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Alert System for Driver Drowsiness Using Raspberry Pi

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ABSTRACT: Feeling sleepy while driving could cause hazardous traffic accident. However, when driving alone on highway or driving over a long period of time, drivers are inclined to feel bored and sleepy, or even fall asleep. Nowadays most of the products of driver anti-sleep detection sold in the market are simply earphone making intermittent noises, which is quite annoying and inefficient. As such, there is a high demand for cheap and efficient driver sleep detection. Therefore, we came up with an idea and successfully developed a sleepy detection and alarming system, which could effectively meet this demand.

I. INTRODUCTION

Drowsy driving is an important, but often unrecognized, traffic safety problem. NHTSA estimates that drowsiness contributes to more than 100,000 collisions each year, resulting in over 1,500 deaths and 40,000 injuries. Drowsiness increases the impairment caused by alcohol. Teenagers, professional drivers (including truck drivers), military personnel on leave, and shift workers are at particular risk.It has been estimated that drowsiness causes between 10% and 20% of traffic accidents, causing both fatalities dead and injuries, whereas within the trucking industry 57% of fatal truck accidents are caused by this problem. In the USA, drowsiness is responsible for 100000 traffic accidents yearly producing costs of close to 12.000 million dollars.In Germany, one out of four traffic accidents originate from drowsiness, while in England 20% of all traffic accidents are produced by drowsiness. To solve these problemsDriver's Sleep Detection System is useful, italerts driver as well as nearby drivers about the drowsiness condition.

Driver's Sleep Detection System is a system which detects sleep of the driver and wakes him by producing alerting sound through buzzer, so that the driver could become aware of his drowsiness condition and could make decision of taking rest or further driving, this system also helps driver to focus back to their driving, it also alerts about driver's sleep to the drivers nearby through indicators so they could become aware of the drowsiness condition of the driver driving vehicle near them. This system will help to prevent accidents caused due to the driver's drowsiness condition and save their life and also prevent loss of property. This system is more useful for the drivers who are driving vehicles continuously for long time specially during night (like truck drivers). This system keeps track of the drivers face and their eyes using camera mounted on their vehicles dashboard. This system uses image processing technique to recognize whether driver is awake or falling asleep by comparing images of the sleeping driver and awaken driver and if the sleep is detected the system produces noise to wakeup the driver and make him alert.

II. LITERATURE SURVEY

There are several methods for drowsiness detection. They consist of monitoring of steering, vehicle positioning, driver face, and also by using sensors to measure brain activity, heart rate, muscle activity. The method preferred in this model is by monitoring of face. Monitoring of eyes is considered suitable as the closure of eye for more than a certain amount of time will cause an accident. In this method one needs to detect the face in the image. The several methods to detect face are feature-based, knowledge-based, appearance-based, template-matching, Eigen face-based, neural network, distribution-based. Typically other methods depends on the set of rules, extracting structural features, correlated features etc. Here, neural network is the method used to detect face from the image. It detects the faces by returning a bounding box around the face. The bounded face is now used to identify the landmarks with the help of landmark detector which produces 68 coordinates for the facial structure. The 68 coordinates are obtained by training the model on iBUG 300-W dataset. The mappings are encoded in a dictionary and are assigned to various features of face like nose, eyes, mouth, face, etc. The dataset consists of different poses, illumination, subjects, occlusions, etc., of over 300 images. The identified face with the landmarks is further processed for detection.

III. PROBLEM DEFINITION

Drowsiness is defined as an abnormally sleepy feeling which cannot be controlled by the person. It is identified as one of the reasons for road accidents especially on highways. Drowsiness is mainly caused when the person is not getting enough sleep, is tired, on night drives or if the person is under medication. Since falling asleep is not in the driver's hand an external entity is required to help him stay awake. This paper is about one of such entities using Raspberry Pi toolkit.

IV. MODULE DESCRIPTION
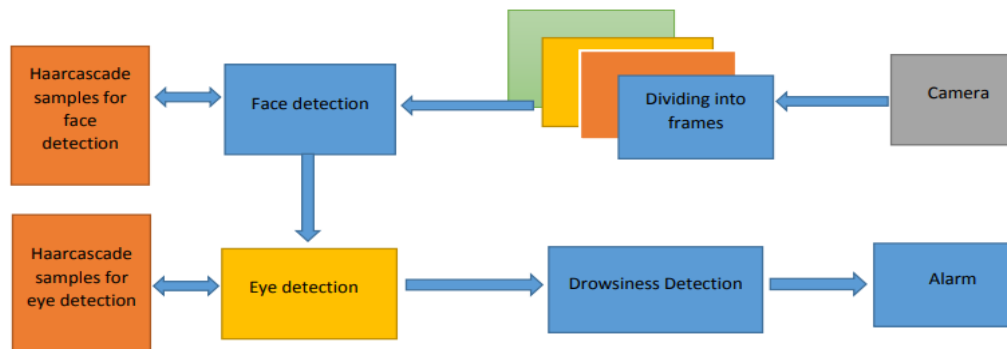
1.   Divinding into Frames:
Dividing into Frames: We are dealing with real time situation where video is recorded and has to be processed. But the processing or application of algorithm can be done only on an image. Hence the captured video has to be divided into frames for analyzing

2.   Face Detection
In this stage we detect the region containing the face of the driver. A specified algorithm is for detection of face in every frame. By face detection we means that locating the face in a frame or in other words finding location of facial characters through a type of technology with the use of computer. The frame may be any random frame. Only facial related structures or features are detected and all others types of objects like buildings, tree, bodies are ignored.

3.   Eye Detection
At this point it performs the detection of eye in the required particular region with the use of detection of several features. Generally Eigen approach is used for this process. It is a time taking process. When eye detection is done then the result is matched with the reference or threshold value for deciding the state of the driver.

4.   Drowsiness Detection
we find the actual state of the eye that if it is closed or open or semi closed or open. The identification of eyes status is most important requirement.
If the system detects that the eyes are open then the steps are repeated again and again until it finds a closed eye

V. CONCLUSION

Driver drowsiness detection system is built to identify driver's drowsy state and make him conscious while driving in order to reduce accidents caused due to drowsiness. The Pi alongside Raspbian camera is utilized to capture the driver continuously. Sleepiness is estimated by extracting Eye from face utilizing shape-indicator and calculating Eye Aspect Ratio (EAR). At the point when the system detects drowsiness, the driver will be frightened by a noisy notice that will awaken the driver from the rest state

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