

Driver Drowsiness Detection System with Gsm Alert using Piezoelectric Sensor

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Abstract- One of the major reason for car accidents is Drowsy Driving. The main objective of our project is to design a system which monitors drowsiness of a driver using an eye blink sensor and issues an audible alarm through a buzzer if he/she was sleepy. By eliminating the time delay between accident occurrence and when the emergency services are dispatched to the accident location can decrease mortality rates, and save lives. One way of eliminating the delay between accident occurrence and emergency services dispatch is to use in-vehicle automatic accident detection and notification systems, which upon sensing that a traffic accident has occurred will immediately notify an emergency number. For accident detection piezoelectric sensor is used and for notifying the emergency services we use a GSM connection. In this project, such a system is described the main application of which is early accident detection.

Keywords: Driver drowsiness detection system, Global System for Mobile communications (GSM), Piezoelectric sensor

I. INTRODUCTION

Vehicle accidents are increasing in today's generation, mainly because of the fast lifestyle. One serious vehicle accident in India occurs every minute. This happen mostly if the driver is Drowsy or alcoholic.

Hence a method should be applied which will address real time monitoring of driver's eyes to the driver himself so that he/she will become aware of their current status. If the driver isn't still aware and crashes the car, the accident alert system will alert a emergency services with the help of GSM.

The driver drowsiness system contains an IR based Eye blink sensor, GSM modem, Atmega microcontroller (AT89s52), piezoelectric sensor. The eye blink sensor continuously monitor the movement of eye, it calculates the closing time of eye, normally eye blinking time is stored in microcontroller, every time sensor sense the closing and opening timings, compare to the original values, if time is more, that information is sent to the microcontroller, then that time microcontroller identify that the person is in sleeping mode, then automatically buzzer will ring to wake up the driver.

Suppose if accident occurs, the force upon piezoelectric sensor is converted in to electric signal and sent to microcontroller where it's used to send alert message automatically to the rescue team and to the police station. The message is sent through the GSM module. This is a real time system can help to save many lives and thus provides a feasible way to alert emergency or rescue services.

II. BLOCK DIAGRAM

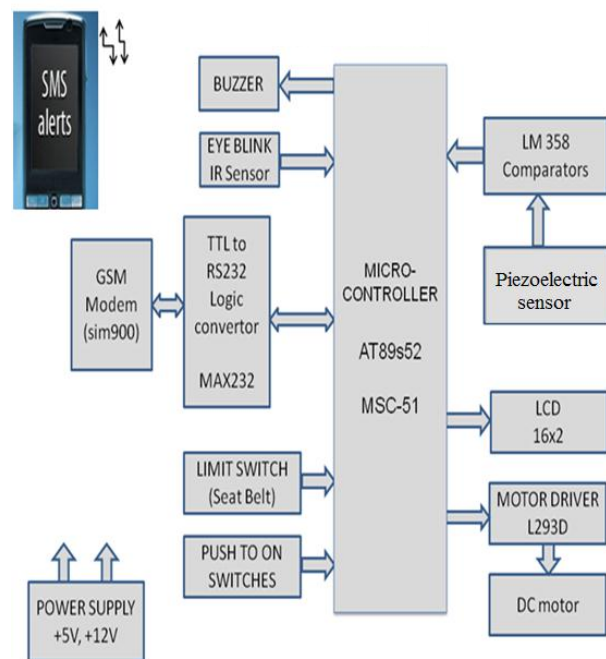


Fig.1.

III. WORKING PRINCIPLE

Drowsiness detection is done by an eye blink sensor which is IR (Infrared) based. It consists of an IR transmitter and an IR receiver. The IR transmitter is used to transmit the infrared rays in our eye. The IR receiver is used to receive the reflected infrared rays from the eye. If the eye is closed then the rays aren't reflected from the eye and the output of IR receiver is high otherwise the IR receiver output is low. This is to know whether the eye is in closed or opening position. This output is given to microcontroller, to indicate the alarm. Thus drowsiness detection is achieved through an eye blink sensor and an audible alarm is issued then by the microcontroller.

Accident detection is done by piezoelectric sensor. The piezoelectric sensor will generate an voltage when it is deformed. Thus when an accident occurs, the piezoelectric sensor will generate an output voltage. Microcontroller continuously scans the piezoelectric sensor and accordingly checks the threshold levels. When the output of piezoelectric exceeds a predetermined threshold value, an SMS packet containing the driver's information, vehicle registration number is sent to using GSM communication.

IV. COMPONENTS

A. EYE BLINK SENSOR:

This eye blink sensor is based on IR. It consists of an IR transmitter and IR receiver. The eye blink sensor illuminates the eye with infrared light and monitors the changes in the reflected light. The infrared light reflected from the eye is used to determine the results. The sensor output is active high for Eye close and can be given directly to microcontroller for interfacing application (e.g. buzzer). When this output remains high for a specific time period (threshold), the driver is considered to be drowsy. Consequently a buzzer can be activated in order to wake the driver.



Fig.2.

B. MICRO-CONTROLLER (AT89S52):

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller. It has 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel’s high-density nonvolatile memory technology. It is compatible with the industry-standard 80C51 instruction set and pin-out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller and can provide a highly-flexible and cost-effective solution to many embedded control applications.

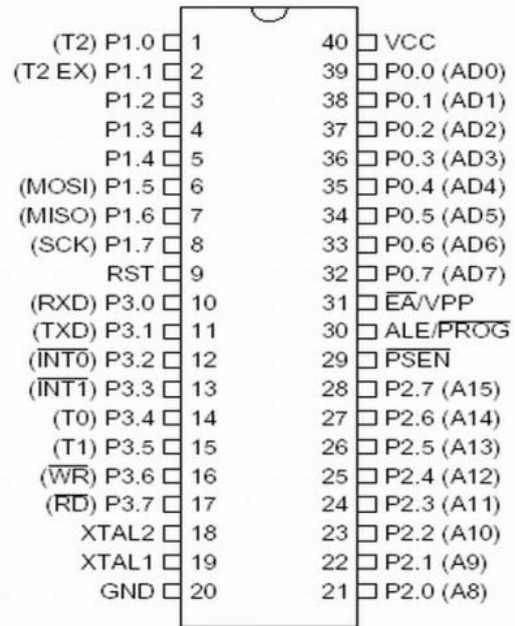


Fig.3.

C. PIEZOELECTRIC SENSOR:

Piezoelectricity is the ability of certain materials to produce a voltage when subjected to mechanical stress. A piezoelectric sensor is a device that uses the piezoelectric effect, to measure changes in pressure, acceleration, temperature, strain, or force by converting them to an electric charge. The rate of charge produced will be proportional to rate of change of mechanical stress applied on it. Higher the stress, higher will be voltage. Zinc oxide ZnO. Aluminum nitride AlN, Quartz SiO2, etc are some of the examples of piezo-electric materials.

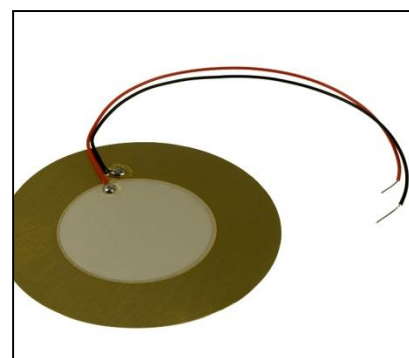


Fig.4.

V. ADVANTAGES

- Interfacing of the components with the driver is easy by means of a spectacle frame.
- It is a real time system to detect the drowsiness of the driver.
- It is a completely non-intrusive system. It is a simple and reliable design.
- Reduce the number of accidents.
- Traffic management is possible.

VI. DISADVANTAGES

- It requires GSM network to send the information.
- The system fails, if the driver is wearing any kind of sunglasses.

VII. APPLICATIONS

It can be implemented in factories to keep a check on machine operator. This system can also be used for the safety of the machine operator. It can be used in railway engines for the safety of the driver. The railway drivers mostly have to travel long distance. With some modifications we can use this system in other modes of transportation as well. This system can be extended with alcohol detection system also. Thus alarm can be issued to the driver who has consumed alcohol.

VIII. CONCLUSION

This project presents drowsy driving detection and alert system using an eye blink sensor and a buzzer. Also vehicle accident detection using piezoelectric sensor and notification system with SMS to the user defined mobile or emergency numbers. GSM alert based connection is designed and implemented in embedded system domain. The proposed Vehicle accident detection sends an alert SMS regarding accident. Thus we attempt to reduce accident by detecting drowsiness of driver and notify emergency numbers using GSM connection, in case an accident occurs.

IX. REFERENCES

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