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Eye Tracking For Driver Drowsiness

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Abstract:-The aim of the project is to develop the hardware which is very advanced product related to driver safety on the roads using 89s52 controller and image processing. This product detects driver drowsiness and gives warning in The Real Time dangerous behaviors which are related in the form of eye closing. Hence we can either measure change in physiological signals, such as brain waves, Heart rate or eye Blinking. Since a large number of road accidents occur due to the driver drowsiness. Hence this system will be helpful in preventing many accidents, and consequently save money and reduce personal suffering. This system will monitor the driver's eyes using camera and by developing an algorithm we can detect symptoms of driver fatigue early enough to avoid accident.

Index Terms:-Driver fatigue; Eye-Tracking; Fatigue Detection;

1. BACKGROUND

The increasing number of transportation accidents has become a serious problem for society. The traffic accidents will be largely decreased if finding a judging rule to determine whether drivers stay awake or not, and make a warning to the drivers when they begin to fall asleep, so it is meaningful to research fatigue detection algorithm Which is also a key technology in smart vehicles driving? The driver fatigue problem has become an important factor for causing traffic accidents. Driver fatigue is a major cause of car accidents, since sleepy drivers are unable to make rapid decisions, and they may have slower reaction times. As a result, many governments have education program to alert people to the dangers of driving while tired, and drivers are encouraged to avoid Conditions which may lead to driver fatigue. Therefore, how to supervise and avoid fatigue driving efficiently is one of the significant problems. Recently many safety systems are followed to avoid transportation accidents. Passive safety systems such as seat belts, airbags, and crashworthy body structures help reduce the effects of an accident. In contrast, active safety systems help drivers avoid accidents by monitoring the state of the vehicle, the driver, or the surrounding traffic environment and providing driver alerts or control interventions. The proposed system focuses on the detection of drowsiness among fatigue-related impairments in driving based on eye-tracking – an active safety system. Nowadays, there are many fatigue detection methods appearing and the best is tracking eye in realtime using camera to detect the physical responses in eyes. It is indicated that the responses in eyes have high relativity with driver fatigue.

2. INTRODUCTION

The previous technique, while more accurate, is not realistic since highly sensitive electrodes would have to be attached directly on the driver's body and hence which can be annoying and distracting to the driver. In addition long time driving would result in perspiration on the sensors, diminishing their ability to monitor accurately.

Fig. 1 Position of camera in the car

In this project eye tracking for the driver drowsiness feature is use by using the camera and image processing algorithm. When the eye blink is not there for more than 10 to 30 sec then serial data send to the controller and will vibrate the seat and automatically control the speed of the wheels or motor. Also we have use the flex sensor

for sensing the fingers on the starring, as value goes above certain threshold then alarm get activated.

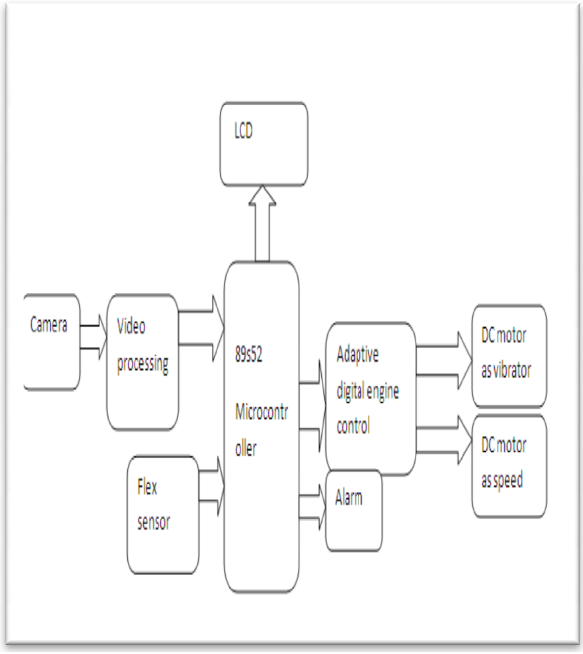

Fig. 2 Block diagram

Once the face of the driver is detected and the eye of the driver is successfully tracked, we continuously monitor the variations of the eye. A normalized correlation technique is then used for detecting whether the eyes of the driver are open or closed. Based on the blink threshold and the detection threshold the open and closed variations of the eye are judged. If the eyes remain closed for a certain period of time (10 to 30seconds), the system determines that the person has fatigue and give a warning signal.

Fig. 3 Image of open eye.

At this stage, the colors of the eyeballs in the eye templates are used directly for fatigue detection. Since the property that the eyeball colors are much darker isa quite stable feature, the eye templates are converted to the grayscale model. The original darker eyeballs become brighter ones in the converted image. According to the observation, the saturation values of eyeball pixels normally fall between 0.00 and 0.14.

Fig. 4 Image of closed eye.

. This observation is used to distinguish whether a pixel in an eye template is viewed as an eyeball pixel. When the eyes are open, there are some eyeball pixels. When the eyes are closed, there are no eyeball pixels. By checking the eyeball pixels, it is easy to detect whether the eyes are open or closed. Update the eye coordinate position each time the frame is successfully tracked, and take this coordinate as the reference of next search range, if it is an eye-open area, take it as next template, then repeat. This is a method which updates template and search range instantaneously to match eye-area dynamically. During the track process, if matched areas in several continuous frames are no longer eye-area, it seems tracking is fail and the algorithm needs restart. So far the eye localization and its state detection of driver video sequences has already been finished, which supply basis for fatigue detection.

3. IMPLEMENTATION RESULTS

We manipulate the signal through mat lab programmer code and measure the time duration between each blink. If it is beyond the 5 second we can find the unchanged stage that we want. But as if we found time duration between the blink beyond the sated time two conditions may occurs.

1. Driver may at napped stage. (Time duration gets longer time from closed to open eye during blink)

2. Slower rate of blink (Time duration between blink gets longer time from open to close blink)

When program will run, graphical user window will be display as shown in figure 5. After initialize camera, video of driver current state will record. Once the face of the driver is detected and the eye of the driver is successfully tracked as shown in figure 6 and 7, we continuously monitor the variations of the eye. A normalized correlation technique is then used for detecting whether the eyes of the driver are open or closed. Based on the blink threshold and the detection threshold the open and closed variations of the eye are judged as shown in figure 8. If the eyes remain closed for a certain period of time (10 to 30seconds), the system determines that the person has fatigue and give a warning signal. Figure 9 is MATLAB command (output) window. It shows that if consecutive three 1's are come then drowsiness will be detected.

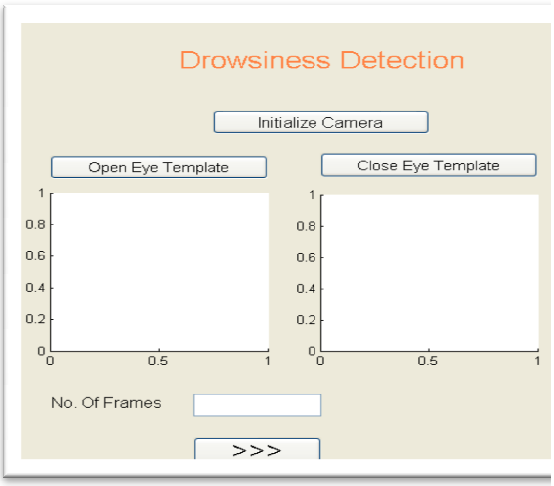

Fig. 5 Graphical user window.

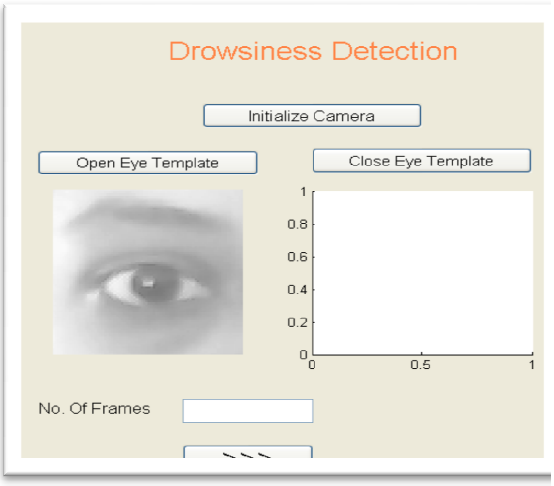

Figure 6 Open eye image.

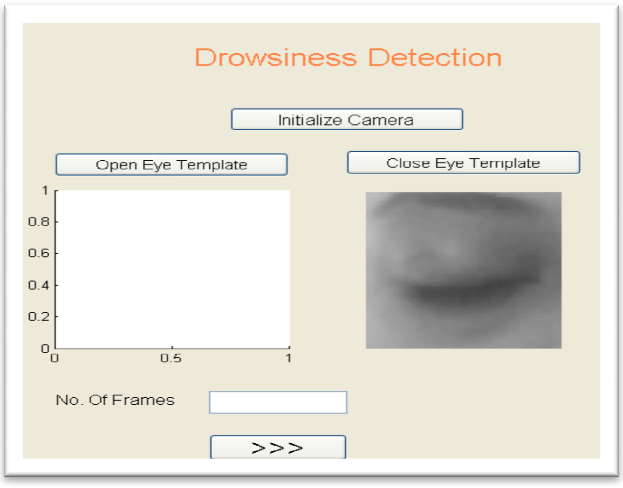

Fig. 7 Close eye image.

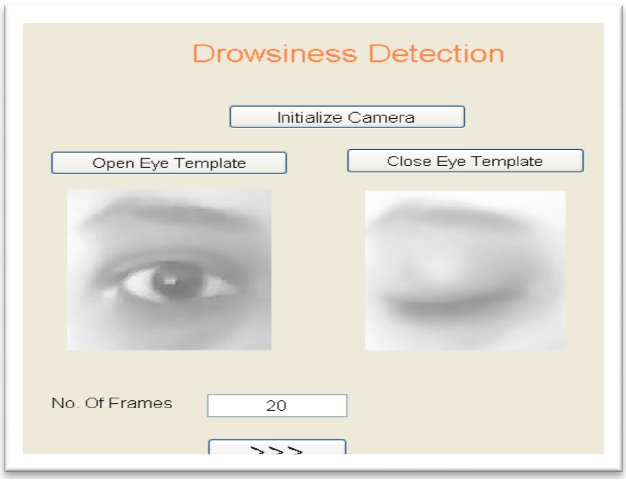

Fig. 8 Final GUI window.

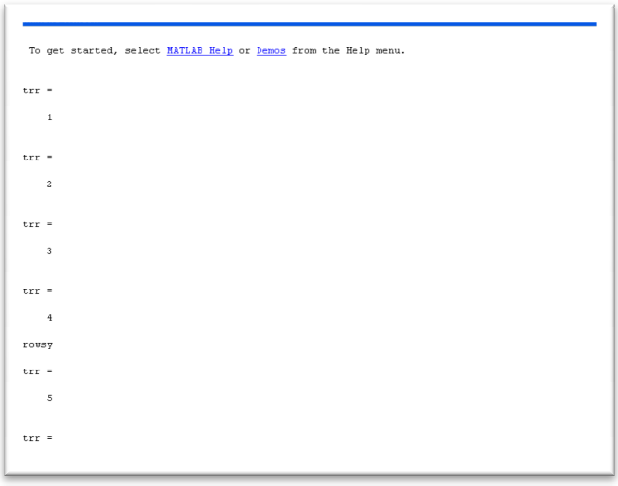

Fig. 9 Output window.

4. CONCLUSION

It is due to the driver's fatigue, traffic accidents keep with a yearly increasing of a high rate. This paper shows the new fatigue detection technique using Image Processing. In this technique the fatigue will be detected immediately and regular alert the driver. Through research presented in this paper, we propose a new advanced safety model that detects the driver fatigue.

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