

# A REAL TIME DRIVING ASSISTANCE USING PIC MICROCONTROLLER

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**Abstract**—This project is proposed to give a real time driving assistance based on the driver – vehicle interaction. Here the driver Drowsiness and alcohol drinking are the important factors in the increasing number of accidents on today's road. The accidents can be controlled by Eye blink sensor (driver drowsiness can be detected), Alcohol sensor (Alcoholic concentration can be detected) by using PIC microcontroller. By this the driver fatigue symptoms can be detected easily and the vehicle speed can be controlled and accidents are avoided. Alcoholic sensor (MQ3) detects the alcoholic concentration if it is high then the ignition of the vehicle will be failed to turn on, eye blink sensor using IR rays which detects the eye blinking by transmitting IR rays into the eye. If the eye is closed the output will be high then the speed of the vehicle is controlled by PIC controller which is interfaced with the sensor and this module is connected with the braking system and buzzer to reduce the speed of the vehicle and to start buzzing, if the eye is open the output is low.

**Keywords**— PIC (Peripheral Interface Controller), Alcoholic Sensor (MQ3), Eye blink sensor & Buzzer

## 1. INTRODUCTION

Making cars more intelligent and interactive which may notify or resist user under unacceptable conditions, they may provide critical information of real time situations to rescue or police or owner himself. Driver fatigue resulting from sleep deprivation or sleep disorders is an important factor in the increasing number of accidents on today's roads. In this paper, we describe a real-time safety prototype that controls the vehicle speed under driver fatigue. The purpose of such a model is to advance a system to detect fatigue symbols in drivers and control the speed of vehicle to avoid accidents. In this paper, we propose a driver drowsiness detection system in which sensor like eye blink sensor are used for detecting drowsiness of driver .If the driver is found to have sleep, buzzer will start buzzing and then turns the vehicle ignition off .

Considering Indian roads, nearly 20 to 30 types of vehicles of different shapes, sizes and speeds drive on available space and are in a rush to reach their destination. Road crashes, deaths and injuries have become an important and leading cause of deaths, hospitalizations, disabilities and socio-economic losses in the country. Government of India shows that driver fault is the single most important factor and accounted for 81 percent of total accidents. These include driving at very high speeds over the optimum speed limit as desired, presence of alcohol and drugs in the blood stream of the driver, fatigue and sleeplessness, distracted driving through use of cell phones, visibility issues such as fog or rain etc., road and vehicle related factors. The impact of crash severity is influenced by presence or absence of certain protective mechanisms such as use of airbags, use of safety devices like helmets in the case of motorcycles, seat belts in case of four-wheelers and use of child-restraints for infants

In order to reduce the number of road accidents caused by various driving factors and to improve the safety and

efficiency of the traffic, the researches and companies on Intelligent Transportation System (ITS) are conducted worldwide survey for many years. Intelligent vehicle (IV) system aims to assist drivers in any dangerous situations to avoid the road accidents. IV system is a component of the ITS system which is able to sense and understand the environment around itself. Hence there is a need to design a system which will over-come above problems.

A new system is introduced which combines the features like lane detection, alcohol and drowsiness detection. This system detects the mentioned parameters and makes the vehicle intelligent by maintaining the parameters within specified safety conditions and avoiding road accidents caused by drowsiness and traffic rules are also not violated. Accident due to drowsy is prevented and controlled when the vehicle is out of control. And also the drunken drive also prevented by installing alcohol detector in the vehicle. The term used here for the recognition that the driver is drowsy is by using eye blink of the driver. In recent times drowsiness is one of the major causes for highway accidents. These types of accidents occurred due to drowsy and driver cant able to control the vehicle, when he/she wakes. The drowsiness is identified by the eye blink closure and blinking frequency through infrared sensor worn by driver by means of spectacles frame. The alcohol consumption is also verified during the starting process of the vehicle using alcohol detector. If the driver is drunk then the buzzer indicates and the vehicle doesn't allow the driver to start the vehicle. If the driver is drowsy, then the system will give buzzer signal and the speed of the vehicle is reduced and the obstacle sensor will senses the adjacent vehicle to avoid collision with that, and if there is no vehicle in left adjacent side then the vehicle move to the left end of the road by auto steering and controlling and vehicle will be parked with prior indications.

Accidents due to drowsiness can be controlled and prevented with the help of eye blink sensor using IR rays. It consists of IR transmitter and an IR receiver. The

transmitter transmits IR rays into the eye. If the eye is shut, then the output is high. If the eye is open, then the output is low. This output is interfaced with an alarm inside and outside the vehicle. This module can be connected to the braking system of the vehicle and can be used to reduce the speed of the vehicle. The alarm inside the vehicle will go on for a period of time until the driver is back to his senses. If the driver is unable to take control of the vehicle after that stipulated amount of time, then the alarm outside the vehicle will go on to warn and tell others to help the driver.

**2. RELATED WORKS:**

A real time driving assistance is given by following approaches IR transmitter and receiver which is used to monitor the eye close and open in the eye blink sensor and give the output signal to the PIC controller to control the speed of the vehicle. And it sense the concentration of alcohol and send the output signal to the PIC controller and when the concentration of alcoholic is high the output will be high then the vehicle ignition is failed, Then the message is sent to the owner through GSM module. And the obstacles can be detected within 10cm using ultrasonic sensors. And by this the road accident due to drowsiness and drunk and drive can be avoided by this proposed system

**3. PROPOSED METHODOLOGY**

As we discussed in the previous sections this proposed system is implemented to give a real time driving assistance to avoid accidents in roadways. In this section it is discussed about the methodology of the proposed system

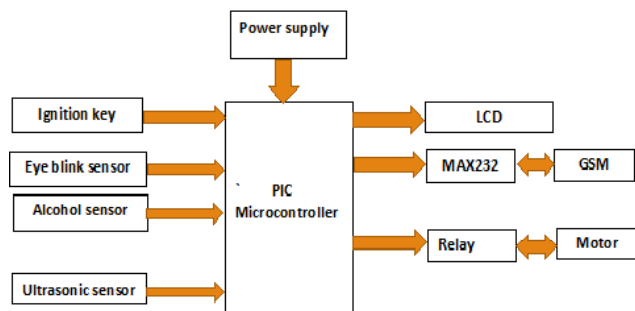


Figure 1: Block diagram of Proposed System

From the above block diagram we can understand the overall working of proposed system and each blocks are briefly explained in the following sections.

**A. Eye Blink Sensor:**

It is necessary in our working to find the blinking of eye, since it is used to drive the device and to operate events. So blink detection has to be done, for which we can avail readily available blink detectors in market (Catalog No. 9008 of Enable devices) or we can incorporate it with a special instruction written in image processing that, if there is no pupil found for the certain period of pre-determined i.e. time greater than the human eye blinking time then consider an event called “blink”, for which the set of operations will be followed. Here, in this case we need to set time as 1 second or above it, as “blink event” is

different from “normal eye blinking”. We need to perform testing for only blink event estimation, and not to find normal eye blinking.

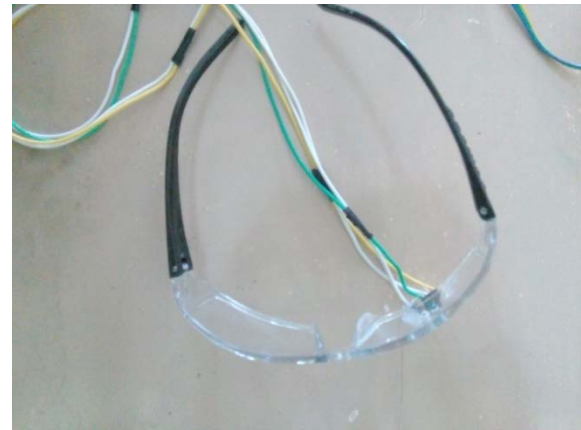


Figure 2: Module for Eye Blink Detection

**B. Distance Sensor**

The distance sensor module can sense if any vehicles are too close to the driver’s vehicle and alerts the driver so he can take action to change the direction of his vehicle. We can use around 10- 12 sensors distributed evenly on the front bumper. This is the method of Distributed sensing using an Array of Sensor. The output to the microcontroller will be the statistical mean of the output of all the Sensors. These sensors are connected to port 2 on 8051. If there is any intrusion detected by sensor, then the corresponding pin of port 2 goes high. Pin 2.7 of 8051 is made output pin. It can also be connected to the braking system to stop the vehicle. The sensors are evenly distributed on the left and right side. The sensors on the left are connected to port 0 and the sensors on the right side are connected to port 1. If at least one of the left sensors is activated, then the corresponding pin goes high, then output pin 0.2 is activated and if it is a right sensor which is activated, then pin 1.7 goes high.



Figure 3. Ultrasonic sensor

**C. RS-232**

The logic level devices that create the RS-232 signal work at 0 and +5V (in this case anyway). The MAX232 provides the interface, which involves a logic voltage inversion. It is two line drivers that convert logic level to +/-RS232 and two line receivers that receive +/-RS232 and convert then to logic level. Low cost systems sometimes dispense with these, as RS-232 usually works with 0V and +5V logic levels too, although this is not specified. I have to say that it doesn't always work, or it may only work at slower speeds on longer lines etc. It is still necessary to provide a logic level inversion with most devices, as they are designed to work with an inverting line driver. This could be a transistor or an unused gate device from a package. The MAX 232 is to connect a serial port device to a serial port which uses the RS-232 standard. The serial port device is usually a UART, but that is often incorporated into a microprocessor chip. It operates with Single 5-V Power Supply. The applicationsOf MAX-232 are Battery-Powered Systems, Terminals, Modems and Computers.

*D.SIM 900 GSM/GPRS Modem*

This is actual sim900 gym module which is manufactured by SIM com.designed for global market,sim900 is a quad-band GSM/GPRS engine that works on frequencies GSM 850mhz,egsm 900mhz,dcs 188mhz and pcs 1900mhz.sim900 features GPRS multi-slot class 10/class 8 and supports the GPRS coding schemes cs-1,cs-2,cs-3and cs-4.with a tiny configuration of 24mm,sim900 can meet almost all the space requirements in user's applications, such asm2m,smartphone,pda and other mobile devices.



Figure .4 GSM module

*E.IR Sensor*

Infrared transmitter is one type of LED which emits infrared rays generally called as IR Transmitter. Similarly IR Receiver is used to receive the IR rays transmitted by the IR transmitter. One important point is both IR transmitter and receiver should be placed straight line to each other. The transmitted signal is given to IR transmitter whenever the signal is high, the IR transmitter LED is conducting it passes the IR rays to the receiver. The IR receiver is connected with comparator. The comparator is constructed with LM 358 operational amplifier. In the comparator circuit the reference voltage is given to inverting input terminal. The non-inverting input terminal

is connected IR receiver. When interrupt the IR rays between the IR transmitter and receiver, the IR receiver is not conducting. So the comparator non inverting input terminal voltage is higher than inverting input. Now the comparator output is in the range of +5V. This voltage is given to microcontroller and led so led will glow. When IR transmitter passes the rays to receiver, the IR receiver is conducting due to that non inverting input voltage is lower than inverting input. Now the comparator output is GND. So the output is given to microcontroller. This circuit is mainly used to for counting eye blinks.

*F. PIC (16F877A)*

The microcontroller that has been used for this project is from PIC series. PIC microcontroller is the first RISC based microcontroller fabricated in CMOS (complementary metal oxide semiconductor) that uses separate bus for instruction and data allowing simultaneous access of program ad data memory. The main advantage of CMOS and RISC combination is low power consumption resulting in a very small chip size with aSmall pin count. The main advantage of CMOS is that it has immunity to noise than other fabrication techniques.

Various microcontrollers offer different kinds of memories. EEPROM, EPROM, FLASH etc. are some of the memories of which FLASH is the most recently developed. Technology that is used in pic16F877A is flash technology, so that data is retained even when the power is switched off. Easy Programming and Erasing are other features of PIC 16F877A.

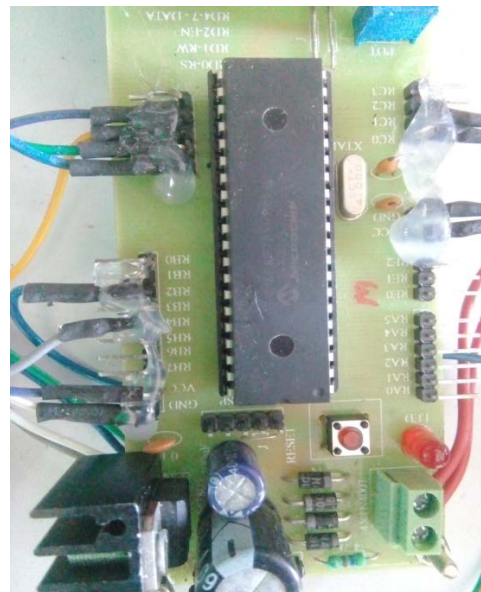


Figure 5. PIC Microcontroller.

*G.Voltage Levels*

It is helpful to understand what occurs to the voltage levels. When a MAX232 IC receives a TTL level to convert, it changes a TTL Logic 0 to between +3 and +15 V, and changes TTL Logic 1 to between -3 to -15 V, and vice versa for converting from RS-232 to TTL. This can be confusing when you realize that the RS-232 Data



Transmission voltages at a certain logic state are opposite from the RS-232 Control Line voltages at the same logic state.

4. RESULT AND DISCUSSION:

Figure 6. Drowsiness and alcohol Detection

A) Drowsiness Detection

In this proposed system the drowsiness is detected by Eye blink sensor through the IR transmitter and receiver. IR signal is transmitted to the eye and when the eye is closed the output is high and it is fed to the PIC microcontroller and the controller accept the signal and automatically slow down the vehicle by controlling the braking system of the vehicle and message will be delivered to the owner through GSM/GPRS modem.

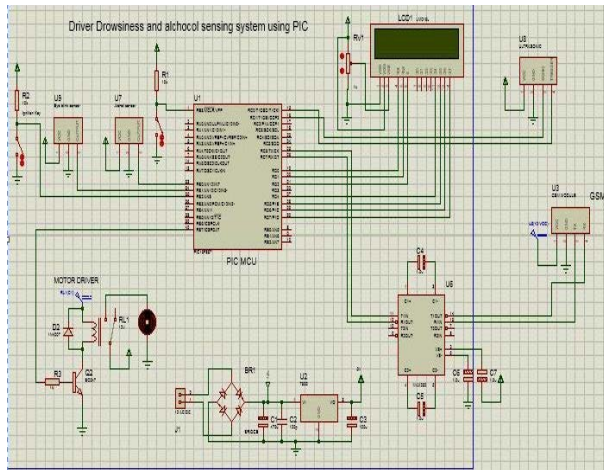


Figure 7. Circuit Diagram

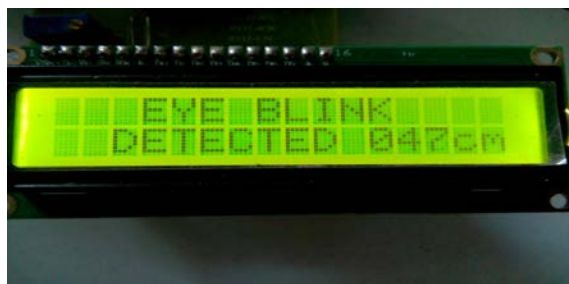


Figure 8. Eye Blink detection

B) Alcoholic Detection

The alcohol concentration is detected using Alcoholic sensor and when the concentration of the alcohol is high

then the output will be high automatically the signal is sent to the PIC microcontroller and the controller controls the ignition of the vehicle. Ignition will be failed.



Figure 9. Indication of drowsiness and Alcoholic Detection

5. CONCLUSION

Thus the project involves preventing accidents due to drowsiness and drunk and drive in vehicles by using eye blink sensor and alcoholic sensor. The IR transmitter transmits infrared rays into the eyes, the ray reflected from the eye is picked up by the receiver which is in a straight line to the transmitter. Depending on the output of receiver, we get to know whether the eye is in an open or closed position. If the eye is in a closed position, then the output is high. This output activates the corresponding pin in the PIC microcontroller and controls the speed of the vehicle. The alcohol concentration is sensed by the alcoholic sensor and when the concentration of the alcohol is high then the ignition of the vehicle is failed and this makes a real time driving assistance & control system.

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