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Sensor Based Accident Prevention System

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Abstract: In the developing countries accident is the major cause of death. If we gaze at the top 10 dangerous roads in the world we can see that all of them are mountain roads and curve roads. In the mountain roads there will be tight curves and the roads will be narrow. In these kinds of situations the driver of a vehicle cannot see vehicles coming from opposite side. Thousands of people lose their lives each year because of this problem. Since we are talking about mountain roads here other side might be lead to a cliff. 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. By looking at the LED light on/off criteria driver can become alert and can slow down the speed of the vehicle.

Keywords: Curve roads, accident prevention, sensor, mountain road, hill roads, ultrasonic sensor, alerting the driver.

I. INTRODUCTION

There are many dangerous roads in the world like mountain roads, narrow curve roads, T roads. In these some mountain roads will be very narrow and they contain so many curves. For example Kinnaur road in Himachal Pradesh, Zoji La Pass in the Himalayas, the Road of Death Bolivia, Fairy Meadows Road (Pakistan) [1]. If the road is in remote areas sometimes there will be the chances of animals on the road and that is also dangerous if the driver couldn't see them. For example Pitt Enterprises Ltd. v. Farkes, 2005 BCCA 511 the defendant collided with a moose standing in his lane and that caused his vehicle to move into the oncoming lane and strike the plaintiff's vehicle [2].

In some of the curve roads, the other end of the curve road cannot be seen by the driver because of the obstacles like trees or rocks etc present in the middle. In these type of roads thousands of people die because careless or presence of unexpected obstacles. According to Million Death Study (MDS) about 2.3 million people die in India per year. In that 137 thousand is because of road accidents. That is about 377 people per day. In that 3.7% because of failed to look the road [3]. 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 in the rainy seasons horn will not be heard. Some people will not use horn itself. So horn is not a good solution to solve this problem. These are the major reasons for accidents [4]. 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 [5].

Ultrasonic sensor which is also called as obstacle sensor sends signal as pulse from trigger. If vehicle is present signal will hit the vehicle and it is received by the sensor. At that time light will glow at the other side of the curve. In the absence of the vehicle the signal will not be received by the sensor and the light will not glow. As soon as the light glows driver can slow down his vehicle and he could even stop it if it's necessary [6]. This sensor based light system can be applicable when the driver cannot see the vehicle coming from other end of the road. Using this idea we can make all the mountain roads and curve roads safer from accidents and can save thousands of lives.

Fig1. Accident due to animals on the road

II. SYSTEM DESIGN

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 colour and uses maximum +5V DC supply.

A. Hardware Design

We have used Microcontroller (Arduino UNO), LED light and ultrasonic sensor as shown in fig. 2. The sending and

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receiving function of ultrasonic sensor is almost same as that of bat [7].

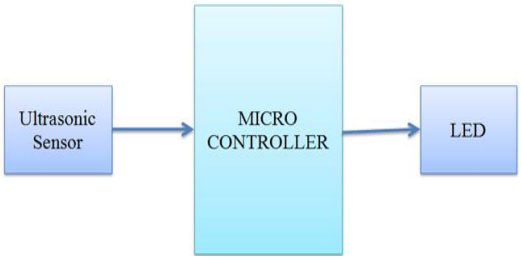

Fig. 2. Block Diagram of connection of components

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 i.e. LED will glow if the signal is reflected back. In the absence of the object the signal will not reflect back. Hence the LED will not glow. The simple block diagram is shown in the figure 2. The trig pin of ultrasonic sensor is connected to the digital pin 9 of microcontroller arduino UNO and echo pin is connected to digital pin 6. VCC is connected to +5V and GND is connected to GND of microcontroller arduino UNO. LED is connected to pin number 12 of microcontroller arduino UNO.

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.

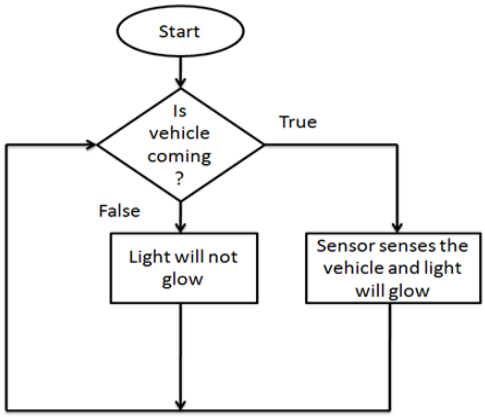

Fig. 3. Flowchart for working principle of sensor based accident prevention system.

We have used fritzing app for simulation and designing purpose of the circuit. Figure 4 shows the circuit design, and figure 5 shows the schematic diagram. Fritzing is open source software developed by University Of Applied Sciences Of Potsdam. Using this software we can obtain Circuit sketch, schematic diagram and PCB design. This software can also use for writing code for various arduino boards.

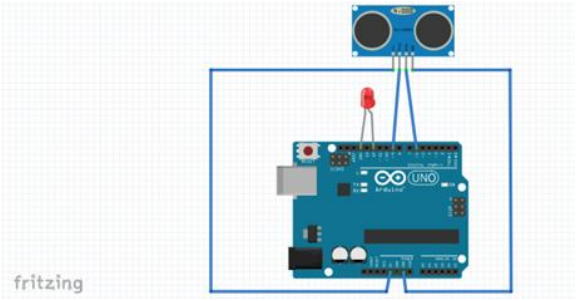

Fig 4 Circuit Design of components sensor based accident prevention system.

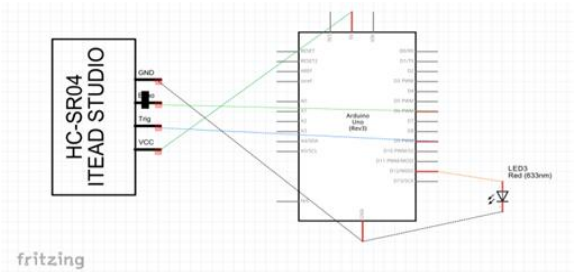

Fig5 Schematic diagram sensor based accident prevention system.

B. Software Design

Fig. 6 shows the flowchart of software design of microcontroller which is programmed by using Arduino 1.0.5 IDE tool which is open source software. Programming can be done by using embedded C. Operating system that we used is windows 8. As shown in the flowchart first initialize the trigger (9) and echo (6) pin to input and LED (12) pin to the output. Then send pulse through trigger and then receive it through echo. Convert the received value into distance. If the distance is in range, time delay is set to 300 else no actions are taken and the process is continued. Next check if time delay is zero if it satisfies the condition then turnoff LED if it does not satisfy the condition then turn on LED and decrease the value of time delay by one.

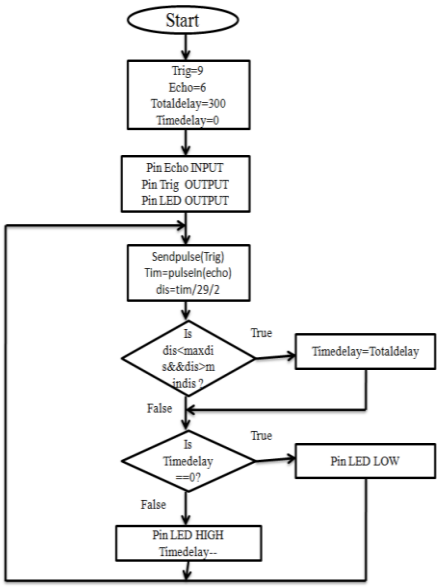

Fig. 6. Flow chart for software design of sensor based accident prevention system.

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III. EXPERIMENTATION AND RESULTS

STEP 1: Coding for micro controller arduino UNO which consists of set of commands to process the data from sensor and to operate the LED as shown in fig. 7.

```
File Edit Sketch Tools Help
micro
const int trig=9;
const int echo=6;
const int LED=12;
const int maxdis=15;
const int mindis=5;
int dis,tim,timedelay=0,totaldelay=27;
void setup()
{
  pinMode(trig,OUTPUT);
  pinMode(echo,INPUT);
  pinMode(LED,OUTPUT);
  Serial.begin(9600);
}

void loop()
{
  digitalWrite(trig,LOW);
  delayMicroseconds(2);
  digitalWrite(trig,HIGH);
  delayMicroseconds(10);
  digitalWrite(trig,LOW);
  tim=pulseIn(echo,HIGH);
  dis=tim/29/2;
  Serial.print(dis);
  Serial.println();
  if(dis<maxdis&&dis>mindis)
  {
    timedelay=totaldelay;
  }
```

Fig. 7. Program for micro controller arduino UNO of sensor based accident prevention.

STEP 2: Circuit connection having sensor and microcontroller arduino UNO where the sensor senses the obstacle and the microcontroller arduino UNO processes and operates LED as per the commands as shown in fig.8.

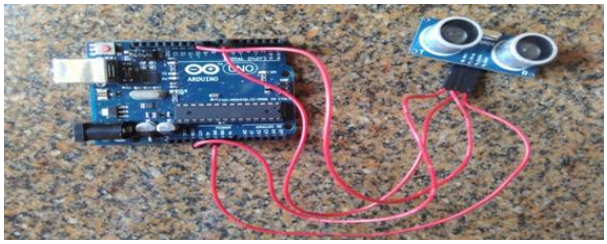

Fig. 8. Circuit connections for sensor based accident prevention system.

STEP 3: Analysing, debugging and running the program. The program is uploaded to microcontroller arduino UNO. Sensor sends the signal and senses the object and gives the signal information to microcontroller arduino UNO. Microcontroller arduino UNO is powered by using laptop. It possesses and the output is shown in the serial monitor. Here the output is distance as shown in fig. 9.

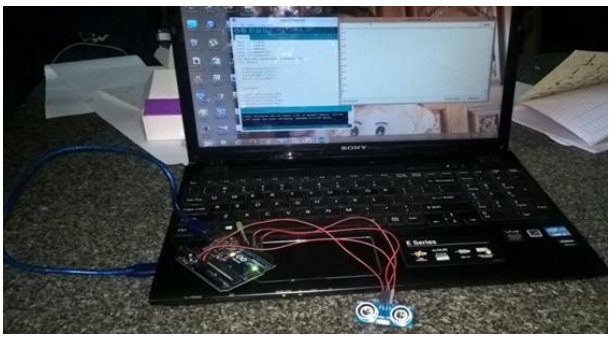

Fig. 9: Analyzing the output of sensor based accident prevention system.

STEP 4: Fixing the circuit to the model i.e. fixing microcontroller arduino UNO, ultrasonic sensor and LED light to the model of curve road as shown in fig.10.

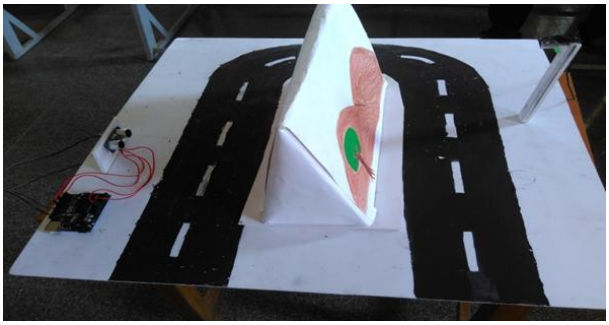

Fig. 10. Circuit fixed to the model of sensor based accident prevention system.

STEP 5: Detection of vehicle by the sensor when vehicle passes through the road. It is the experimental demonstration for this paper. The signal sent by the sensor hits the vehicle and reflected back to the sensor as shown in fig. 11.

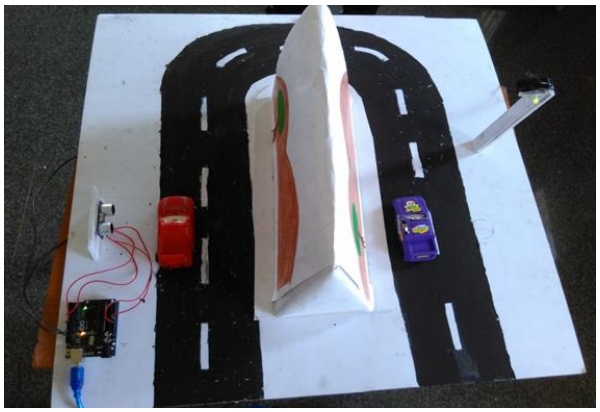

Figure 11: Vehicle passing through the road.

STEP 6: Output is obtained i.e. glowing of LED at the instant when the signal is received by the sensor after hitting the vehicle.As shown in fig. 12.

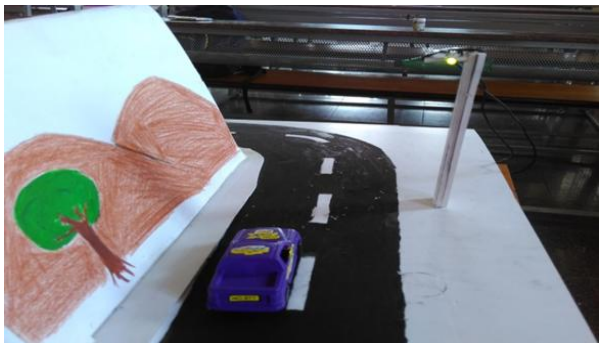

Fig. 12. Final output of sensor based accident prevention system by glowing of LED light.

IV. 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.
6. Vehicle monitoring systems can be implemented easily.

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V. FUTURE WORK

1. Arrangements to protect the sensor from being damaged in critical places.
2. Decrease the size of unit so that it occupies small place and easily kept in narrow roads.
3. Implementing the system to detect number of vehicles and velocity of vehicle.

VI. 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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REFERENCES

[1] Jessen Joseph Leo., R. Monisha.,et.al. : Vehicle movement control and accident avoidance in hilly track, IEEE Int. Conf. on Electronics and Communication Systems (ICECS).pp. 1-5(2014).
[2] Ki-Hyeon Kim., Dong-Hoon Yum.,et.al. :Improving driver's visual field using estimation of curvature, IEEE Int. Conf. on Control Automation and Systems (ICCAS).pp. 728-731(2010).
[3] Duy Tran., Weihua Sheng.,et.al. :A Hidden Markov Model based driver intention prediction system, IEEE Int. Conf. on Cyber Technology in Automation, Control, and Intelligent Systems (CYBER).pp. 115-120(2015).
[4] Jiang Yuying., Wu Yazhen.,et.al. :A surveillance method for driver's fatigue and distraction based on machine vision, IEEE Int. Conf. on Transportation, Mechanical, and Electrical Engineering (TMEE).pp. 727 – 730(2011).
[5] Ashutha K., Ankitha K., "Smart Shopping cart using embedded system and wireless module", Recent Patents on Computer Science (CSENG), UAE, Vol. 8, pp. 1-6, January 2016.
[6] Ashutha K., Shetty Arpitha., et. al "Novel wireless data communication for fisherman", International journal of computer science and mobile computing (IJCSMC),Vol. 5, Issue 4, pp. 511-517, April 2016.
[7] Ashutha K., Ankitha K., "Error Minimization in BCH Codes", International Journal Of Innovative Research In Electrical, Electronics,Instrumentation And Control Engineering (IJIREEICE), Vol. 4, Issue 5, pp. 402-405, May 2016.