

# Four Wheel Accident Prevention and Alert System

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**Abstract -** The entire paper describes different methods to improve driver safety by drunken drive alert, driver sleepiness alert and high beam alert. The number of vehicles on the roads is growing day by day and it's now very important to integrate extra safety features into the vehicle. The paper mainly focuses on the intelligent systems and sensors that will become even more prevalent in the coming years. This will achieve through In-vehicle sensor systems that, will aware drivers from abnormal conditions. Developing driver assistance systems will help reduce accidents injuries, death and property harm. These systems help drivers make decisions and operate vehicles more effectively.

**Keywords -** Sensor, Microcontroller, High Beam Light.

## 1. Introduction

The aim of our project is to deduce the number of road accidents which causes the loss of precious human life and other valuable goods. There have been huge improvements in automobile technologies already. Because of these technologies, now we are enjoying the required reassurance and protection. India ranks fifth in the road accidents over the world. In our project we comprises of three main modules namely,

- 1) Alcohol detection system,
- 2) High beam light detection system,
- 3) Driver drowsiness detection system.

### 1.1 Alcohol Detection System

At present limitless alcohol consumption have increased so much and so is the deaths due to that. The main reason for driving after consuming alcohol is that the police are not able to check each and every car and even if they catch any one the police can be easily bribed. The alcohol sensor module is used to detect whether the driver has consumed alcohol at present. There are laws to punish and penalize the drunken drivers they cannot be fully utilized as police cannot stand on every road corner to check each and every car driver whether he/she is drunk or not. This leads to reckless accidents, so there is a need to develop a well-organized alcohol detection scheme.

### 1.2 High Beam Light Detection Systems

Many of the road accidents that take place during the night are caused by high beam lights of vehicles blinding

the driver coming from the opposite direction, which results in a accident. Accidental deaths continue in the city and state, the system are yet to act tough on the needless use of high beams by drivers at night. According to the data available with the Motor Vehicles Department, accidents due to high beams are much higher than those due to drunken driving or being without helmet. High beams provide considerably more light and are used to illuminate the vehicle's forward path when other vehicles are not. The proposed system contain a light detector enclosed in a glass tube so that only the straight light can incident on the LDR sensor surface and it can detect the high beam light. As soon as the high beam light incident on the detector, the speed of the vehicle can be manage to avoid the road accidents. It basically check the high intensity of light level on eye through LDR sensor.

### 1.3 Driver Drowsiness Detection System

Sleep is a neurobiological scenario. Drowsiness causes automobile crashes because it affects the act of driving cautiously and can eventually lead to the incapability to refuse to accept falling asleep at the wheel. Dangerous aspects of driving harm associated with tiredness are response time, care, concentration, and information dealing out. Normally when a driver feels drowsy then mechanically the head position goes downwards. Hence Head will drop down if driver feel sleepy or drowsiness. This tilted position of the head will detect by the tilt position detector and will inform the system by buzzer alarm signal so that driver will perform necessary action like washing face or have a cup of tea etc.

## 2. Types of Sensor Used

### 2.1 Alcohol Sensor

The Gas Sensor Module, fitted with an alcohol sensing element, allows for the electronic detection of C<sub>2</sub>H<sub>5</sub>OH concentration present in the drivers breath. The board provides a simple LOW/HIGH buzzer output, where HIGH indicates that the gas level has been reached or exceeded. This demo connects the sensor module to the Board of Education Shield and displays output in the Atmega16 LED screen. [4]

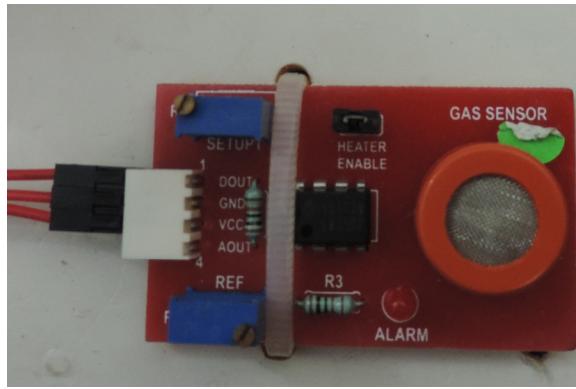


Fig 1. Alcohol Sensor Module

Alcohol detector elements routinely incorporate their own heating elements that must be activated before sensing can take place. The Gas Sensor Module provides us with a simple means to control the heater contained inside the alcohol detector element. The alcohol sensor we use has a sensing element, a base and a cap in its construction. The sensing element has a sensing material and a heater to heat up the sensing material[4].

## 2. 2. LDR Sensor

The all-purpose Light Dependent Resistor. The whole belief of an LDR is as follows. In a semiconductor , an energy gap exists between transmission electrons and valence electrons. As an LDR is also known as semiconductor photo-conductive transducer, when light is directly incident on it, a photon is engrossed and thereby it excites an electron from valence band into transmission band. Due to such new electrons coming up in conduction band area, the electrical conflict of the device decreases. Thus the LDR has the resistance which is the opposite function of radiation concentration. [5] When the light level is low the resistance of the LDR sensor is high. This stops current from flowing to the base of the transistors. Accordingly the LED does not light. However, when light shines onto the LDR its resistance falls and current flows into the base of the first transistor and then the second transistor. The predetermined resistor can be twisted up or down to increase or decrease resistance, in this way it can make the circuit more or less responsive.[1]

## 2.3 Tilt Position Detection Sensor

The tilt sensor is a constituent that can detect the tilting of any object given. However it is only equivalent to a push button activated through a different physical mechanism. This type of sensor is the eco-friendly version of a mercury-switch. It contains a metallic ball inside it which will connect the two wires of the device from on to off and vice versa. If the sensor reaches a certain angle of tilting, then the switch is on. Tilt sensors play an important role in various applications. In our

project a tilt position sensor is attached with a buzzer and a battery power supply. [2]

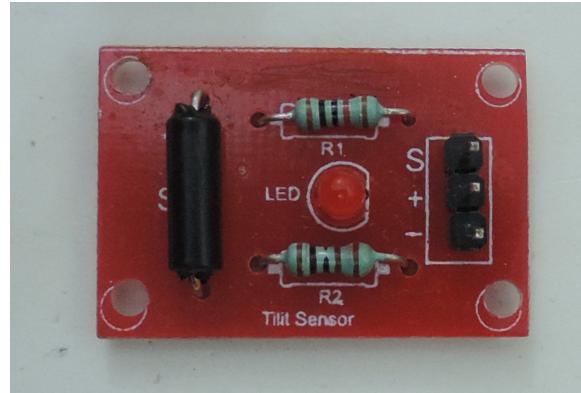


Fig 2 . Tilt sensor

## 3. Project Modules

Three different modules makes overall project mainly,

- 1) Drunken Driver Detection Module
- 2) High Beam Light Detection Module
- 3) Driver Drowsiness Detection Module

### 3.1 Drunken Driver Detection Module

The vehicle's steering wheel is incorporated with an alcohol sensor module which is connected to the Atmega16 microcontroller circuit. In order to drive the vehicle, driver needs to confirm whether he/she consume alcohol or not by breathing nearer to the alcohol sensor module. Alcohol sensor also called breathalyzer will identify the presence of alcohol in the driver's breath, if it is found positive then the vehicle will not move at all. [4]

### 3.2 High Beam Light Detection Module

Many of the accidents happen in the night due to heavy light falling on drivers face directly from the vehicle approaching from the front. The heavy light detection module detects the light as soon as the high beam light incident on the detector, the speed of the vehicle can be controlled to prevent the road accidents. It simply checks the high intensity of light level on eye through LDR sensor.

### 3.3 Driver Drowsiness Detection Module

While actually giving in to our body's natural wants such as sleep, we're keeping the balance beam in an upright and neutral position. The Driver Drowsiness Detection Module is very useful for people doing all night drives. The newest high tech way to stay awake is a good purchase for you whether you ever have to drive back home after an exhausting day at work or just need to get something done and sleep is not an option. This Driver Drowsiness Detection Module will keep you at full alert

and is always ready to help if your head dozes off. The circuit consists of Tilt sensor, a small electronic buzzer, a LED, a resistor and a power supply.

## 4. Methodology

Our system works with three modules. The first amongst the three is 'Drunken Driver Detection System', in this module we are providing with an alcohol sensor which has the in-built chemistry of alcohol. There are three major types of breath alcohol testing devices, and they're based on different principles:

### 4.1 The Alcohol Sensor Contains

A system to take the sample the breath of the driver. Two glass tubes containing the chemical reaction mixture. A system of photocells connected to a meter to measure the color change in association with the chemical reaction. To measure the alcohol, a suspected driver breathes into the device. The breath sample is bubbled in one tube through a mixture of sulfuric acid, potassium dichromate, silver nitrate and water. The principle of the measurement is given below.

- 1) The sulphuric acid removes the alcohol from the air into a liquid.
- 2) The liquefied alcohol then reacts with potassium dichromate to produce chromium sulfate potassium sulfate acetic acid water.

The silver nitrate in the alcohol is a substance that makes a reaction go faster without actual taking part in the reaction.

The sulfuric acid, in addition to this removes the alcohol from the air, also provide the acidic condition needed for this reaction to take place effectively.

During this reaction, the reddish dichromate ion changes color to the green chromium ion when it reacts with the alcohol; the degree of the color change is directly related to the level of alcohol in the expelled air.

To determine the amount of alcohol in that air, the reacted mixture is compared to a vial of unreacted mixture in the photocell system, which produces an electric current that causes the buzzer to go off and buzz till the driver is shifted out of the car. The setting off of the buzzer depends upon the level of alcohol in the driver's breath. If that exceeds above the level defined in device the buzzer will buzz. This system will not allow the driver to start the ignition of the vehicle which will prevent the possibility of any accident. This way we can alert the other passengers sitting in the car and also the driver about his alcohol consumption and will prevent them for committing a crime. This is an effective way to

make people understand their moral duties towards society.

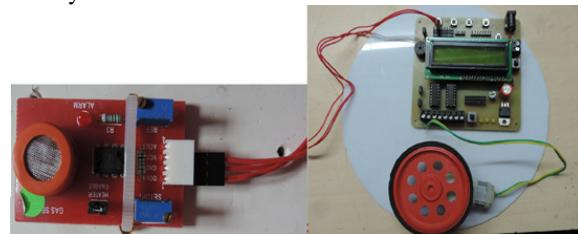


Fig3. Drunk and Drive Detection System

The next module, that is the high beam light detection system of our project mainly focuses on the high intensity light falling on drivers face while driving in the night. The intensity of light above 500 affects the vision of the normal human being. Hence in the programming of our proposed system we have set the light intensity falling on the sensor up to 500. When the light intensity reaches above 500, the sensor attached to the speed controller will immediately stop the vehicle and prevent the head on crash. The sensitivity of a photo resistor varies with the light wavelength. If the wavelength is outside a certain range, it will not affect the resistance of the device at all. It can be said that the LDR is not sensitive in that light wavelength range. Different materials have different unique spectral response curves of wavelength versus sensitivity. Extrinsic light dependent resistors are generally designed for longer wavelengths of light, with a tendency towards the infrared (IR). When working in the IR range, care must be taken to avoid heat buildup, which could affect measurements by changing the resistance of the device due to thermal effects.

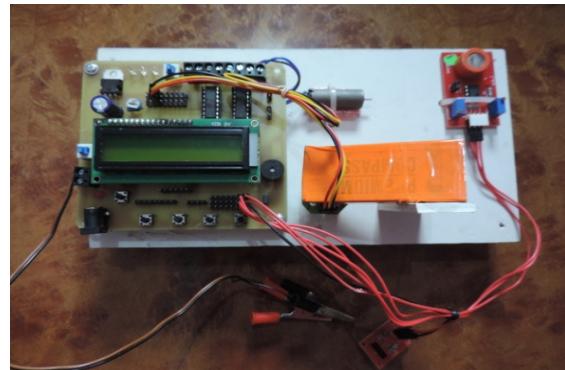


Fig 4.Driver Safety Alert System

The basic tilt sensor we are using acts very much like a push button does. The main difference is that you push the push button and with the tilt sensor, you tilt it! The picture below shows the two possible states of the tilt sensor. The tilt sensor we have implanted in our system works similar to our switches in day to day life. There's

a conductive ball inside of the tilt sensor and when not tilted, it connects the two wires of the tilt sensor.

However, when we tilt the sensor, the connection between the ball and wires is broken similar to the situation when you stop pushing on a push button. We

are using this button-just like 'on/off' capability in our project.

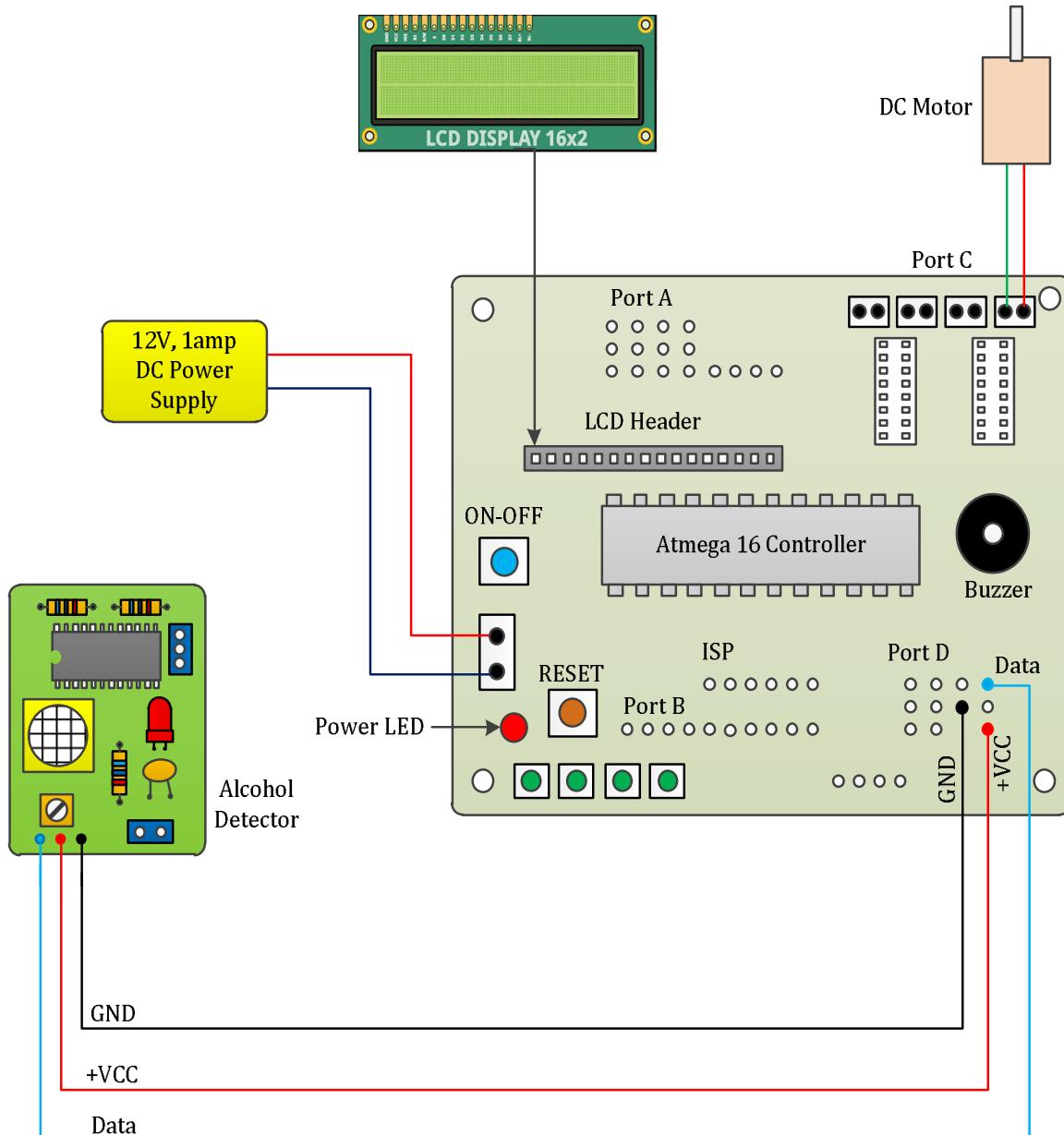


Fig.5 Interfacing diagram of System

## 5. Conclusion

There are many planned working system on the driver safety. Here we are giving certain names and their own work concerning uncovering and avoidance of urgent situation:

**Mercedes-Benz: Attention Assist** In 2009, Mercedes-Benz unveiled a system called notice Assist which

monitors the driver's exhaustion level and sleepiness based on his/her driving inputs. It issues a visual and capable of being heard alarm to alert the driver if he or she is too drowsy to continue driving safely.

**Driver Alert Control:** The system monitors the car's actions and assesses whether the vehicle is being driven in a controlled or uncontrolled way. If the system detects a high risk of the driver being drowsy, the driver is alerted via an buzzer signal. Also, a text message

appears in the car's information display, alerting him or her with a coffee cup symbol to take a break. The starting-point is five bars. The less consistent the driving, the fewer bars remain. Mercedes-Benz accident researchers caution against lessening asleep briefly whilst driving. Drivers who do not take regular breaks when driving long distances run a high risk of becoming drowsy. This is why Mercedes-Benz has developed the innovative ATTENTION ASSIST system, which can notice when drivers start to become snoozing and punctual them to take a break before it's too late. Scientific studies end that around 25 percent of all ruthless motorway accidents are down to driver sleepiness, meaning that sleepiness causes more road accidents than drink-driving.

The danger of falling asleep for a moment is at its maximum on long-distance journeys in the dark or in static conditions because this is when drivers are most likely to undergo a fall in concentration. The pure dullness further heightens the risk of falling asleep at the wheel. Studies show that, after just four hours of non-stop driving, drivers' reaction times can be up to 50 percent slower. So the risk of an accident doubles during this time.

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