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Extended Drowsiness Detection with Accident Detection and IOT based GPS Positioning

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Abstract

Drowsiness or fatigue is a major cause of road accidents and has significant implications for road safety. Several deadly accidents can be prevented if the drowsy drivers are warned in time. A variety of drowsiness detection methods exist that monitor the drivers' drowsiness state while driving and alarm the drivers if they are not concentrating on driving. The relevant features can be extracted from facial expressions such as yawning, eye closure, and head movements for inferring the level of drowsiness. The biological condition of the drivers' body, as well as vehicle behavior, is analyzed for driver drowsiness detection. This paper presents a comprehensive analysis of the existing methods of driver drowsiness detection and presents a detailed analysis of widely used classification techniques in this regard. First, in this paper, we classify the existing techniques into three categories: behavioral, vehicular, and physiological parameters-based techniques. Second, top supervised learning techniques used for drowsiness detection are reviewed. Third, the pros and cons and comparative study of the diverse method are discussed. In addition, the research frameworks are elaborated in diagrams for better understanding. In the end, overall research findings based on the extensive survey are concluded which will help young researchers for finding potential future working the relevant field.

1. Motivation

Driver drowsiness is a significant factor in the increasing number of accidents on today's roads and has been extensively accepted . This proof has been verified by many researchers that have demonstrated ties between driver drowsiness and road accidents. Although it is hard to decide the exact number of accidents due to drowsiness, it is much likely to be underestimated. The above statement shows the significance of a research with the objective of reducing the dangers of accidents anticipated to drowsiness. So far, researchers have tried to model the behaviour by creating links between drowsiness and certain indications related to the vehicle and to the driver.

2 Problem definition

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The main purpose of this project is to develop prototype Drowsiness System. In United states from 1989-1993 approximately 100,000 crashes were reported by police per year, all the crashes are related to drowsiness. Fatality Analysis Reporting System (FARS) reported that around 71,000 of all crashes were non-fatal injuries & 1,357 resulted in mortality. Many of the road accidents were not reported & verified by police, because the problem is very large. Nowadays more accident occurs in trucks and cars than vehicles due to drowsiness. Nearly 97% of crashes of vehicles happen due to drowsiness of driver. It results into loss . for eg: human loss, money loss, medical loss. The accident or crashes not only affect the internal system but also to outside world. 70% injury occurs in internal system and 30% injury happen to the external system. Environmental loss is one of the disadvantage of accident. Accidents results in human as well as non human loss.

3 Objective

The main objective of this project is to ensure the safety system. For enhancing the safety, we are detecting the eye blinks of the driver and estimating the driver status and control the car accordingly.On the whole, by using blinks we can decide if the eye blinks are less, then the driver is very sleepy and alarm will raised and at the same time location will be sent to the person through mail. Finally car will be slow down.

4. Existing system

Recently most of the accident occurs due to drowsiness of drivers in cars and trucks. Annually 1200 deaths and 76000 injured. These approaches include analysis of police reported crash data, in-depth on-site investigations immediately following a crash of the general driving population.

4.1 Disadvantages

- In the existing system if the driver is drowsy only the alarm will be raised to wake him up.
- Even if the alarm will be raised accident may happen if the driver does not respond to the successive alarms.
- Hence the existing system is not applicable for this problem.

In order to conquer the problem of existing system an extension is added to the existing system.

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5. Proposed system

Detection of fatigue involves the observation of eye movements and blink patterns. The analysis of face images is a popular research area with applications such as face recognition. This project is focused on the localization of the eyes, which involves looking at the entire image of the eye, and determining the position of the eyes, by a self-developed image-processing algorithm using python..

5.1.Advantages

- If the Driver is feeling Drowsy then Alarm will be raised to wake him up and Engine can be halted to avoid any further mis happening.
- Even then if the driver is not waking up then car slows down automatically and IOT Alert message will be sent to concerned Authorities with current GPS location.
- If somehow the car meets any accident, then also the current GPS location will be sent to concerned authorities using IOT.

6. Architecture

Abstractly speaking software architecture describes the elements of the system. It also shows the interaction between the elements, models governing its composition and the constraints of these models. As timetable construction research moves beyond the limitations of single, isolated solution methods, software architectures are needed that allow the researcher to combine many different solution methods in arbitrary ways in the solution of a single problem. This paper describes a blackboard architecture, implemented as an object-oriented framework, which addresses this need. Also included is a first application of the framework, comparing two quite different solution methods on a tutor allocation problem. The flow of data will be first sent from database to the admin followed to the web server then internet and then to the browser to browse and vice-verse. The user can be able to access from the web server directly.

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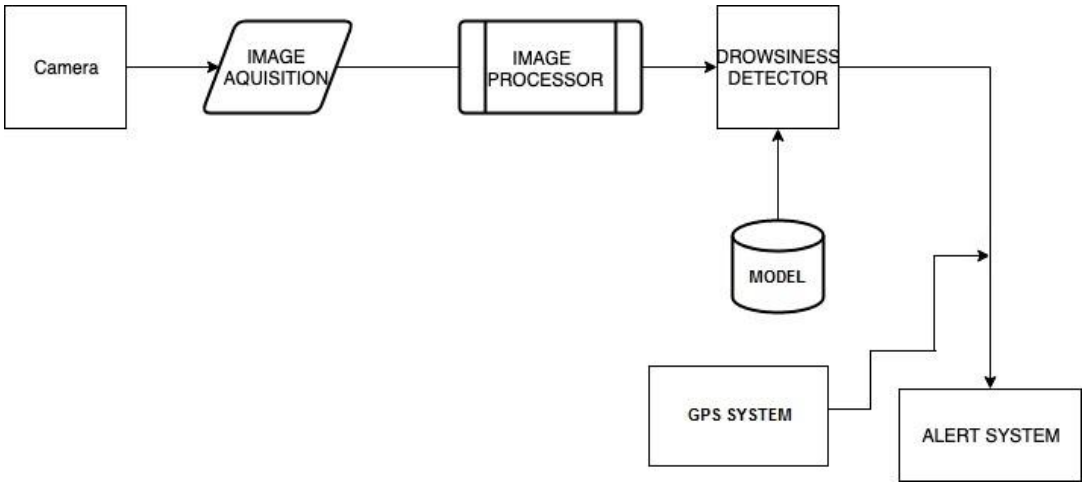

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Fig1: Architecture Diagram

7.Implementation And Results

Implementation is the most crucial stage in achieving a successful system and giving the user's confidence that the new system is workable and effective. Implementation of the modified application to replace the existing one. This type of conversation is relatively easy to handle, provide there are no major changes in the system. Each program is tested individually at the time of development using the data has verified that is program linked together in the way specified in the programs specification, the computer system and its environment is tested to the satisfaction of the user. The system that has been developed is accepted and proved to be satisfactory for the users. And so, the system is going to be implemented very soon. A simple operating procedure is included so that the user can understand the different functions clearly and quickly. Initially as a first step the executable form of the application is to be created and loaded in the common server machine which is accessible to the entire user and the server is to be connected to a network. The final stage is to document the entire system which provides components and the operating procedures of the system.

7.1.Output screens

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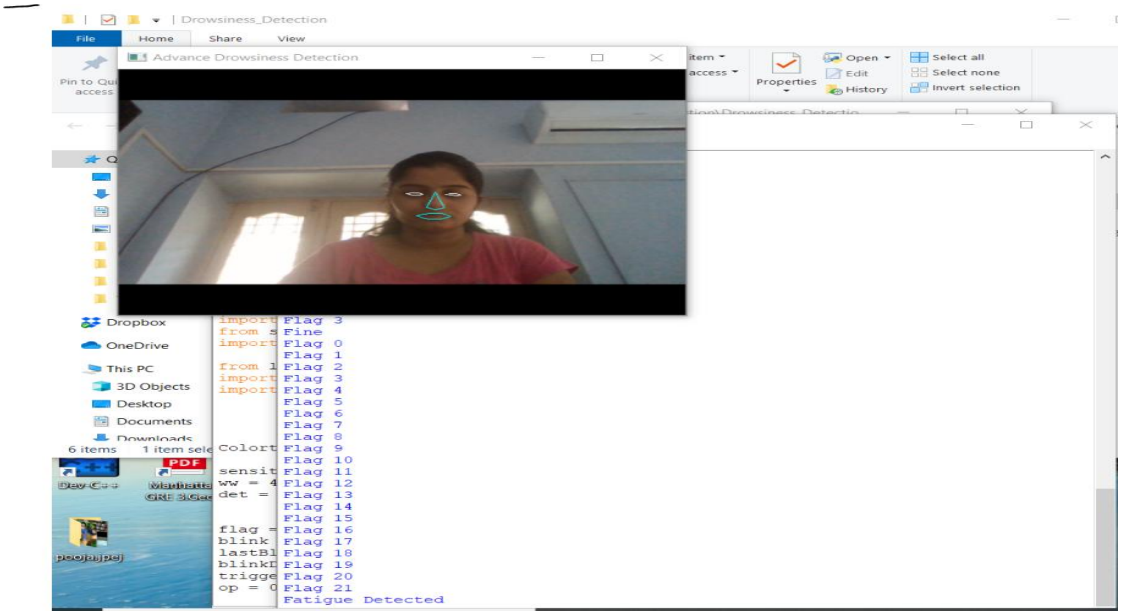

Fig 2: Person with open eyes

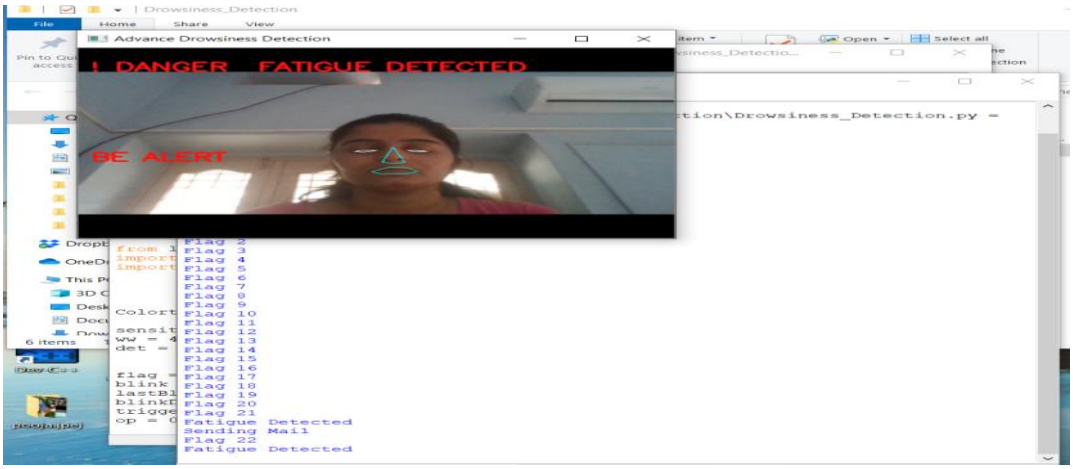

Fig 3: Person with closed eyes and fatigue is detected

8.Testing

8.1. Design of test cases and scenarios

Test ID	Test Case Type	Test Case Description	Expected Value	Actual value	Result

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TC_1	Initialization of camera	User initializes the camera	Initialization must be successful	Initialization Successful	Pass

Table 1: TestCase#1

Test ID	Test Case Type	Test Case Description	Expected Value	Actual value	Result
TC_2	Video capturing	Camera starts recording video	Video must capture successful	Video capturing successful	Pass

Table 2: TestCase#2

Test ID	Test Case Type	Test Case Type	Expected Value	Actual value	Result
TC_3	Video didn't captured	If camera doesn't recognize face	Capturing must fail	Capturing failed	Fail

Table 3: TestCase#3

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Test ID	Test Case Type	Test Case Type	Expected Value	Actual value	Result
TC_4	Face Detection	Video is converted into frames	Face must be detected successfully	Face is detected successfully	Pass

Table 4: TestCase#4

Test ID	Test Case Type	Test Case Type	Expected Value	Actual value	Result
TC_5	Eye Detection	Position of eyes are detected	Detection of eyes must be successful	Eye detection is successful	Pass

Table 5: TestCase#5

Test ID	Test Case Type	Test Case Type	Expected Value	Actual value	Result
TC_6	Drowsiness detection	Drowsiness detection based on eye detector	Drowsiness must be detected successfully	Drowsiness detection successful	Pass

Table 6: TestCase#6

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Test ID	Test Case Type	Test Case Type	Expected Value	Actual value	Result
TC_7	Alerter	Alarm will be raised And location is sent	Alarm must be raised successfully And location must sent	Alarm raised Successfully And location is sent successfuly	Pass

Table 7: TestCase#7

9.Conclusion

The primary goal of this project is to develop a real time drowsiness monitoring system in the automobiles. The driver drowsiness is analysed and driver drowsiness is detected and alert system is also designed. The discussion regards the avoidance of accidents due to drowsiness is discussed with eye blink and corresponding system was developed.

9.1. Future scope

Some of the future enhancements that can be done this system are:

- In future, this prototype can be extended to give alarm before sleeping by calculating the heart beat measure without physical disturbance i.e., non intrusive method using modified ECG methods.
- Usually in ECG method key points of body (For example chest, head, wrist etc.,) are sticked with wire. In the extended method, sticking wire may be avoided. This will lead us to a way to find out the optimum level of drowsiness.

- Further, this prototype will be extended to monitor the reflect ray from eye using nano camera. If the reflection ray is absent, then eye is closed otherwise eye is opened. We believe that this will create a better opportunity to detect drowsiness.

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