

WAKEUP ALERT FOR DROWSY DRIVERS USING IOT

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Abstract : As signal processing is widely used in various security applications and which is motivated for implementing an application with minimum complications. Here, a non-intrusive methods are used to detect a drowsiness of drivers. The system consists of pi camera and which is used to record driver head movements to detect drowsiness. After detection of drowsiness, an alert will be issued to the driver. This system will be used to detect face, eyes and mouth from the captured image and by considering all the actions an output will be generated. Here based on eye blinking action of a driver, drowsiness will be determined. Other than drowsiness, driver's attention will also be considered while in driving. The system is implemented using Haar based cascade classifier to detect face, eyes, nose and mouth from the image captured by pi camera. In this system location of eyes and mouth are determined and then these are indicated by rectangle. Logic is used to identify whether eyes are open or closed. Relay is connected to Raspberry pi for enabling buzzer and water sprinkle.

Index Terms: Raspberry pi, Pi camera, Relay, Drowsiness detection, Eye tracking, Eye blinking , Haar based cascade classifier.

I. INTRODUCTION

Drowsiness is a physical activity and which occurs involuntarily on human and it is a feeling of being sleepy[1]. Since drowsiness can be directly related to the human concentration and activeness this may leads to many problems like accidents, lack of involvement in work etc. So many methods are added in vehicles to minimize the cause of accidents. Driver's drowsiness or fatigue has been found as one of the main reason for the cause of accidents. Based on different measures like heartbeat rate, brain signals and eye blinking are used to determine the drowsiness of driver. To detect drowsiness of driver, eye blinking is found as a robust parameter. To solve the cause of occurrence of accidents two methods are developed and they are classified as:

a) Intrusive methods b) Non-Intrusive methods

Intrusive methods includes the measuring devices which would come in direct contact with the human body and then causes any health issues to the human, where as in non intrusive methods no devices come in direct contact with human body. In this case ,we are using a non intrusive methods to detect drowsiness and also we can use new technologies to design a solution to solve this problem and to measure their level of attention during the driving new systems are developed.

In this paper ,we presents a new method to reduce the number of accidents caused by driver fatigue and to improve road safety. This system will detects driver drowsiness based on machine learning and visual information automatically .We proposed haar based cascade classifier to locate, track and analyze both the driver face and eyes to measure an eye aspect ratio. This system is very much user friendly and doesn't require any specialized hardware.

The remainder of this paper is organised as follows, Section 2 presence the literature survey, Section 3 presence the proposed system and the implementation of the system ,section 4 presence the experimental results in the last section conclusions and perspectives are presented.

II. LITERATURE SURVEY

Malla et al.[2] was developed a light intensive and light insensitive system. To detect objects they used haar algorithm [3]and face classifier implemented by[4] in OpenCV[5] libraries. From the facial region eye regions are derived anthropometric factors. Then, to measure the level of eye closure easily, first they will detect the eyelid.

Vitabile et al.[6] implement a system to detect symptoms of driver drowsiness based on an infrared camera. By exploiting the phenomenon of bright pupils, An algorithm for detecting and tracking the driver's eyes has been developed. When drowsiness is detected, the system warns the driver with an alarm message.

Bhowmick et Kumar[7] use the Otsu thresholding to extract face region. The localization of the eye is done by locating facial landmarks such as eyebrow and possible face center. Morphological operation and K means is used for accurate eye segmentation. Then a set of shape features are calculated and trained using non-linear SVM to get the status of the eye.

Hong et al. [8] define a system for detecting the eye states in real time to identify the driver drowsiness state. The face region is detected based on the optimized Jones and Viola method [3]. The eye area is obtained by an horizontal projection. Finally, a new complexity function with a dynamic threshold to identify the eye state.

Tian et Qin [9] build a system that checks the driver eye states. Their system uses the Cb and Cr components of the YCbCr color space. This system locates the face with a vertical projection function, and the eyes with a horizontal projection function. Once the eyes are located the system calculates the eyes states using a function of complexity.

III. EXISTING SYSTEM

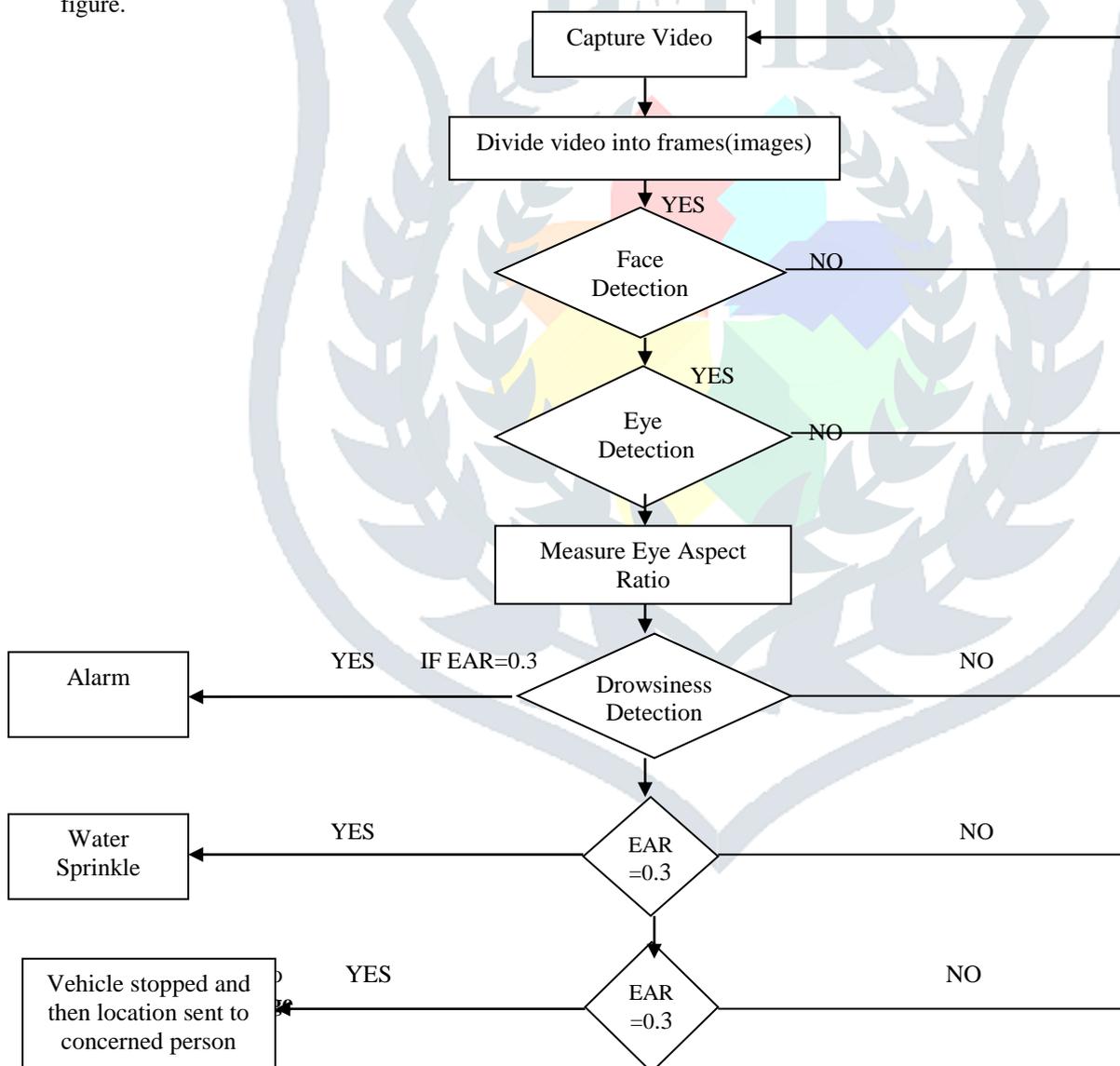
In existing system, to detect drowsiness different steps are involved as follows:

- i. Capturing video frames using the web camera
- ii. Face detection and extraction
- iii. Eye region Extraction and Eye detection
- iv. Blink detection
- v. PERCLOS Calculation
- vi. Drowsiness detection

the algorithms used in existing system are Haar features, Cascade classifiers, HOG features and SVM classifiers are used for detecting face, eyes and drowsiness.

IV. PROPOSED SYSTEM

In existing system drowsiness is only detected by following some steps, where as in proposed system drowsiness is detected and then it issues alerts to the drowsy drivers to woke up the drivers. The overall flowchart for our proposed system is shown in below figure.



Here video will be captured by using Pi camera and then it divides video into frames which are known as images. Each of these frames are extracted and processed separately.

ii. Face Detection

The faces are extracted from the videos and frames that are captured by the Pi camera by using the method Haar based cascade classifiers face will be identified.

Haar based cascade classifier

Initially an algorithm needs a lot of images that are captured by the pi camera and then these images are arranged in the form of cascaded format. Then it will check for features at each stage in the sense it compares the distance between eyes, nose, mouth and eye brows. If all these features match then it would be considered as a face.

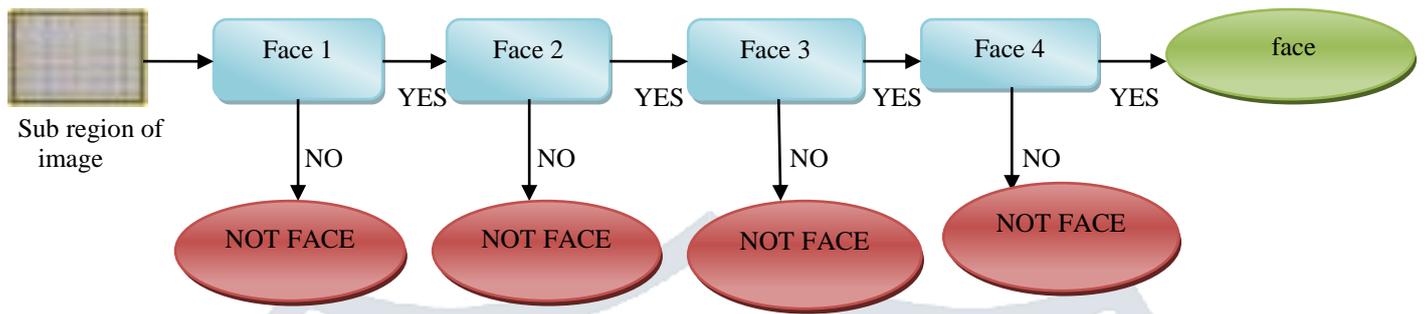


FIGURE: Image for face detection based on features

Above figure illustrates that if all the features are extracted from all the images then it will conclude that it is a face otherwise it declares that face not found.

iii. Eye detection

Once the face is detected, by using same Haar features the eyes are detected. Once eyes are detected, then it applies a rectangular window to eyes and then it extracts the exact shape of an eye.

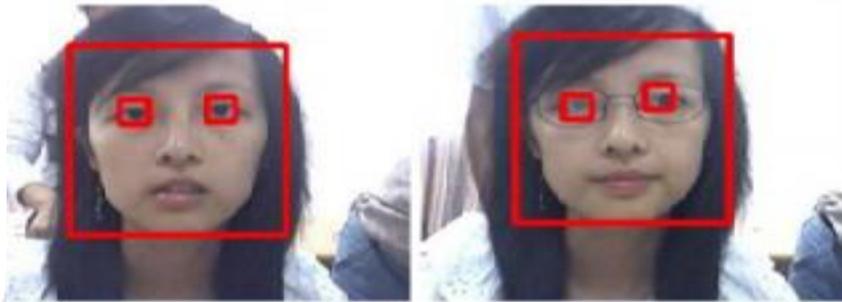


FIGURE: Image for eye detection

iv. Eye Aspect Ratio Calculation

After extracting the shape of an eye, then it calculates the distance between left end to right end and then up to bottom of each eye. And then it will compare this distance with all other frames that are arranged in cascaded format. If it is below the threshold value then it is considered as a drowsiness.

$$\text{Eye Aspect Ratio(EAR)} = (\text{Left} + \text{Right}) / 2$$

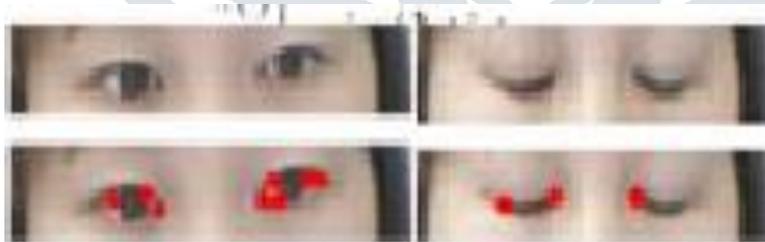


FIGURE: Image for calculating eye aspect ratio

v. Drowsiness Detection and alerts

Based on eye aspect ratio it concludes that whether a person is drowsy or not. If a person is in drowsy then it issues an alert like buzzer at first stage and then water sprinkles at second stage and then vehicle will be stopped and location will be sent to concerned person.

V.IMPLEMENTATION

RASPERRY PI:



Figure: Raspberry pi 3

Raspberry Pi is a low cost, **credit-card sized computer** that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games.

BUZZER:



Figure : Buzzer

A buzzer is a device which makes a buzzing or beeping noise. This type of buzzer requires some kind of oscillator or something more complicated like a microcontroller to drive it.

POWER SUPPLY:



Figure : 12V power supply

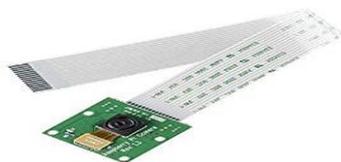
This power supply is used to supply 12v power to on and off the buzzer, water sprinkle and ignition.

RELAY:



A relay is operated like a switch and these switches are used for turning on light, fan etc. But in this project it is used to on buzzer, water sprinkle and ignition.

PI CAMERA:



Pi camera is used to capture the video and then it divide video into a set of frames.

CONCLUSION

In this paper ,we proposed an implementation of a system for detecting drowsiness of a driver and then it aims to alert driver if that person is in drowsy state. This system determines the driver state under lighting conditions and also with in spectacles. In future we will implement a system for detecting if any accidents occurred due to over drowsiness and then sends location to the concerned person or nearby hospitals.

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