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Image based Eye Tracking and Detection for avoiding accidents on Roads: A Review

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Abstract- This paper aims to provide reliable indications of driver drowsiness describe of detecting early signs of fatigue in drivers and provide method for more security and attention for driver safety problem and to investigate driver mental state related to driver safety.As soon as the driver is falling in symptons of fatigue immediate message will be given to driver.In addition of the advance technology of Surff feature extraction algorithm is also added in the system for correct detection of status of driver.The Fatigue is detected in the system by the image processing method of comparing the images(frames) in the video and by using the human features we are eable to estimate the indirect way of detecting fatigue.The technique also focuses on modes of person when driving vehicle i.e awake, drowsy state or sleepy and sleep state.The system is very efficient to detect the fatigue and control the vehicle.

Keywords: Eye Tracking, Driving Safety, Mad Functions, Face Detection

I. INTRODUCTION

In recent trends of development many safety techniques and methods have been developed in detection of fatigue or drowsiness in vehicles for drivers.The development of the transportation system and the increase of vehicle owners,traffic accidents happen more frequently and recently.This may result in collision or vehicle may go on the dead end track resulting in loss of many life and also involving damage to the expensive vehicle equipments and property. Since from 19th century many methods have been developed to detect and prevent the fatigue or drowsiness in drivers. These methods and techniques involved warning messages. In India, an alarm system is used for providing the awaking mode.

By adopting these features proposed technique will develop and integrate product by intelligently combine software used for detecting the current state of driver[1].In this technique proposed system capture the fatigue and motion as well as messaging technique providing alertness to the vehicle driver.The processing of vision based detection of fatigue[2].

There are many people who are travelling in vehicle and every safety depends if driver is in proper state.Hence our system continuously keeps the track of the driver's state and will give the message to the driver whether it is getting drowsy or not. The visual features are the most important factors used for detecting the fatigue.The head movement of the driver and body movement are responsible since the person makes head movement in case of fatigue also no movement of driver states that driver is in sleepy mode or victim to any kind unconscious[6].

II. RELATED WORK

The following sections explain survey of various papers. Many efforts in about past twenty years were made to develop feature detection systems for purpose of driver fatigue monitoring. One of widely popular methods is to use active illumination for eye detection.

Grace et al.[1] have used special camera for capturing images of a driver at different wavelengths. Using the fact that at different wavelengths human retina reflects different amount of light, they subtract two images of a driver taken in this way in order to obtain an image which contains non-zero pixels at the eyes location.

Ji and Yang[2] have used active infra –red illumination system which consists of CCD camera with two sets of Infra-red LEDs distributed evenly and symmetrically along the circumference of two coplanar and concentric rings, where the centre of Both rings coincides with the camera optical axis. The light from two rings enters the eye at different angle resulting in images with bright pupil effect in case when inner ring is turned on, and with dark pupil effect when the outer rings switched on. The resulting images are subtracted in order to obtain the eyes positions. This method of Eye detection is also used by other researcher[3].

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Smith Shah and D Vitoria Lobo[4] present the method which relies on estimation of global motion and color statistics to track a person's head and facial features. For the eyes and lips detection they employ color predictes, histogram-like structures where the cells are labeled as either a member or non-members of desired color range.

W.Rongben, G.Lie[5] explain the method based on the assumption that in RGB color spaced red and green components of human skin follow Gaussian planar distribution. The R and G values of each pixel are examined, and if they fall within 3standard deviations of R and G's means, the pixel is considered to belong to skin. When the faces is localized the Gabor wavelets are applied for extracting the eye features.

D'Orazio, Leo, Spannolo and Guarangella [6]presents the method for eyes detection using operator based on Circle Hough Transform[7].This operator is applied on the entire image and the result is maximum that represents the region possibly containing an eye. The second eye is then searched in two opposite directions compatible with the range of possible eyes position concerning the distance and orientation between eyes. The obtained results are subjected to testing of similarity, which is evaluated by calculating the mean absolute error applied on mirrored domains. If this similarity measure falls below certain threshold, the regions are considered the best match for eyes.

Valenti and Gevers[8] explain the methods based on the observation that eyes are characterized by radially symmetric brightness pattern, and isophotes are used to infer the centre of circular patterns. The centre is obtained by voting mechanism which is used to increase and weight important votes to reinforce centre estimates.

The second method is proposed by Timm and Barth[9].It is relatively simple method which is based on fact that all circle gradients intersect in the center of a circle. Thus the eye centre can be obtained at locations where most of the image gradients intersect. Moreover, this method is robust enough to detect partially occluded circular objects, e.g. half-open eyes.

III.EVALUATION AND DISCUSSION

Table.1 Represents the objectives and performance of various approaches along with techniques and features selection.

Sr.No.	Studies	Techniques Used	Advantage	Disadvantage
1.	Grace et. al	Special cameras.	Calculate different wavelength of Eyes.	Slow and long learning procedure.
2.	Ji and Yang	Infra- red illumination system.	Used light function between eyes.	Very high sensitivity change in illumination condition.
3.	Smith and D.Vitoria	Global motion and color statistic method.	Fast Eye color range.	Long training procedure.
4.	W.Rongben	Facial Feature Detection Method.	Fastly examine face features.	Slowly examine eye location.
5.	D'Orazio	Circle Hough Transform	Reliable and best match for eye position.	Slowly examine eye position.
6.	Valenti and Geverse	Isocentric Patterns	Reliable and very fast.	Misdetection of eye corners as the eye detection.
7.	Timm and Barth	Accurate eye centre localization	Very accurate in Eye centre detection.	Lower accuracy due to feature dependency chain.

IV.CONCLUSION

As describe throughout the paper, many technologies exists to detect driver fatigue. This paper tries to look at the emerging technologies and determine the best approaches in trying to prevent the number one cause of fatal vehicle crashes. To overcome such problem our system is using new method SURF Feature Extraction Algorithm specially for eye tracking to improve matching

accuracy and also Fast Search Algorithm in eye tracking to improve search efficiency. Also through these methods the particular attention has been paid to accuracy in feature detection and ability to operate in real time system.

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