

Accident Prevention Using Eye Blink Detection with Braking System and Inner Wiper Mechanism

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Abstract: The need of creating the accident alarm Indicator is a high as the number of accident is high and it more safe compared to another device. The main aim of this device is to give alarm to the driver and also vibrate the seat of the vehicle at the back and also apply the brake of the vehicle. The advantage of this project is to less the number of accident and also save the lives of human beings and also creating a new theory of accident detecting system in this competitive world, as new technology is going to lead the globe. The purpose behind Inner Wiper mechanism is that it reduces the accidents due to driver distraction. If the windscreen of vehicle such as car, truck, bus etc catches the moisture then by inner wiper mechanism it is easy to clean the glass. And hence the driver can drive the vehicle with maximum concentration.

Keywords: Micro Controller, Relay, Keil software, Braking, Eye blink sensor, Buzzer, Vibrator.

1. INTRODUCTION

The drowsiness is one of the reason responsible for the vehicle accidents. Around 30 percent accidents are occur due to drowsiness of the driver. The driver drowsiness can be detected by checking driver response. One of the method for detecting eye blinking of the driver is by making use of IR sensor. The IR sensor is used to see the blinking of eyes of the driver. If the eyes are closed for certain period it will sense by IR sensor. The information of eye blink is send to microcontroller from IR sensor and makes the device work. Hence drowsiness of the driver is prevented and results in reduce percentage of accidents.

The proposal model will have one additional set of wiper blade exclusively for the inner surface cleaning of the windscreen, fitted in addition to the existing model of wiper blade moves along with the already existing outer wiper blade. Once the driver switches on the wiper motor, the outer wiper works as per the present norm. In order to clear fogging, the inner wiper also starts moving, thus clearing the fogging on the inner surface of the windshield. This improvisation of the windscreen wiper is least expensive and very effective. This model helps the driver to drive with maximum concentration without bothering about the fogging of the windscreen.

2. BACKGROUND STUDY

Previously the very first method of eye blink detection was made through image processing. But this sometimes contains slow processing of image and leads to more time. It needs additional set of computer or laptop which becomes complicated arrangement. Sometimes the shocks in the vehicle due to bad conditions of the road may damaged the program stored in laptop or computer. So the second technique installing sensors in front of eye or in long range is the possible way to detect the accurate blinking of eyes.

As in wiper, the previously and even now has only a set of wiper form from outside. So it is not possible to clean the moisture from inside. The driver has to wipe out the foggy glass which may results in accident. For that purpose inner wiper mechanism is the possible technique to clear the moisture which will move along with the outer wiper.

3. EYE BLINK DETECTION

In this eye blink detection the sensor used by us is to see the blinking of eyes of a person driving the car. This will not recognize the normal flashing of eyes but will provide the time period for it, so that it will detect after the given time period. If the eyes are closed for 3sec it will sense by IR sensor and this signal is further send to microcontroller .The intensity of IR light and time for closed position of eyes can made adjustable according to the distance of sensor from the eyes.

4. TECHNIQUES FOR DETECTING DROWSY DRIVERS:

Following are the possible techniques can be used to detect drowsiness of the driver: sensing of physical changes such as sagging posture, head movement, process imaging using camera and IR sensor.

Process imaging and head movement can sense by more than one camera, sometimes which is not possible in dark light and image processing is relatively slow. Also it requires installation of computer in the vehicle which can be getting damaged on bad roads hence this method is not convenient. Whereas the sensing using optical sensors (IR sensor) is fastest and also accurate as it can be sense closed position of eyes in dark light.

5. METHODOLOGY

RUNNING OF THE SYSTEM

The system works when the driver closes the eyes for around 3 seconds. There is an Infra-red sensor in the system, it senses the eye blink of the driver and when the eye is closed for 3 seconds, the system gives an alarm and also there is a vibrator present at the back of the seat, the vibrator vibrates and the brake is also applied gradually. This is how the project works.

WORKING OF THE SYSTEM

There are three relays one for the disconnecting the driving motor and another for the braking circuit running purpose. If the driver is seen to be drowsy i.e. the eyes of drivers are closed for 3 seconds then the IR sensor gives the information to the timer circuit it activates the microcontroller and microcontroller gives information to three relays. Accordingly the buzzer will on along with vibrator placed under the seat and at the same time the driving motor will be disconnected by disconnecting the relay and motor used for braking will be on through relay.

WORKING OF THE CIRCUIT OF SYSTEM

There are many circuits present in this system; all the circuits are interconnected with each other with wires. The circuits are:-

- Microcontroller Circuit
- Relay Circuit
- Driver Circuit
- Timer Circuit
- Alarm Circuit
- Braking Mechanism

6. MANUFACTURING AND ASSEMBLY

PROCESS OF THE SYSTEM:

THE PCB BOARD:

The PCB board was drilled by us. On the PCB board many circuits should be placed and is to be mounted with a screw or soldering. The PCB board holds all the electrical parts and circuit.

BLOCK DIAGRAM:

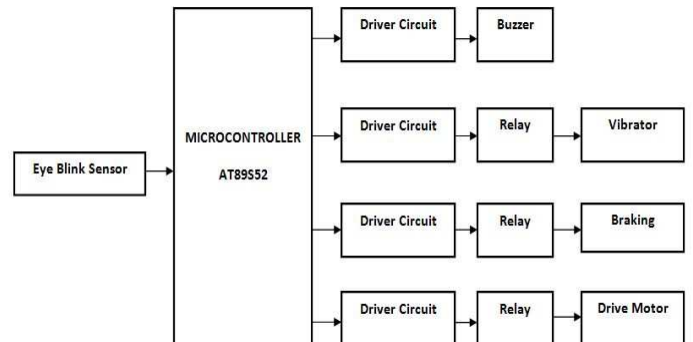


Figure 1. Block Diagram

MICROCONTROLLER:

The microcontroller is brain of the circuit and control the entire system. IR sensor provide necessary input signal to the microcontroller and gives output signal to the vibrator, brakes, buzzer and driving motor. The microcontroller we have used is AT89S52 which belongs to 8051 family.



Figure 2. Microcontroller

EYEBLINK SENSORS:

The eye blink sensor consists of an Infrared Transmitter and a Receiver. The infrared transmitter transmits the rays and the receiver receives the rays. The sensors sense our reaction of the eye (closed or opened) and gives information to the system that is the timer circuit. The timer circuit then proceeds the information to the microcontroller.

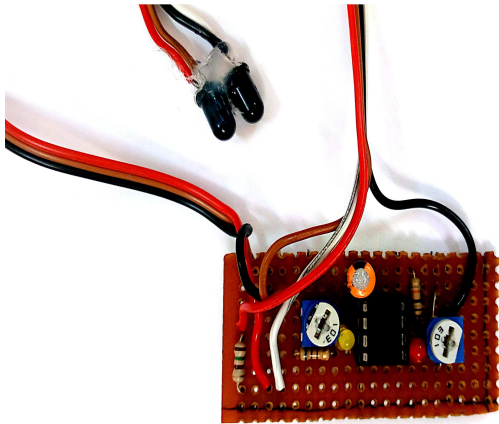


Figure 3. IR Sensor

BRAKING MECHANISM:

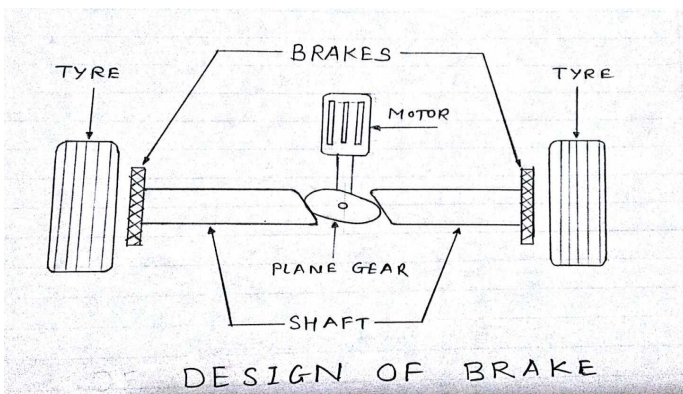


Figure 4.1 .Brake Mechanism 2D

This mechanism consists of brake lining, tires, partially cut shaft, elliptical disc, motor and a retracting spring.

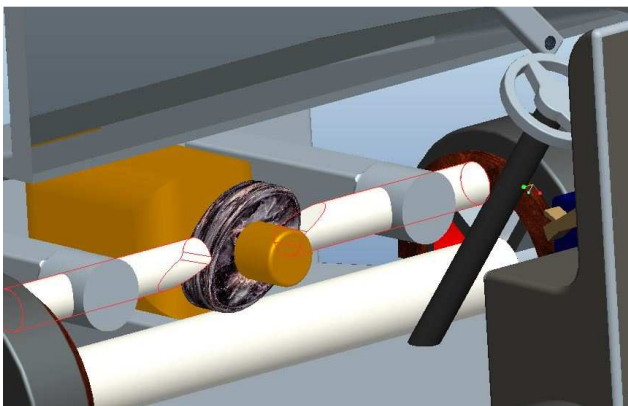


Figure 4.2 . Brake Mechanism 3D

The shafts are cut in two pieces with a taper section from both the starting section. One shaft consists of taper from top side while another from bottom side. As the motor rotates the shafts will expand outside and again will be back to its original position by retracting spring mechanism and the brakes will be applied. This process will continue until the relay switches off.

BUZZER:

The alarm indicates the driver by giving an alarm sound and the driver gets alert about the sleeping temptations. For this alarm in this system a beeper is set.

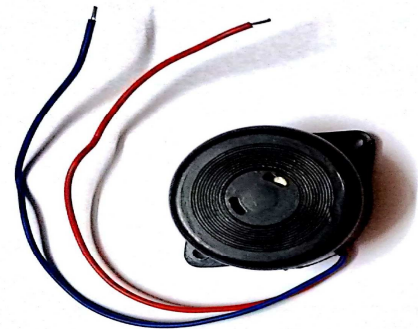


Figure 5. Buzzer

As the eye blink sense (Closed position of eye) the microcontroller turn on the buzzer, Due to which driver will woke up. There is no requirement of relay for the buzzer.

RELAY UNIT:

The relay unit is same as the driver circuit in which the three relays are connected in the circuit. The relay open and close is controlled by the microcontroller. The microcontroller gives the relay the command and by the relay motor starts and braking is applied and the driving motor is disconnected. There are three relays in this system for vibration, rotation of the braking motor and for disconnecting drive motor. A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions.

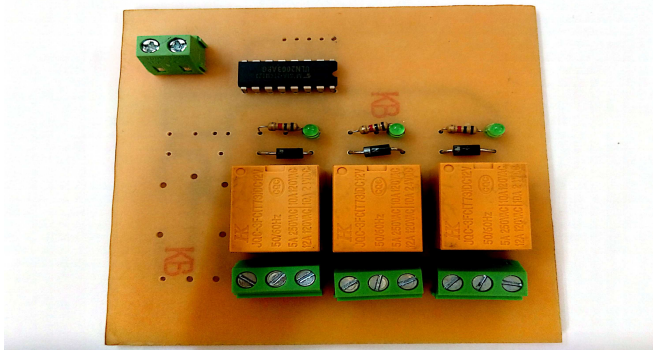


Figure 6. Relay Unit

VIBRATOR:

This is the vibrator kept in the circuit of the system. In real time the vibrator is set under the seat of the driver or at the back of the seat or on the steering of the vehicle. The vibrator has a separate driver circuit and a relay for its control. The vibration is controlled by the microcontroller. A vibrator is fixed in the circuit in which it will vibrate and make the driver alert about the drowsiness condition.

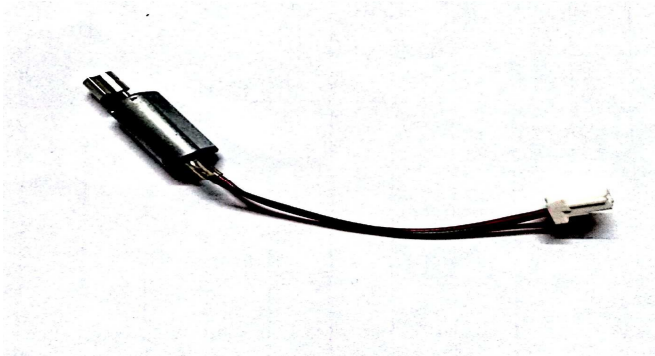


Figure 7. Vibrator Motor

In the real time application the vibrator is fixed under the seat of the driver, in which it vibrates and alerts the driver. The vibrator works along with the alarm and also alerts in motion to the driver. The vibrator wakes up the driver in real time. The vibration makes the driver alert to dangerous driving conditions and from uncontrolled of the vehicle.

7. FUTURE SCOPE

Better models of accident alarm indicator and breaking should be developed according to our present traffic conditions. For the next level of improvement some recommendations are given down.

- The IR sensor used for the eye blink detection should be taken and a web cam should be used for the eye blink detection rate.

- Image processing technology should be used for accurate eye blink detection.
- Battery should be used as a source of power and there should be an adequate flow of power as high power is needed for microprocessor.
- An alarm should be used instead of a buzzer and a large vibrator should be used instead of small vibrator.
- The breaking system should be made more compact and should be designed according to disc break.
- Wireless connection should be used by using transmitter and receiver.
- Sensors should be fitted on the back and front of the car so that it avoids from hitting other vehicles coming in front and back.
- The inner wiper should be attach with a sensor from the inside of windscreen, so that when the fog is detected at that time only the Inner wiper will wipe out the foggy glass automatically.

8. CONCLUSION

The components in the systems are revised and checked for the proper working of the system and all the components are working. The torque of the motor is calculated. The Electronic parts are checked. The time taken for the break, buzzer, disconnecting driving motor and the vibrator to apply is calculated and shown in the result. The system is drawn in Pro-E and the analysis is done in Ansys. The displacement strength, and also the factor of safety of the system is found by analysis. The analysis shows the product is safe to use. The above results and the works shows the present design is best and the Accident alarm indicator and breaking is working good according to the eye blink closing and opening of the driver and it is successful.

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