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Camera Based Driver Distraction

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Abstract: Driver inattention is a major contributor to highway crashes. The National Highway Traffic Safety Administration (NHTSA) estimates that approximately 25% of crashes involve some form of driver inattention – the driver is distracted, asleep or fatigued, or otherwise "lost in thought" Every year nearly million people die and are injured as a result of road traffic crashes. These deaths and injuries have an immeasurable impact on families and communities as they tragically and irrevocably change people's lives. In addition to the huge emotional toll these injuries cause the considerable economic loss to casualties, their families and nations as a whole. It will be necessary in next- generation smart vehicles, to develop advanced driver specific active/ passive safety systems. Important to analyse on-road, real traffic naturalistic driving data for all possible driving variations in different maneuvers. The Purpose of this project is to identify alertness of driver in driving. If the driver is found to be yawning or sleeping or distracted from driving, then continuous sound is played to alert him. Continuously evaluate driving performance. In case the driver is distracted, then buzzer is played and led glows.

Keywords: Driver Distraction, yawning Detection, glance behavior.

I. INTRODUCTION

Distraction is basically defined as "when a driver is delayed in the recognition of information needed to safely accomplish the driving task because some event, activity, object, or person within or outside the vehicle compelled or tended to induce the driver's shifting attention away from the driving task." The presence of a triggering event distinguishes a distracted driver from one who is simply inattentive or "lost in thought." It is important to note that driver distractions are generally caused by a competing trigger activity that may lead to driver inattention, which in turn degrades driving performance. Alternatively, other forms of driver inattention might not necessarily be due to a trigger or competing activity, making inattention difficult to detect and even harder to control. By identifying some of the causes of driver distraction, it is possible to isolate scenarios when the cause of distraction can be controlled. All other functions such as texting, video messaging, online chatting, reading preview messages and emailing are not allowed. The new laws make it clear that a driver in a moving or stationary vehicle (unless parked) MUST

NOT HOLD a phone in his or her hand other than to pass the phone to a passenger. Using a mobile while driving can increase the risk of a collision by four times, according to several studies. Sending a text message is even worse.Adjusting vehicle settings is also most common bad driving habit because many people don't realize it's dangerous to fiddle with the radio, air-conditioning or windows while driving. Distractions while driving are shown to be common, based on data where respondents report engaging in distracting activities.

II. RELATED WORK

[Design of ARM-based face Recognition system using Open CV[4] library gives system using ARM 7 based microcontroller and Open CV based machine. This is interfaced to USB camera to capture the images continuously and compared with existing database. If the current images are matching with any of the existing images the system generates the command to the output unit to perform the location identification using GPS and forward the necessary information about the identified person using GSM/GPRS to concern authorities. This paper [2] proposes a system which actively monitors driver vigilance level and alerts the driver to any insecure driving condition. Drowsiness detection of the driver is based on violations algorithm is used for face and eyes detection. The paper gives an integrated driver state monitoring [3]. It combines gaze position, gaze variability, eyelid opening, as well as external environmental complexity from the driving scene to facilitate ToC in automated driving. This integrated system helps to inform relevant future research and development towards improved human-computer interaction and driving safety.

Paper focuses on naturalistic driving studies, with the interest of understanding driver behaviour and distraction [4] from multichannel sensor data. Approach is to first extract the driving context in terms of micro-level components and then evaluate risky events and variations against similar driving patterns in the vehicle dynamics domain. An alternative approach is to directly monitor driver's physical or glance behaviour and assesses their cognitive and visual

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attention. To take advantage of the fast-growing smart phone applications market and integrate telematics services, recent activities have resulted in a mobile platform that contributes to in-vehicle naturalistic driving studies and voice-based human-machine interfaces. A novel real-time computer vision algorithm [5] is used for the system which consists of a visible and near-infrared imaging device observing the front-row seat area in the vehicle. It is an alternative of detecting and tracking the hand movement and classify the hand into respective classes.

III. PROPOSED SYSTEM

Today, embedded controllers, as well as a variety of sensors and high-performance computing in present-day cars allow for a smooth transition from complete human control toward semi supervised or assisted control, then to fully automated vehicles. Next-generation vehicles will need to be more active in assessing driver's awareness, vehicle capabilities, and traffic and environmental settings, plus how these factors come together to determine a collaborative safe and effective driver–vehicle engagement for vehicle operation. If the driver is found to be yawning or sleeping or distracted, then the continuous sound is played to alert him.

Raspberry pi based camera continuously captures the driver image and stores it on the SD card. Capturing of images is done using Open CV and Java module. Haar cascade is used to detect eyes and face from the captured image. If a closed eye is found, then an alert is made to the driver. Haar cascade is used to detect face from the captured image. Yawning is detected from the face image using eye, nose and mouth order. The project's primary motto is to identify alertness in driving. If the driver is found to be yawning or sleeping or distracted from driving, then continuous sound is played to alert him. Raspberry Pi is connected to led and buzzer modules. In case the driver is distracted, then buzzer is played and led glows. User driver statistics are synchronized to server.

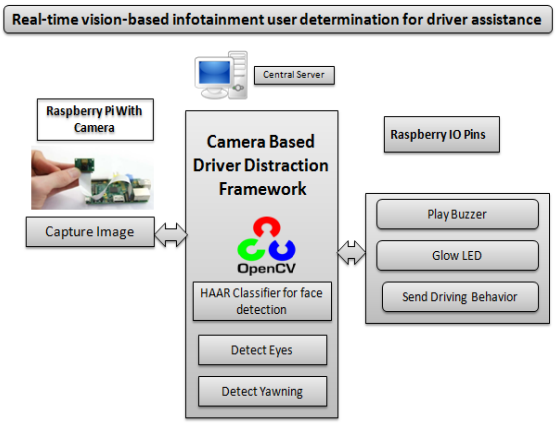

Fig 1: Architecture Diagram

IV. ALGORITHM USED

Haar cascade classifiers:
Object Detection using Haar feature-based cascade classifiers is an effective object detection method. It is a machine learning based approach where a cascade function is trained with lot of positive and negative images. It is then used to detect objects in other images. Here we will work with face detection. Initially, the algorithm needs a lot of positive images (images of faces) and negative images (images without faces) to train the classifier. Open CV comes with a trainer as well as detector. As we want to train own classifier for any object like car, planes etc. we can use Open CV to create one. The cascade classifier consists a list of stages, where each stage consists a list of weak learners. The system detects objects by moving a window over the image. Each stage of the classifier labels the specific region defined by the current location of the window as either positive or negative. Positive meaning that an object was found or negative means that the specified object was not found in the image.

Training Steps to Create a Haar-like Classifier:

- Collection of positive and negative training images
- Marking positive images using objectmarker.exe or
- Image Clipper tools
- Creating a .vec (vector) file based on positive marked images using createsamples.exe
- Training the classifier using haartraining.exe
- Running the classifier using cvHaarDetectObjects()

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V. EXPERIMENTAL RESULTS

The experimental setup of the project is as shown in Below Figure.

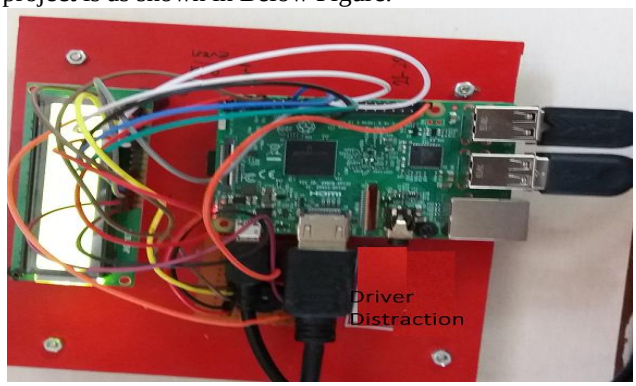

Fig 2 : Experimental Setup

Case-1
Firstly driver's eyes are detected i.e. if he is focusing on road he is not drowsy so message is displayed as" DRIVER IS NOT DISTRACTED.

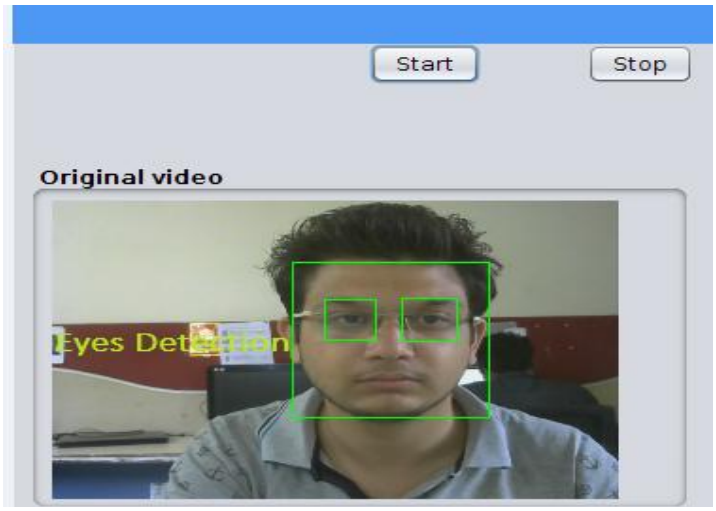

Fig 3: Eyes detection

Case-2:
When driver is distracted from driving then buzzer sound is given and message is displayed as" DRIVER DISTRACTED" on LCD screen as shown in figure no 4.

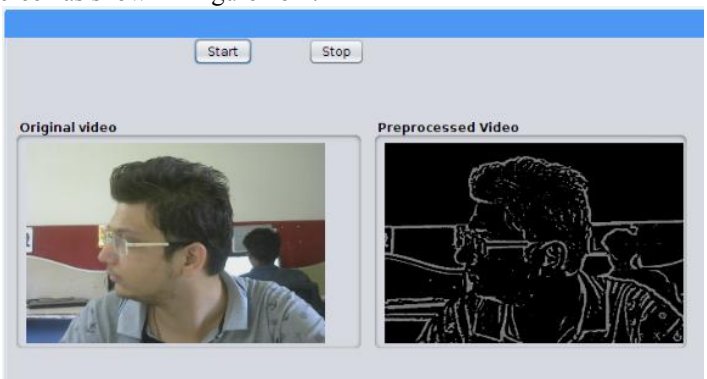

Fig 4: Driver Distracted

Case-3:
Driver's eyes are open and mouth is open as shown in figure no 5 then alert is given and message is displayed" DRIVER IS YAWNING".

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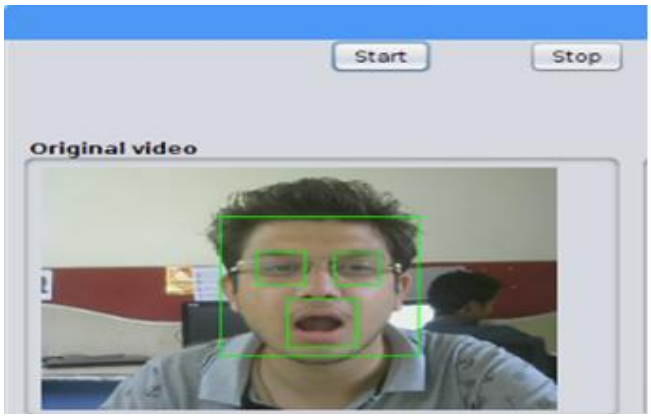

Figure 4- Driver is Yawning

Case-4:

If driver's eyes are closed and mouth is open as shown in figure no 6 then alert is given and message is displayed" DRIVER IS DROWSY".

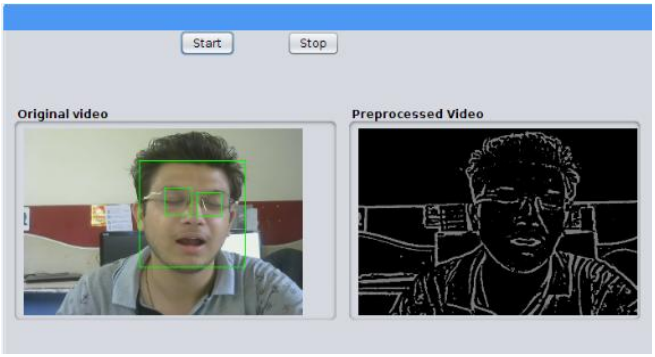

Fig 5: Driver is Drowsy

VI. CONCLUSION

Distracted driving is a serious and growing threat to road safety. Distracted driving may cause both external and internal damage to the vehicle. We presented a real time system by intended to improve the safety and comfort of the vehicle by alerting the driver when driver gets distracted from driving. It is one more step towards monitoring driver's behaviour automatically in order to reduce road accidents. There is also a need to detect the causes such as drowsiness, fatigue and to alert the driver which is one of the reasons in majority of road accidents.

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