efficient tool for face detection & it is one of few object detection which identifies face also. It is developed by Paul Viola & Michel Jones [2].

As this algorithm is trained with different types of faces under various environment & also in various exposure climate [22] [18]. This algorithm has a very high accuracy rate, comparing with 14 pictures per person for 200 individuals the accuracy rate came around 99.25% where as other classifier are not so accurate as this classifier which gave poor results compared to this[13].



2.1.2 Region of Interest

This is used to detect face because instead of capturing the whole image processed from the camera. Then only required object from the image is extracted.

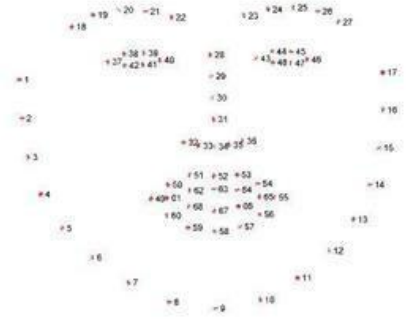
Creating ROI masks are one of the best ways for face and eye detection. But it is very important that Region of Interest is detected accurately and captured with proper image. Although there are different concern the detection of face with the relationship between Region of Interest and face recognition it is accurate.

2.2 Eye Extraction

Here extract the eye region from ROI captured face image with the help of below methods.

2.2.1 Facial Landmark Localization

68-facial landmark coordinates from iBUG-300W Dataset is used [4].



2.2.2. A: 300W Dataset:

*Multi-PIE
*XM2VTS
*AFW
*AFLW
*IBUG

Above are the facial databases, IBUG is used because the databases uses 150 images from the web with large change in the expression, conditions & pose[11].
The Base of IBUG is Multi-PIE database where it contains around 7, 50,000 images of 447 people captured under controlled climate in 4 different timeframes. For Each person there are 25 different poses under 19 different climatic space & 6 different facial expressions [14].

2.3Hardware
2.3.1 Raspberry Pi 3
A Major benefit of the Raspberry Pi is least price compared to a personal computer & it is very portable and can be embedded into any structure in the gadget. In the aspect of research done on Rpi it performs advanced digital signal processing algorithms[3].As advised in "The SAS project :speech signal processing in high school education" Proc.of signal processing conference(EUSIPCO)-- real-time base image processing applications performed are efficient & almost accurate results has come. Moreover, some complex algorithms can be deployed in raspberry pi .

2.3.2 Microwave sensor
Microwave sensor is used to calculate the other car speed which is coming towards our direction which might cause an accident to avoid this a buzzer is used to alert the user, as microwave produces frequency in the microwave range and will analyze the returned/reflected microwave frequency for incoming motion. Whereas the PIR/Ultrasonic is slow compared to this because it doesn't emit multiple frequencies it emits only 1 frequency. Microwave sensor use Doppler Effect which is highly used for speed calculation between 2 objects [24].

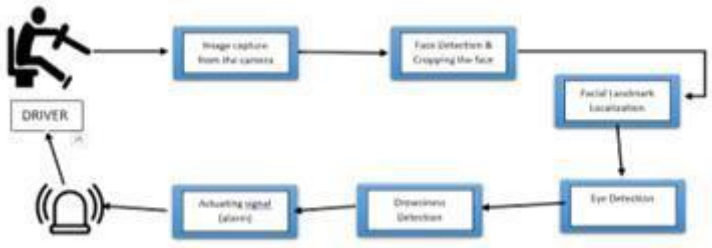
2.3.3 Hall sensor
This sensor is used, because to observe the steering rotations of the driver when he is driving, when someone is driving with drowsiness the steering movement will be high, which helps us to identify the driver drowsiness and alert him with the help of this sensor[16].

2.3.4 Raspberry Pi Camera

It is a very high quality which is portable and compatible to Raspberry pi & can be embedded in the board which makes the gadget portable.

3. PROPOSED METHODOLOGY

Many research papers on drowsiness detection are surveyed, there is no a single device which has all 3 methods to detect drowsiness, drowsy driver detecting system with eye detection will be performed, angle sensor, microwave sensor & ECG sensor where it provides complete safety system available in a single device which protects the driver causing accidents, passengers who trust on the driver and people who are on the road.
According to the methodology proposed in this paper, new device will be made by combining all the above mentioned methods to give a complete secure system.



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5. CONCLUSION

In this paper, it is been discussed about the various procedures that can be implemented or used to analyze the drowsy detection of the driver. As mentioned this may help many people who have lost their life due to the accident caused .This approach measure the drowsiness of the driver based on the sensor data, face analysis, microwave sensor and the steering angle of the driver. This may reduce the risk of the accident caused. ECG sensors are used to measure the driver health status so if the driver is facing and serious issue the passengers in the car are alerted. This might save the driver life a few times. The feedback given to the driver is the important part of this paper. The motive of this paper is to help the driver feedback and reduce the accidents caused due to the fatigue of the driver.

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