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DETECTION OF EYE LID FOR MONITORING AND CONTROLLING VEHICLE

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Abstract:
In this paper, a vehicle driver drowsiness warning system using image processing technique is proposed. The proposed system is based on analysis of facial images for warning the driver of drowsiness. The facial images of driver are taken by a video camera which is placed in front of the driver. The results have indicated that the proposed expert system is effective for increasing safety in driving.

I INTRODUCTION

Safe driving is a major concern of societies all over the world. Every year, due to drivers falling asleep at the wheels thousands of people are seriously injured or killed. Recent studies show those drivers' drowsiness accounts for up to 20% of serious or fatal accidents on motorways and monotonous roads, which impair the drivers' judgment and their ability of controlling vehicles. Therefore, it is essential to develop a real-time safety system for drowsiness-related road accident prevention. Many systems have been proposed and some of them are widely used for detecting the driver's drowsiness, which include the measurements of pulse rate, heart rate, head movement, physiological features like EEG, eyelid movement, gaze, and behaviors of the vehicle, like steering movements and lane deviations. Out of these different technologies, like eyelid closure and eye-blinking, are considered as promising ways for monitoring alertness.

Figure 1.1: Movement of Eye

Recently many countries have noted the importance of improving driving safety. Developing vision based warning systems for drivers is an increasing area of interest. Computer vision has gained a lot of importance in the areas of face detection, face tracking, eye detection for various applications like security, fatigue detection, biometrics. This technique has gained importance due to its non-invasive nature. According to the National Crime Records Bureau or NCRB in 2012 total unnatural deaths were 3,72,022 out of which 1,39,091 death were due to road accidents as shown in table 1

S.No	Year	Number of accidental deaths		Percentage share of 'Road accident' deaths in un-natural total deaths
		Road Accidents	Total Un-Natural	
1.	2008	1,18,239	3,18,316	37.1
2.	2009	1,26,896	3,34,766	37.9
3.	2010	1,33,938	3,59,583	37.2
4.	2011	1,36,834	3,59,583	37.3
5.	2012	1,39,091	3,72,022	37.4

Table 1: India Road Accidents Statistic

II System Design :

i) Eye Tracking:

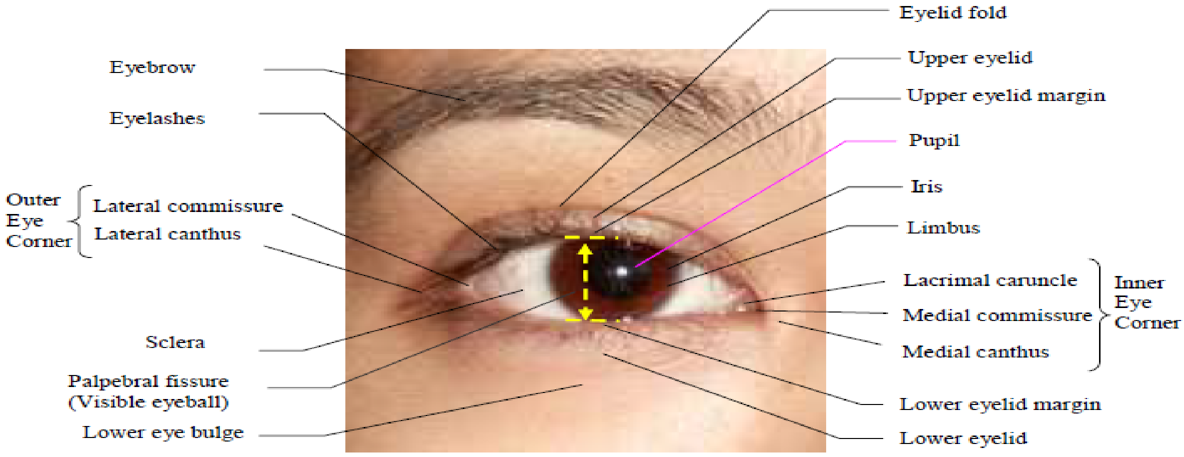

Figure .2.1: Photo of a right eye labeled with the visible surface eye anatomy

The motion and geometric characteristics of the eyes are unique which makes gaze estimation and importance of tracking for many applications. For implementing eye detection and tracking systems there are many different approaches [11]. In the literature many eye tracking methods were presented. However, a lot of research is still going on to find robust eye detection and tracking methods to be used in a wide range of applications.

ii] Computer-Vision-Based Eye Tracking: Most eye tracking methods presented in the literature use vision based computer techniques. In these methods, to record the eye movement a camera is placed to focus on one or both eyes. In this paper the main focus is on computer vision based eye detection and gaze tracking. In the field of computer vision based eye tracking there are two main areas. The first area is eye detection in the image. This is known as eye localization. Eye tracking is the second area, in which the process of eye gaze direction estimation takes place. Based on the data obtained from processing and analyzing the detected eye region, the direction of gaze can be estimated and is either used directly in the application or tracked over subsequent video frames in the case of real-time eye tracking systems.

III Circuit Methodology:

I] Circuit Implementation Idea:

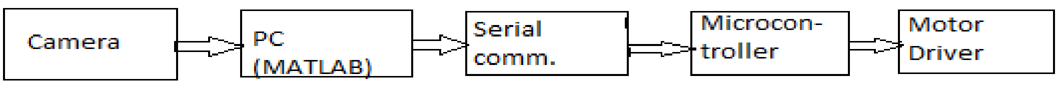

Figure 3.1: Block Diagram Of Circuit Implantation Idea

Description:

Camera: XPRO night vision image-in web cam (20.0)mp.

- Category defining design(straight shape instead of oval)
- Interpolation up to 20mp
- 3x zoom(with software)
- Special effects
- Crystal clear motion

  Input to the camera is the real time video of face. Output image of camera is processed in MATLAB.

PC (MATLAB): The input to the program is the real time image or video of a drivers face. Then image is analysis. Program continuously monitor eye lid of driver. If Program detects driver's eyes close then the signal is send to serial communication. Program is developed by in MATLAB
Serial Communication: RS232 port is used for serial communication. The program communicates between hardware and software through serial port. The output of serial communication is sent to the microcontroller.

Microcontroller: ATMEGA16 microcontroller is used in this system. Microcontroller continuously monitor input image frame. If driver's eyes are close than the microcontroller turns on the buzzer and send signal to the motor driver IC.

Motor Driver :
Microcontroller is send signal to motor driver circuit. If drowsy of driver detected buzzer turn on and speed of motor decrease automatically.

IV Hardware Circuit:

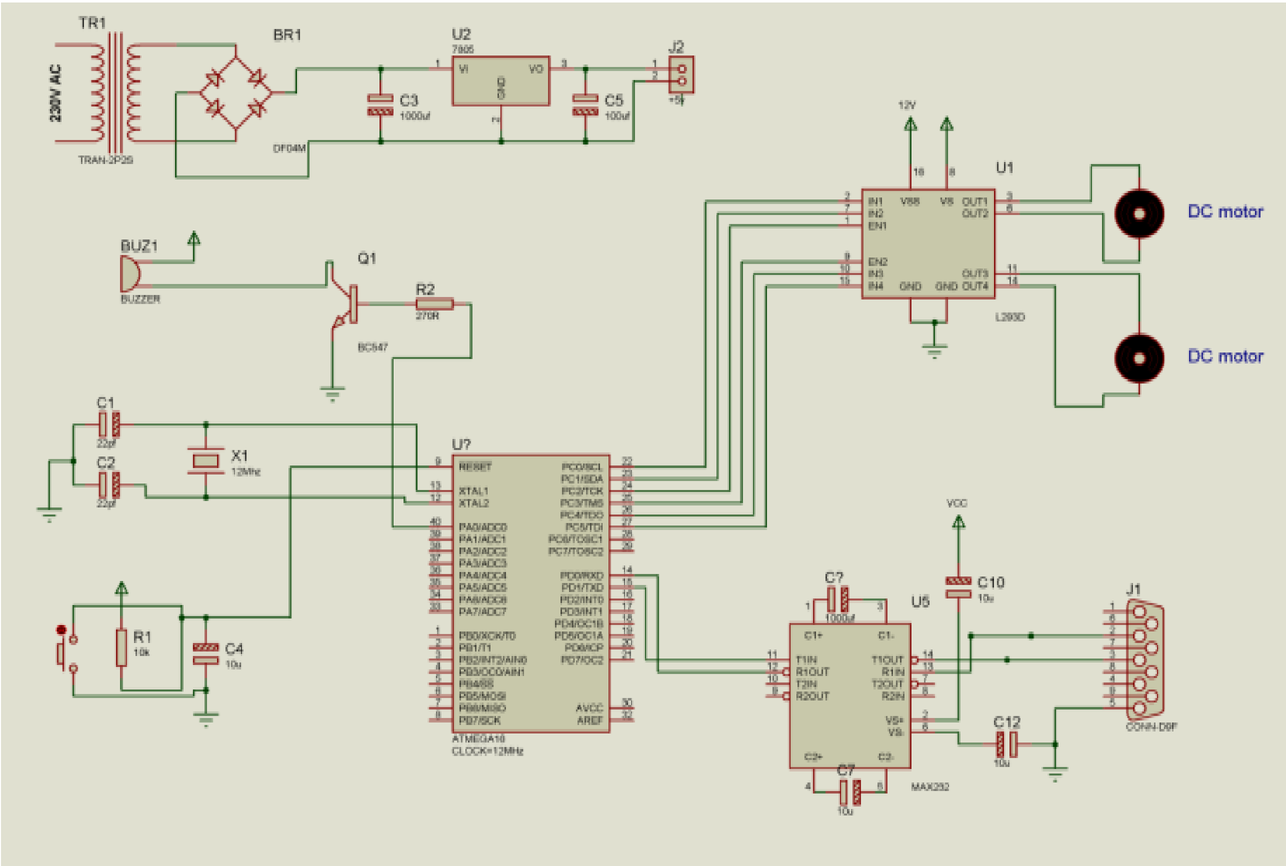

Figure4.1: Circuit Diagram

Power Supply: The 230 V power supply from the mains will be given to 12 V step down transformer whose output will be 12V and from this output of the transformer we will generate 5V power supply using an LM 7805 regulator IC.

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Micro Controller: The microcontroller ATMEL ATMEGA16 is provided with all necessary connections for its operations. The 12 MHz crystal along with two capacitors provides the clock circuit to the microcontroller. This Microcontroller is a 40 pin IC, with inbuilt functions such as ADC, DAC etc.

DC Motor Driver:L293D is a typical Motor driver or Motor Driver IC which allows a DC motor to rotate on either direction. L293D in a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control a set two DC motors with a single L293D IC.

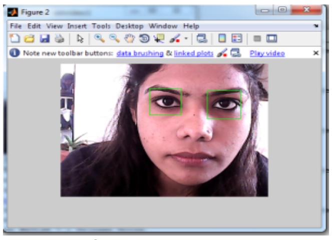
Serial Communication: RS232 port is used for serial communication. This port communicates between the hardware & software. Then the output is sent to the microcontroller.

V Hardware Collaboration With MATLAB :

I] MATLAB: MATLAB is a high performance language for technical computing. It integrates computation ,visualization and programming in an easy way to use environment where problems and solutions are expressed in familiar mathematical notations. The program of this system is developed in MATLAB software. Input from camera (image) is processed in MATLAB. The MATLAB program first of all detects the eye region of face. Then it continuous to monitor the images frame by frame. If the eyes are continuously close for 3 sec MATLAB will send an alert signal to the microcontroller through the serial communication cable. This results a buzzer to activate and the vehicle speed to decrease gradually .

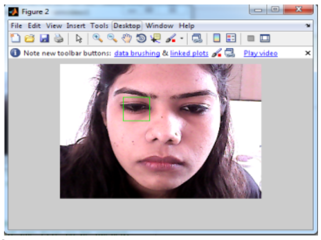
RESULT : Camera continues to record real images of the driver's face frame by frame. If continuously 3 sec eyes are close than microcontroller send alert signal to motor driver circuit and motor driver decreases the speed of motor. Performance analysis operation is done in the following manner:

STEP 1 :when eyes are fully open.



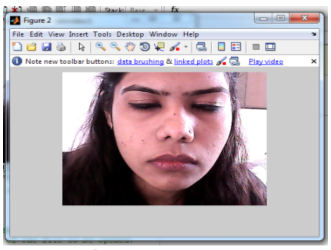
Speed of motor is 100rpm.

STEP 2:when eyes are partially open



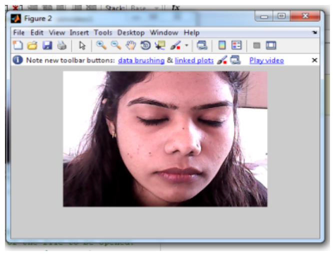
Speed of motor is 70rpm. Time delay from step 1 to step 2 is 3.89 sec.

STEP 3 :when eyes are partially open.



Speed of motor is 35 rpm . time delay from step 1 to step 3 is 7.13sec.

STEP 4: When eyes are fully closed.



Speed of motor is 0 rpm. Time delay from step 1 Step 4 is 10.73 sec.

CONCLUSION:

Eye-blink based braking system can prove a step in the direction of accident prevention. It is the future of controlling the device with greater comfort and ease. Artificial intelligence and many other researches and new technologies can give a new dimension to it. Further improvement and research is required in this field to make this system safer for the driver.

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