Smart Accident Prevention System

Shivam Deshmukh[1], Prasad Fating[2], Himanshu Dhale[3], Shubham Jain[4], Prof.Patne.D.A[5]

[123&4] *Student, Department of Electronics Engineering,*
Shri Ramdeobaba College of Engineering & Management, Nagpur, Maharashtra, India.
Assistant Professor, Department of Electronics Engineering,
Shri Ramdeobaba College of Engineering & Management, Nagpur, Maharashtra, India

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Abstract: *Travelling is an important necessity for human life but has now turned to be a dangerous one because the road accidents are proportionally increasing with time. Nowadays, the number of accidents are increasing due to negligence of the driver. Negligence such as attending phone calls, lack of awareness, exhaustion due to prolong driving, etc. Road accidents are increasing rapidly nowadays. The most unfortunate thing is that we don't learn from our mistakes on road. Most of the road users are quite well aware of the general rules and safety measures while using roads but it is only the laxity on part of road users, which cause accidents and crashes. Moreover in the reported death cases, nearly two-thirds die due to intoxicated driving and late arrival of medical recovery. The main aim of this project is to construct a smart accident prevention system with minimizing the limitations of existing methods and also enhancing the security of vehicles and human beings and also reduces the number of accidents. Hence this system can be used for Real time tracking and Accident prevention.*

Key Words: **Accidents, Alcohol Sensor, Seat belt**

1. INTRODUCTION

Car accidents are considered as one of the most destructive phenomena. Though there are many different reasons behind car accidents, most accidents occur due to driver's unawareness and uncontrolled speed. Also, there seems to be a problem reaching the spot of accident in time for lack of awareness. As a solution, the advent of Smart Accident Prevention System technologies can reduce the number of accidents. In this project, a smart system is described that alerts and controls the speed of a vehicle, also notifies the individuals accordingly when an accident occurs. This system always monitors the distance between vehicles and obstacles that are in front, using ultrasonic sensor. It will alert the driver to control the speed and reduce the speed when a critical distance comes. The system is designed for prevention of the accident that occurs due to driver's unawareness, drunk driving, not wearing seat belt, etc. As the project monitors that the driver has worn seat belt and didn't take excessive amount of alcohol otherwise the car will not start and it will also monitor for safe overtaking.

2. LITERATURE SURVEY

1] Intelligent Transportation System for Accident
Prevention and Detection
(Dr.D.Selvathi, P.Pavithra, T.Preethi)

- In this paper the system is designed for two wheeler in which they have designed a smart helmet which will also check the alcohol limit so if driver wears helmet and his breath is not alcoholic then bike will start otherwise the ignition will be of this will be done by the use of relay
- So we took idea from this paper that we can implement this on a car so we are making system that consists of alcohol sensor and seatbelt sensor and a relay is also used there, so if driver is not drunk and seatbelt is fastened then only ignition will be ON, if these two conditions are not satisfied then due to relay ignition will be OFF.

2] Sensor Based Accident Prevention System
(Aravinda, Chaithralakshmi, Deeksha, Ashutha K)

- This paper tells about usage of Ultrasonic sensor in accident detection and accident prevention

3] Intelligent Accident Identification and Prevention System Using GPS and GSM Modem (Priyanka Berade, Kranti Patil, Pradnya Tawate, Prof.Ghewari.M.U)

- From this paper we got idea of Seatbelt and Alcohol sensor, how it can help in accident prevention system.

3. FLOW CHART

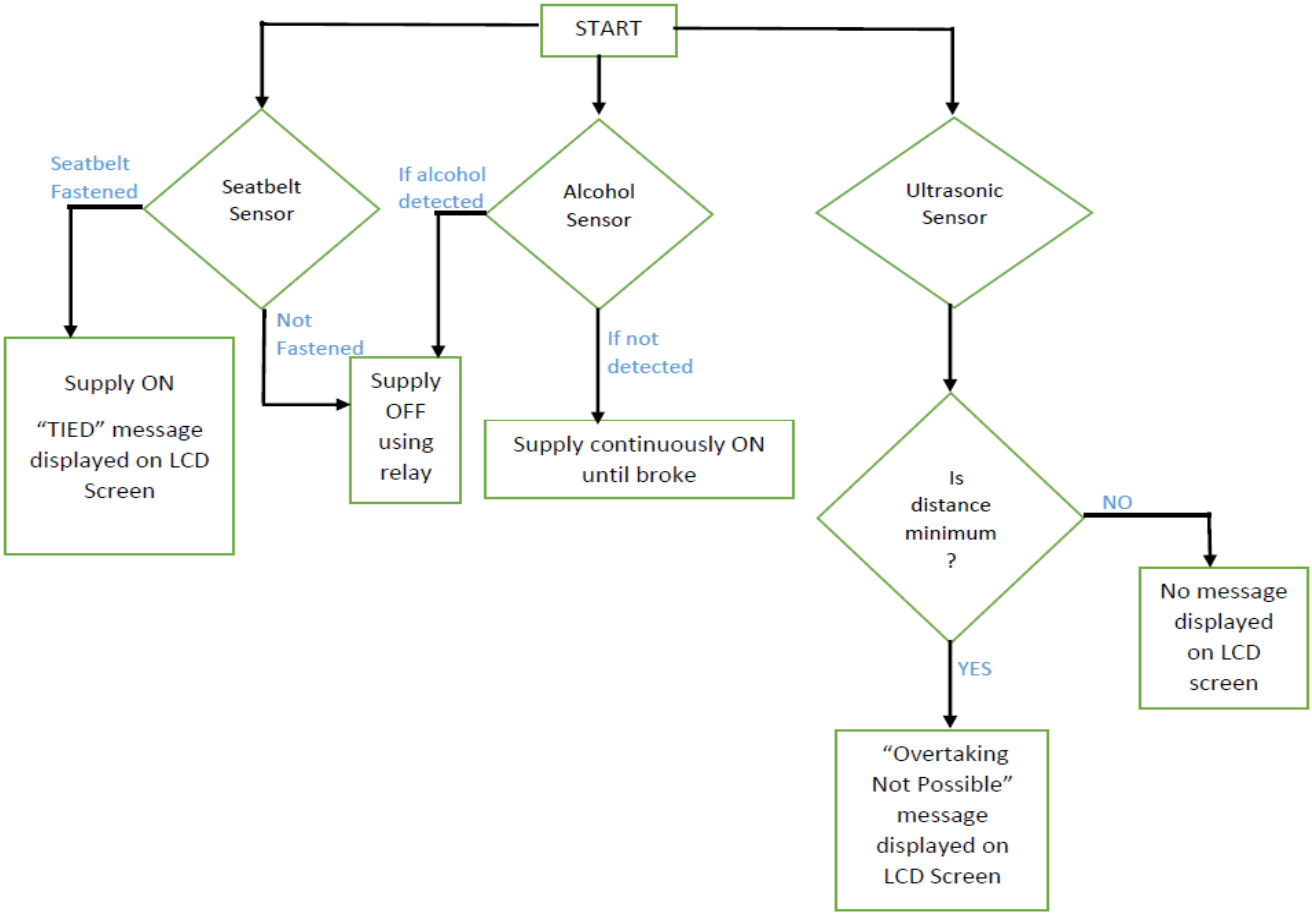

Fig: Flow Chart

4. BLOCK DIAGRAM

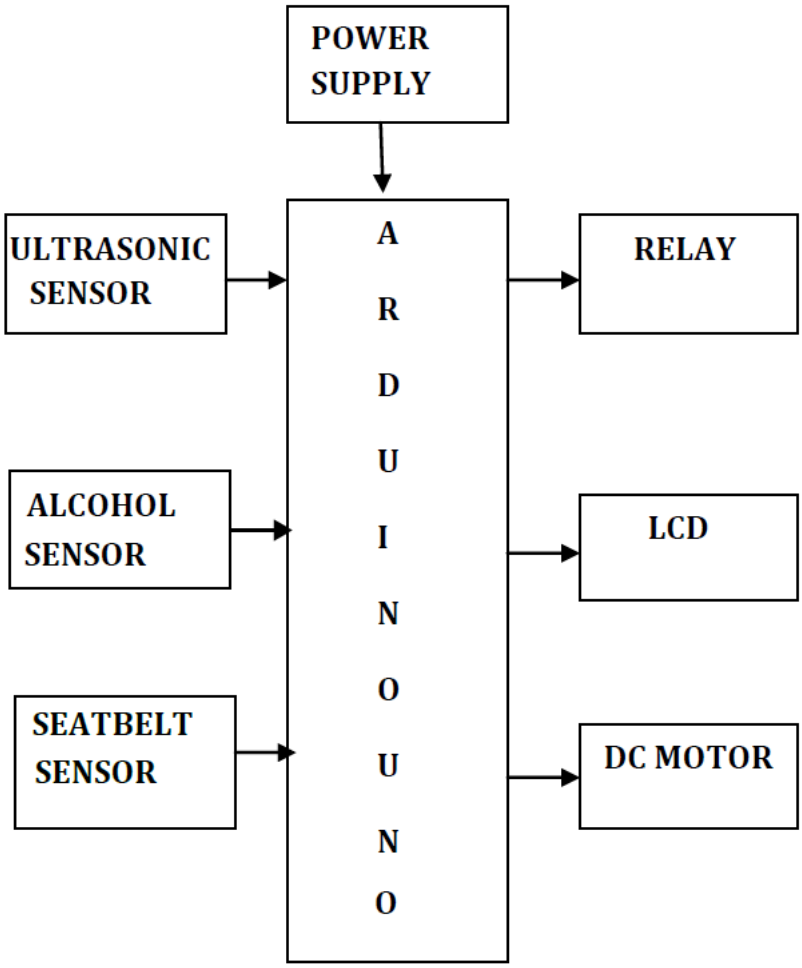

Fig: Block Diagram

4.1 BLOCK DIAGRAM DESCRIPTION

Block diagram is as shown above, it is accident prevention system. As power supply will get ON the system will also get ON simultaneously there are three sensors, alcohol sensor will check if the driver is drunk if yes then "Drunk" message will be displayed then the seatbelt sensor will ensure that seat belt is tied, if not message will be displayed on LCD screen as "Seatbelt Not Fastened", also we have used Ultrasonic sensor for safe overtaking if distance is greater than threshold value then overtaking will be possible and message will be displayed on LCD screen accordingly. We also have used relay here and for demonstration purpose we have used DC motor here so if driver is drunk or seatbelt is not fastened then using relay ignition will not start and if one of the sensors condition doesn't get satisfied when car is in motion then ignition will be turned OFF and car will stop slowly.

5. HARDWARE DESCRIPTION

5.1 ARDUINO UNO

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM

output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment). It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts

5.2 SEAT BELT SENSOR

Reed Switch is used as Seatbelt Sensor which ensures if seatbelt is fastened or not. This is for the driver's safety. It has switch inside as circuit gets completed result is obtained. The contacts are usually normally open, closing when a magnetic field is present, or they may be normally closed and open when a magnetic field is applied.

5.3 ALCOHOL SENSOR

Fig: Alcohol Sensor

It is a low cost semiconductor sensor which can detect the presence of alcohol gases at concentrations from 0.05 mg/L to 10 mg/L. The sensitive material used for this sensor is SnO2, whose conductivity is lower in clean air. Its conductivity increases as the concentration of alcohol gases increases. It has high sensitivity to alcohol and has a good resistance to disturbances due to smoke, vapor and gasoline. This module provides both digital and analog outputs. MQ3 alcohol sensor module can be easily interfaced with Microcontrollers, Arduino Boards, and Raspberry Pi etc.This alcohol sensor is suitable for detecting alcohol concentration on your breath, just like your common breathalyzer. It has a high sensitivity and fast response time. Sensor provides an analog resistive output based on alcohol concentration. The drive circuit is very simple, all it needs is one resistor. A simple interface could be a 0-3.3V ADC.

5.4 ULTRASONIC SENSOR (HC-SR04):

Fig: Ultrasonic Sensor (HC-SR04)

The HC-SR04 ultrasonic sensor uses sonar to determine distance to an object like bats do. It offers excellent noncontact range detection with high accuracy and stable readings in an easy-to-use package. From 2cm to 400 cm or 1" to 13 feet. Its operation is not affected by sunlight or black material like sharp rangefinders are (although acoustically soft materials like cloth can be difficult to detect). It comes complete with ultrasonic transmitter and receiver module.

5.5 ATMega328P MICROCONTROLLER

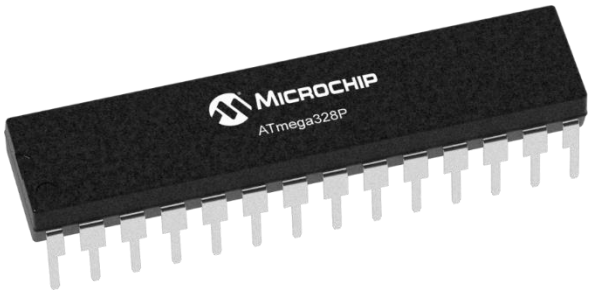

Fig: ATMega328P MICROCONTROLLER

ATMega328P Microcontroller. ATMEGA328P is high performance, low power controller from Microchip. ATMEGA328P is an 8-bit microcontroller based on AVR RISC architecture. It is the most popular of all AVR controllers as it is used in ARDUINO boards.

5.6 LCD Display

Fig: LCD Display

In this project 16*2 LCD is used to display message. It is basically used for displaying purpose. It will display message according to conditions.

5.7 RELAY

Relays are switches that open and close circuits electromechanically. Relays control one electrical circuit by opening and closing contacts in another circuit. As relay diagrams show, when a relay contact is normally open (NO), there is an open contact when the relay is not energized.

6. SOFTWARE DESCRIPITION

6.1 EAGLE

It is used to design PCB layout, because it is easy to use and learn so in this project we have used EAGLE.

6.2 ARDUINO IDE

The Arduino project provides the Arduino integrated development environment (IDE), which is a cross-platform application written in Java. It includes a code editor with features such as syntax highlighting, brace matching, and automatic indentation, and provides simple one-click mechanism for compiling and loading programs to an Arduino board. A program written with the IDE for Arduino is called a "sketch". The Arduino IDE supports the C and C++ programming languages using special rules of code organization.

7. RESULT

Fig: Testing of Seatbelt sensor

In this photo for demonstration purpose when we took a magnet near the reed switch or seatbelt sensor then the switch was closed and circuit was completed,
"Tied" message is displayed there.
In car when driver will fasten seatbelt same operation will happen and message will be displayed

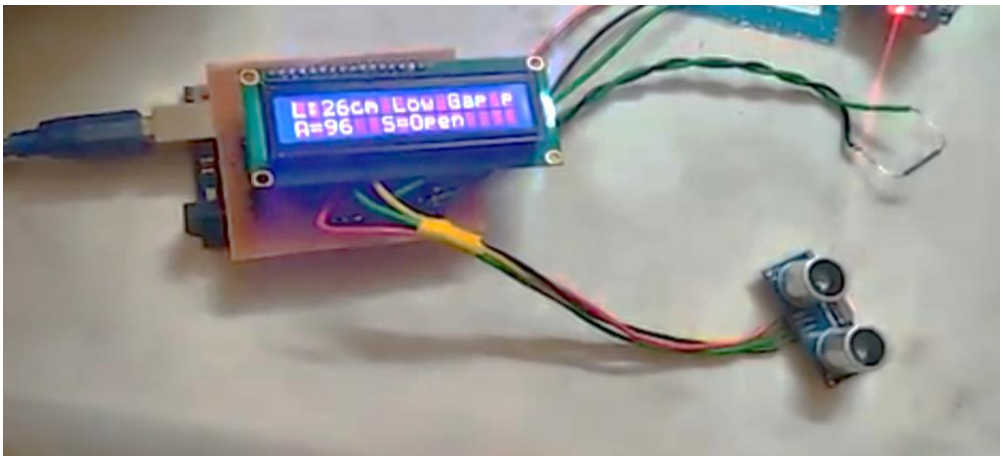

Fig: Testing of Ultrasonic Sensor

In above image we have demonstrated Ultrasonic sensor so when there was an obstacle, like here we tested with hand, so the length there is showing (L=26cm) means it is less than the threshold value that is set therefore the message was displayed as "Low Gap".

Fig: Testing of Ultrasonic Sensor

As we have seen in last figure that value of less than Threshold value then "Low Gap" message was displayed. Now in this case the value or distance is greater than threshold value so we overtaking is possible therefore message was displayed as "OK PASS".

Similarly, we have used Alcohol sensor which when person or driver will be drunk it will show the message as "Drunk" on LCD screen and also a relay is connected. We have connected a DC Motor for demonstration purpose.
So when the criteria or condition of all sensors will get fulfilled then only car will start if anyone of the condition doesn't, get fulfilled then Ignition will be OFF. The system will be continuously ON and it will continuously monitor the situation in case if one of the condition gets unsatisfied (except Ultrasonic Sensor) when car is in motion then relay will get triggered and Ignition will get OFF and car will stop slowly.

8. CONCLUSIONS:

As we know nowadays accidents are increasing more we see the number of accidents happening by various surveys and it raises question on safety of the car. So we have made a small effort to make a system which will ensure maximum safety and will prevent accidents happening on roads due to various reasons.

9. FUTURE SCOPE:

In future this intelligent system can be easily fabricated in a compact size model so that it can be globally used. It will be very helpful in safety means and accident index will decrease drastically. It will also play an important role for automobile industry.

10. ACKNOWLEDGEMENT

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