

# Sensor Based Accident Prevention System in Curving

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## ABSTRACT

*In developing country accident is main cause of death. The intensity of deaths are more in curved roads i.e mainly in U-Turn, Hairpin bend roads and mountain narrow roads. In this case the driver can't see the vehicle coming from the other side. Because of which thousands are losing their lives in accident. The solution for this problem is alerting the driver about the vehicle coming from the other side. This is done by keeping the ultrasonic sensor on one side of the road before the curve and keeping LED light after the curve, so that vehicle coming from the one side of the road is sensed by the ultrasonic sensor and LED light glows at opposite side. By looking at the LED light driver become alert and slow down the speed of vehicle.*

**Key Words:** Curved roads, Mountain road, Hilly roads, Accident prevention, Ultrasonic sensor, AurdinoUNO, Alerting driver.

## 1. INTRODUCTION

Today, road traffic injuries are one of the leading causes of death, disabilities and hospitalization in the country. Road network in India, of about 56 lakh km in March 2016, is one of the largest in the world. A total of 4,64,910 road accidents have been reported by States and Union Territories (UTs) in the calendar year 2017 claiming 1,47,913 lives and causing injuries to 4,70,975 persons. These figures translate, on an average, into 1274 accidents and 405 deaths every day or 53 accidents and 17 deaths every hour in the country.

There are many dangerous roads in the world like mountain roads, narrow curve roads, T roads. The problem in these curve roads is drivers can't able to see the vehicle or obstacles coming from other end of the curve. If the vehicle is in very speed then it is difficult to control and there are chances of falling to cliff. The solution for this problem is alerting the driver about the obstacle or vehicle. Usually horn is used for this purpose but it is not a valid. To avoid these problems in curve roads or T roads we are introducing sensor based accident prevention system. That is we are keeping ultrasonic sensor in one side of the road before the curve and keeping a LED light after the curve.



Fig 1: Drivers cannot see the vehicles on the side

## 2. LITERATURE SURVEY

**Aravinda B, Chaithralakshmi C, Deeksha, Ashutha K** <sup>[1]</sup> from their report, it is concluded Accident prevention in U-turn, S-turn, hilly Ghats and mountain roads using modern sensor technology, Which uses Aurdino UNO, Ultrasonic sensor, RF module LED etc.

It is the one having possibilities to reduce the accidents in U-turn, S-turn, hilly Ghats and mountain roads as the system is outside the vehicle. Moreover this technology covers all kind of vehicles New version and Old version cars.

**R.Saranya, R.Arun Kumar** <sup>[2]</sup> we come to know that, Accidents may takes place in various factors drunk and driving, Texting while driving, Speeding, Distractions, Sleeping while driving. Among Drowsiness is reason for most of the accidents. While driving at the speed of 100km/hr. driver falls sleepy within 4 seconds the buzzer will enables.

But its Drawback is this technology is not there in all vehicles Ex: Old version vehicles, so which is not effective in reducing accidents. Even face detection is not accurate and is comlex task.

**Ranga Sreedhar Galla** <sup>[3]</sup> has studied the basic aim of their paper is to reduce accidents on hilly and slippery roads. In curve roads the other road end of vehicle cannot seen by driver. At night time accidents may happens by intensity of head light from opposite side of vehicles. Also, the light intensity problem occurs both curved roads and mountain roads; Thousands of people lose their lives. The solution for this problem is alerting the driver about the vehicle coming from opposite side. This is done by keeping an ultrasonic sensor in one side of the road before the curve and keeping a LED light after the curve, so that if vehicle comes from one end of the curve sensor senses and LED light glows at the opposite side.

**Kartik Venkata Mutya, Sandeep Rudra** <sup>[4]</sup> has studied that road traffic accidents are being recognized as a major public health problem in numerous countries with alarmingly increasing fatalities in developing countries. Careless driving as a result of excessive waiting and blind corners is attributed as one of the most important factor for all road accidents. An estimated 1.2 million people lose their lives in road traffic crashes every year, and another 20 to 50 million are injured. A docile, economical mechanism to prevent these road accidents is the need of the hour. It is hoped that the mechanism presented in this article would help in alleviating this concern especially in correspondence with large vehicle accidents on highways by being easily implemented in low and middle income countries.

**R. Meena, R.Lavanya and K.Suresh Kumar** <sup>[5]</sup> by this paper got that Accidents are commonly occurring in hilly regions. They are caused because of curve roads and speed breakers placed in mountain roads. Many mountain climbing roads are having tight curves. The vehicles from opposite side cannot be visible to the driver. Millions of peoples are losing their life because of the accidents. And by arising these situations an idea is proposed to avoid those types of accidents by implementing the crash sensing and warning system. It will sense the vehicle from the opposite side detect the vehicles and gives the warning alarm. Here voice command starting the condition of the tyre is used, if air pressure is decreased. Visible mirror of the vehicles observe the high intensity of opposite vehicles that will automatically reduce intensity of light in our vehicle by using dim and dip sensor.

## 3. SYSTEM REQUIREMENTS

The design of this system mainly consists of two parts; they are hardware design and software design. Hardware design consists of sensors like ultrasonic sensor, a microcontroller and LED. Ultrasonic sensor uses +5V DC supply. Its range is from 2 cm to 100 cm. Microcontroller Software design is done for sensing the vehicle or obstacle and to operate the LED by using Arduino 1.0.5 IDE tool which is open source software. Programming can be done by using embedded C or C++. Operating system that we used is windows 8. The LED light here we used is of green color and uses maximum +5V DC supply.

### 3.1 Hardware

#### Arduino

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller, simply connect it to a computer with a USB cable or power it with an AC to-DC adapter or battery to get started. The power for Arduino can be derived from Non-conventional sources like solar energy.

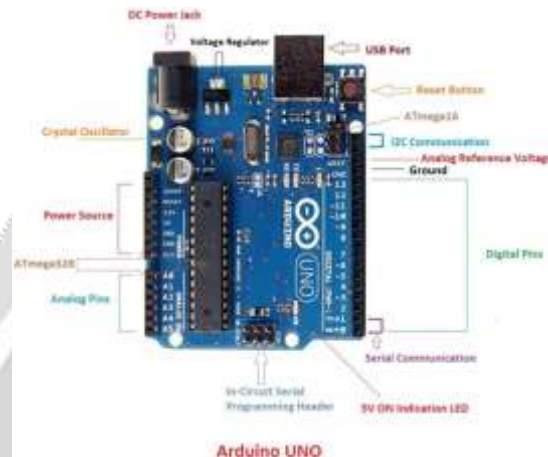


Fig 2: Arduino UNO

#### Ultrasonic sensors

Ultrasonic sensors are “based on the measurement of the properties of acoustic waves with frequencies above the human audible range” often at roughly 40 kHz. They typically operate by generating a high-frequency pulse of sound, and then receiving and evaluating the properties of the echo pulse.

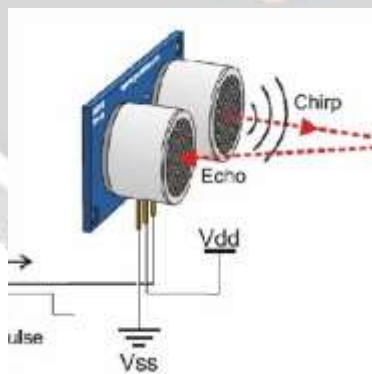


Fig 3: Working of an Ultrasonic sensor

In the presence of vehicle the sensor senses the vehicle; the light will glow at the other end of the curve. In the absence of the vehicle the sensor will not sense and the light will not glow. This process repeats continuously.

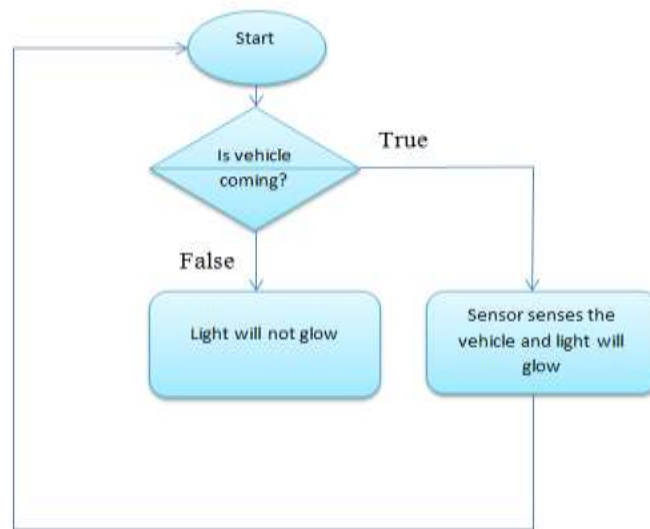


Fig 4: flow chart for working principle of sensor

### Hardware Interface

We have used Microcontroller (Arduino UNO), LED light and ultrasonic sensor as shown in fig. 4. The sending and receiving function of ultrasonic sensor is almost same as that of bat.

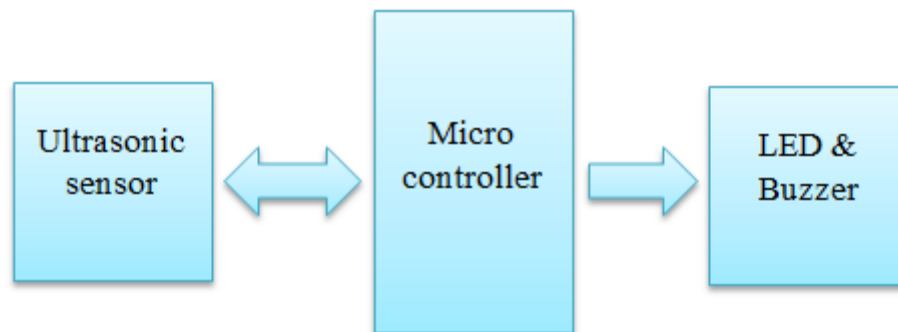


Fig 5: Block Diagram of connection of components

### 3.2 Software Design

The arduino integrated development environment (IDE) is a cross-platform application (for windows, macos, linux) that is written in the programming language java. It is used to write and upload programs to arduino board.

The source code for the ide is released under the gnu general public license, version 2. The arduino ide supports the languages C and C++ using special rules of code structuring. The arduino ide supplies a software library from the wiring project, which provides many common input and output procedures.

#### 4. WORKING

Ultrasonic sensor has 4 pins. They are +5V VCC, GND, Trig pin and Echo pin. Here Trigger pin is output pin and Echo pin is input pin. Ultrasonic sensor sends the signal in the form of pulses from trigger pin. When this signal hit the object it will get reflected back and is received by the echo pin. From echo the signal is sent to microcontroller Arduino UNO. Microcontroller Arduino UNO processes this data and operates the LED which is connected to output pin of the microcontroller Arduino UNO. LED is operated according to the command.

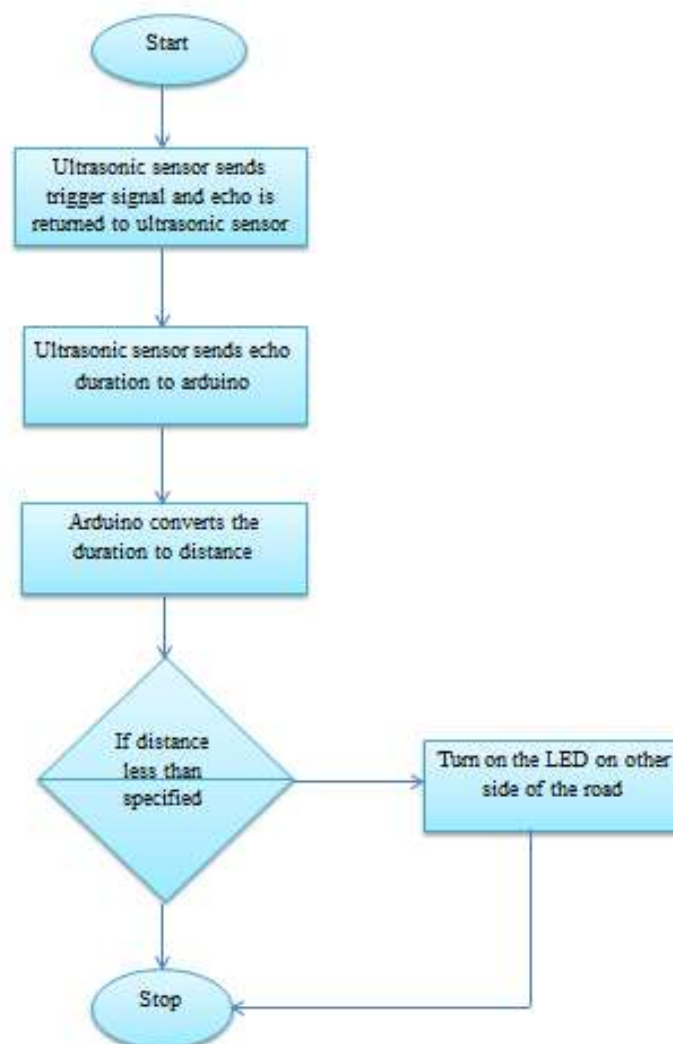


Fig 6: Flow chart of the working of system



## 5. EXPEIMENTATION AND RESULTS

It involves the physical setup of the model. Those are two ultrasonic sensors kept at a particular distance. The two sensors are used because the intention to show that vehicle is at safe distance means far from the curve but which ensures the vehicle is coming, this can be done by glowing the green LED light and when the vehicle approaches very near the curve then it will glow red LED light, by this one can alert at the other side .Which helps to avoid the accident.



Fig 7: Vehicle passing through the road

In programing we devided the entire program into three parts first part is from 0 to 130 cm for pedestrians, in second part from 130 to 270cm is to detect the vehicle and in third part of the program above 270cm is vehicle is not in range. The experimented programs results are shown in next page.

Step 1: In this the obstacle is detected by the sensor but not used for alerting the driver at other side. The range is from 0 to 130cm. In program it will write “pedestrian” as shown in below figure.

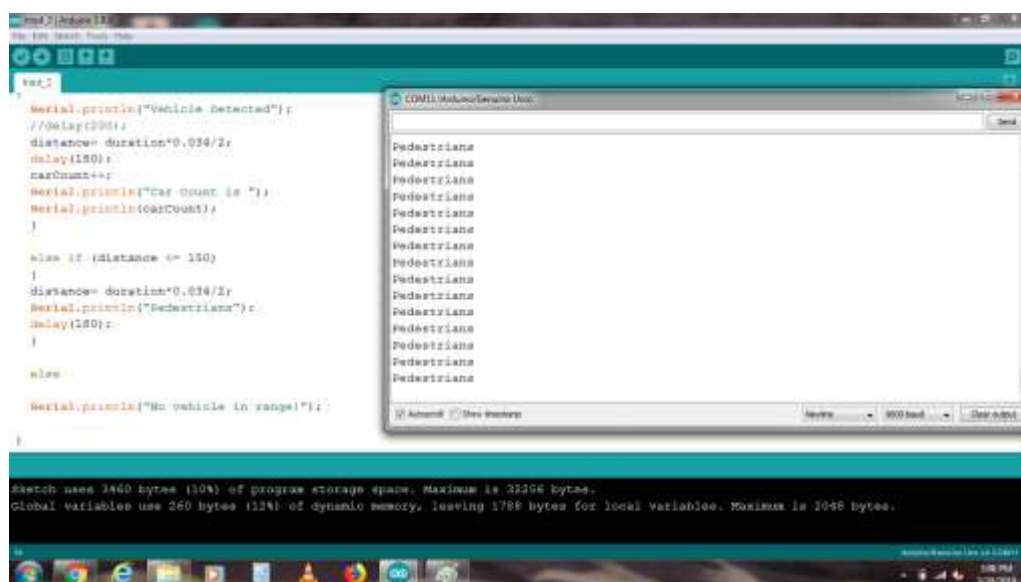


Fig 8: showing “Pedestrian”

Step 2: In this the obstacle is detected by the sensor this signals are will processed in Arduino and used to alert the driver at other side by glowing the LED light. When two sensors are detects the object at a time in the range of 130 to 400cm. Then only it writes in program that “vehicle detected”.

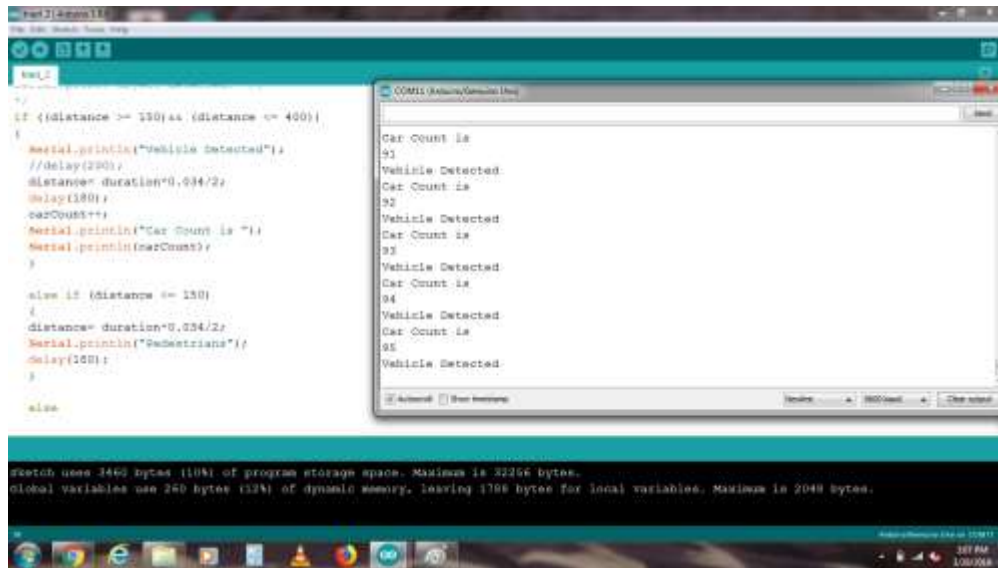


Fig 9: Showing “vehicle detected”

Step 3: Its range is more than 400cm, above 400cm if any object is detected then there is no indication on other side of the road. In programing it writes “no vehicle in range”.

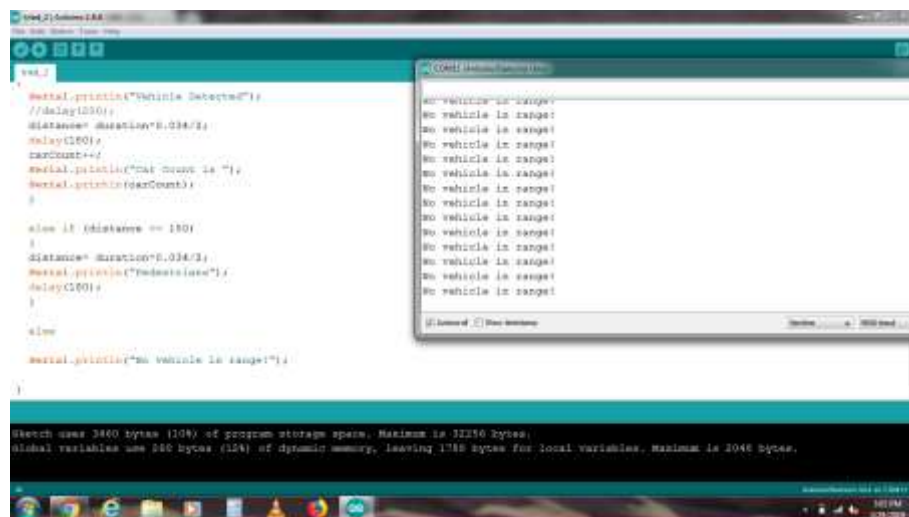


Fig 10: Showing “vehicle not in range”

## 6. ADVANTAGES

1. Avoid accidents in curve roads mountains roads and hill roads.
2. Saves thousands of lives.

3. Easily implementable to the existing roads.
4. Fully automated (No person is required to operate).
5. Installation cost is very less.

## 7. CONCLUSION

The purpose of this paper is to decrease the number of accidents in curve roads. This is done by alerting the driver by means of LED light which glows when vehicle comes from the other side of the curve. The vehicle is detected by the help of Ultrasonic sensor which is interfaced to the microcontroller arduino UNO. By this we can save thousands of lives in the curve roads.

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