

VEHICLE ACCIDENT PREVENTION USING EYE BLINK SENSOR

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ABSTRACT

Drowsiness is one of the major causes for highway accidents. These types of accidents occur due to drowsiness and driver being not able to control the vehicle. Drowsiness can be identified by the eye blink and blinking frequency through infrared sensor worn by the driver by means of a spectacles frame. IR sensor detects blinking and inform the driver through alarm buzzer.

Key words: Infrared sensor (IR), Vehicle accident, Eye blink

1. INTRODUCTION

Driver drowsiness is recognized as an important factor in vehicle accidents. It has been demonstrated the driving performance deteriorates with increased drowsiness with resulting crashes constituting more than 20% of all vehicle accidents¹. But the life lost once cannot be re-winded. Advanced technology offers some hope to avoid these up to some extent. This project involves measuring the eye blink using an IR sensor. The IR transmitter is used to transmit infrared rays. The IR receiver is used to receive the reflected infrared rays from the eye. If the eye is closed the output of IR receiver is high otherwise the IR receiver output is low. This is to know whether the eye is closed or at open Position. This output is given to logic circuit to activate an alarm.

Drowsiness features

The drowsiness features are characterized by the blinking frequency of the eye.

*Awake-conscious-normal

*Blinking frequency low

*Drowsy-less conscious-risky

*A sleep-out of conscious-at extreme risk

2. EXPERIMENTAL

2.1 eye blink detection

This project involves measuring the eye blink using IR sensor. The IR transmitter is used to transmit the infrared rays to the eye. The IR receiver is used to receive the reflected infrared rays from the eye. Theoretically if the eye is closed the output of IR receiver is high otherwise the IR receiver output is low. This is to know whether the eye is closed. This output is given to logic circuit to indicate the alarm. However it is not easy to implement. Because emitted IR power is not enough to be received by a photo diode. Emitted ray should be completely reflected from the eye. Although practically it is difficult to get that readings. Received voltage is given to the arduino board. Opening and closing values were obtained to implement Arduino program. This project helps in controlling accidents due to unconsciousness through manufacturing Eye blink. Here one eye blink sensor is fixed in vehicle where if driver loses consciousness, then it is indicated through alarm.

The method of eye blink recording utilizes infrared (IR) photoelectric sensors. This approach measures IR light reflected from the surface of the eye. A typical IR eye blink measurement device consists of an IR light emitting diode (LED), which illuminates the eye surface, paired with an IR photodiode that detects IR light reflected back from the eye. An ideal IR eye blink detector should have several important properties. To detect the full range of eyelid movement, the IR LED should completely illuminate the surface of the fully opened eye, and in addition, the field-of-view of the IR photodiode should encompass the whole eye area.

TCRT5000 is an IR Emitter and an IR Photo Transistor packaged together. The Arduino TCRT5000 is designed to sense the distance to an object using Infra Red light waves. It can also identify the difference between white and black based on the contrast of an object and its reflective properties.

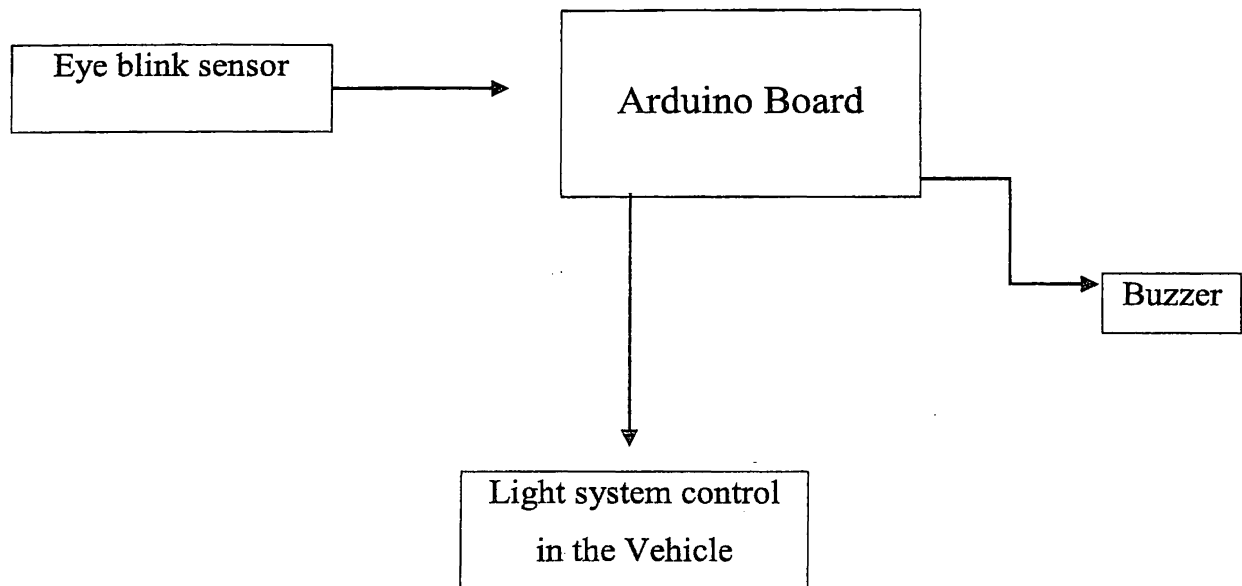


Figure1: Block diagram of the system

3. RESULT AND DISCUSSION

Following analog sensor values were obtained using Arduino. The result of the system is for change in the eye surface.

Table 1: IR Sensor output

No of person	Eye Closing sensor value(mV)	Eye Opening sensor value(mV)
01	820	880
02	830	900
0	8	8
3	0	7
	0	0
04	820	850

Above values changed between 800mV and 900mV. 840mV value was used to identify the open and closed positions of the eye.

The emitting power should be reduced. Because IR rays produced heat. It is not good for the eye. Therefore emitter IR intensity was reduced using 1k ohms resistor.

An ideal IR eyeblink detector should have several important properties. To detect the full range of eyelid movement, the IR LED should completely illuminate the surface of the fully opened eye, and in addition, the field-of-view of the IR photodiode should encompass the whole eye area.

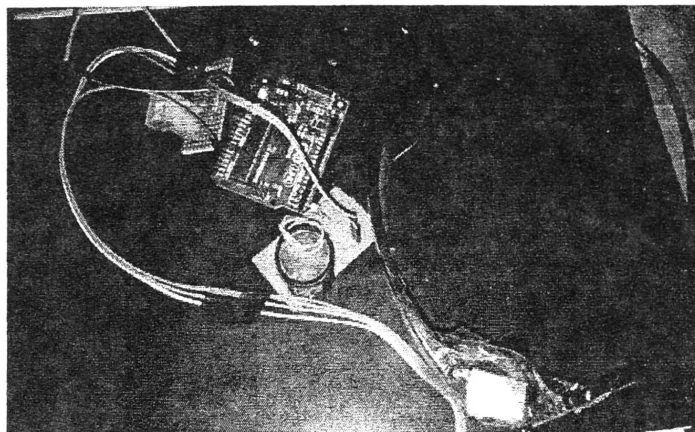


Figure2: Photograph of developed system

4. CONCLUSION

The study and the implementation is very useful to persons driving at night. This system will be useful to prevent accidents due to drowsiness and can be implemented at a low cost.

ACKNOWLEDGEMENTS

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