TEST Engineering & Management

January - February 2020
ISSN: 0193 - 4120 Page No. 14927 - 14931

Road Curve Vehicle Accident Prevention System

Geetha Ramadas[1], Y Sukhi[1], J Alex[2], N V Srikanth[1]
R.M.K. Engineering College[1], Kirubai Foundations[2]

Article Info
Volume 82
Page Number: 14927 - 14931
Publication Issue:
January-February 2020

Article History
Article Received*: 18 May 2019*
Revised*: 14 July 2019*
Accepted*: 22 December 2019*
Publication*: 29 February 2020*

Abstract

In the developing countries accident is the major cause of death. If we gaze at the top ofrisky roads, most 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 the other 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. In order to provide solution to this problem, it is better to alert the driver about the vehicle coming against him. The solution is provided by placing an ultrasonic sensor along the road side before the curve. A LED light is provided after the curve. The vehicle reaching one end of the curve senses the ultrasonic sensor. The LED light connected in the other side glows. The driver get information from the LED light condition and can slow down the speed if there is a vehicle in the opposite side of the road.

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

I. INTRODUCTION

There are many unsafe 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, ZojiLa Pass in the Himalayas, the Road of Death Bolivia, Fairy Meadows Road (Pakistan) [1],[3]. 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 Farkes crashed with a moose which was on his lane in the year 2005[5],[6]. This caused his vehicle to move to the other lane and struck the other vehicle.

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[9]-[11]. 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. 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. This problem can be solved by giving an alert signal regarding the vehicle in the other side. Generally the driver is giving an horn sound to alert the situation. During rainy season, the horn sound may not be audible. Sometimes drivers do not use horn. So alert signal are to be given to the driver in this situation. This is one reason for accident taking place in the curve. This can be avoided using intelligent accident avoidance system. For this purpose, ultrasonic sensor is kept in one side of the road before the curve and a LED light is kept after the road curve[2],[4].

Ultrasonic sensor which is also called as obstacle sensor sends signal in the form of pulse. When a vehicle is approaching the signal, it is sensed by the sensor. Immediately light will glow in the opposite side of the curve. When there is no vehicle in the curve, sensor do not receive any signal and the LED light will be in off condition.

When the driver see the LED light glowing, he can slow the vehicle or even stop the vehicle also[6], [8]. Even though the driver do not see the vehicle, this sensor based light system can be implemented. This method can be implemented for all the curved roads in the hilly areas to safe people from accidents.

January - February 2020
ISSN: 0193 - 4120 Page No. 14927 - 14931

II. SYSTEM DESIGN

There are hardware design and software programming in the circuit functioning. Hardware design is implemented using ultrasonic sensor, a microcontroller and LED light. For the operation of ultrasonic sensor, +5V DC supply is required. This sensor can detect over a range of 100 cm.

Fig.1. Accident due to animals on the road

Microcontroller is programmed to receive the signal after sensing the vehicle or obstacle. This will send the signal to the LED light by using Arduino. 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.

A. Hardware Design

We have used Microcontroller (Arduino UNO), LED light and ultrasonic sensor as shown in fig. 2. The sending and receiving function of ultrasonic sensor is almost same.

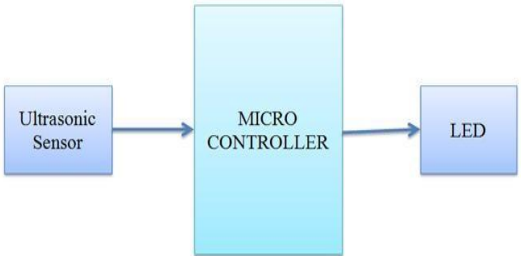


Fig. 2. Block Diagram of connection of components

The pin diagram ultrasonic sensor is explained. This sensor has 4 pins. They are +5V supply voltage for the sensor, ground pin, triggers signal pin and echo pin. In the circuit construction trigger pin acts as output pin and echo pin is input pin. Ultrasonic sensor sends the signal in the form of pulses from trigger pin. As the signal reaches the obstacle, it is send back. This signal is received by the echo pin. This signal is sent to microcontroller arduino UNO. In the microcontroller, the data is processed and operates the LED light which is connected to output pin of the microcontroller arduino UNO.

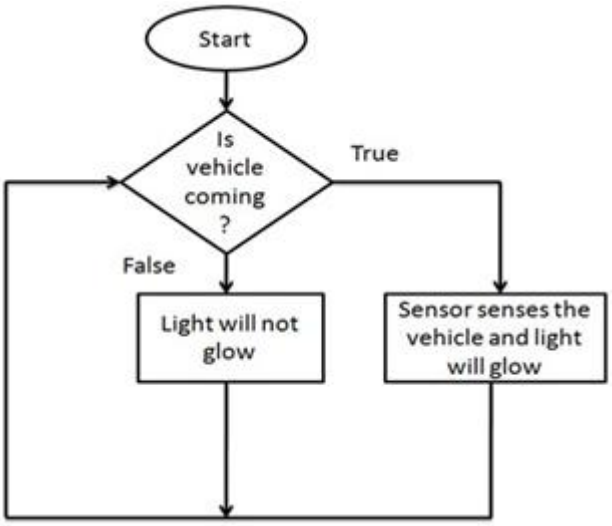


Fig. 3. Flowchart for working principle of sensor based accident prevention system

LED Light will glow only when the signal is reflected back. When ther is no obstacle, the signal is not reflected back. Therefore the LED will not glow. The simple block diagram is represented in the fig.2. The trig pin of ultrasonic sensor is joined to the digital pin 9 of microcontroller arduino UNO and echo pin is connected to digital pin 6. VCC is connected to +5V and ground potntial is connected to ground of arduino UNO. LED light is connected to pin number 12 of arduino UNO.

When vehicle the sensor senses the vehicle, LED light will glow. When there is no obstacle in the road path, the LED light will be in off condition. This process repeats continuously.

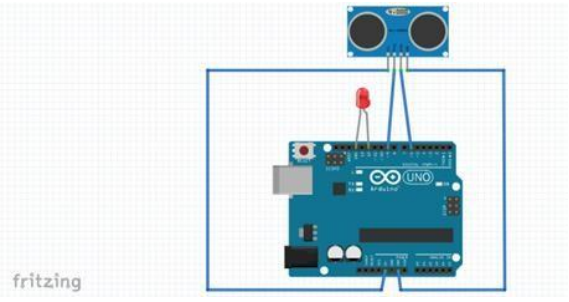


Fig. 4.Circuit Design of components sensor based accident prevention system

January - February 2020
ISSN: 0193 - 4120 Page No. 14927 - 14931

Fig. 5.Schematic diagram sensor based accident prevention system

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

We have used fritzing app for simulation and designing purpose of the circuit. Fig. 4 shows the circuit design, and Fig. 5 shows the schematic diagram. Fritzing software is used for development. 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.

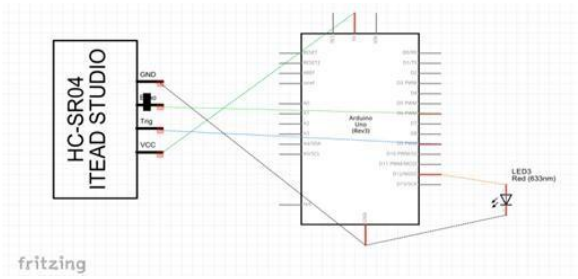
B. Software Design

Fig. 6 shows the flowchart of software design of microcontroller which is programmed by using Arduino1.0.5 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 byone.

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

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.



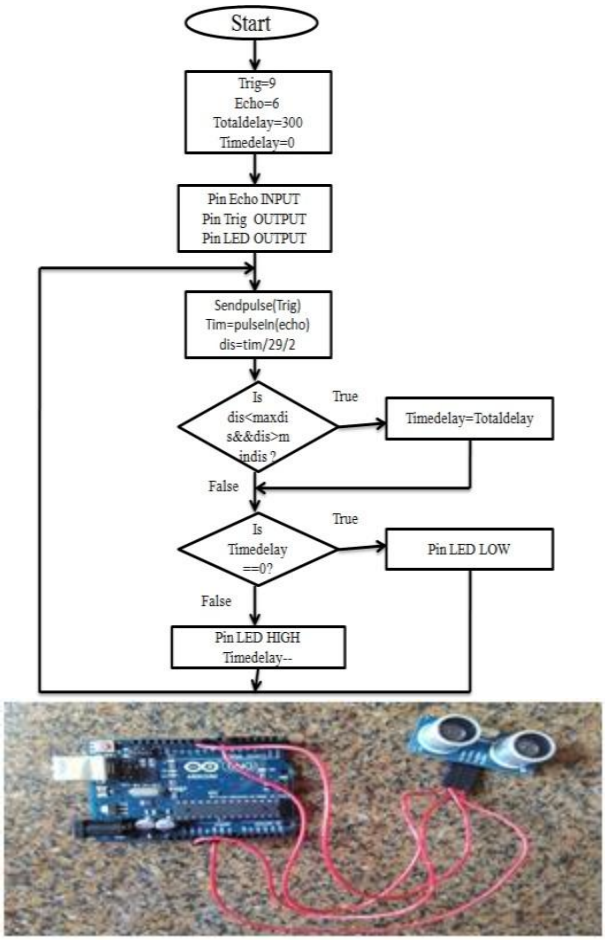


Fig. 8. Circuit connections for sensor based accident prevention system.

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

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.

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

January - February 2020
ISSN: 0193 - 4120 Page No. 14927 - 14931

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.

STEP 4: Model of the prototype developed for the curved road is shown in fig.10.

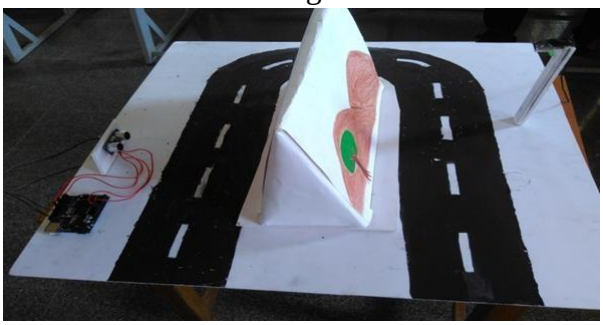


Fig. 10. Circuit fixed to the model of sensor based accident prevention system.

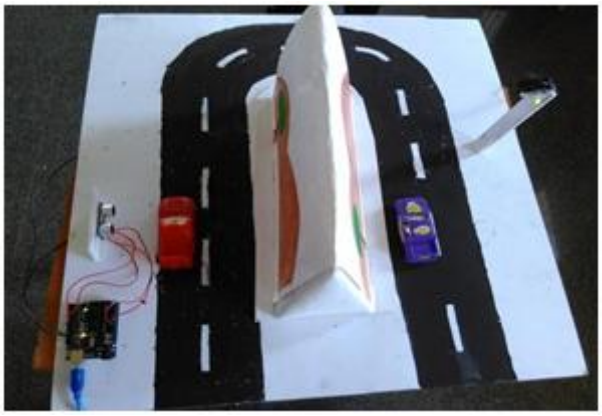


Fig. 11: Vehicle passing through the road

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.

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

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.

IV. ADVANTAGES

Avoid accidents in curve roads mountains roads and hillroads. Saves thousands of lives. Easily implementable to the existingroads. .Fully automated (No person is required to operate). Installation cost is very less. Vehicle monitoring systems can be implemented easily.

V. 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 arduinoUNO. By this we can save thousands of lives in the curve roads.

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] Y. Jeyashree, and Y.Sukhi, " LCC resonant converter with power factor correction for power supply units", *Journal of the Chinese Institute of Engineers*, Vol. 38, Issue 7, 2015, pp. 843-854

[3] Ki-Hyeon Kim., Dong-HoonYum.,et.al. :Improving driver's visual field using estimation of curvature, IEEE Int. Conf. on Control Automation and Systems (ICCAS).pp.728-731(2010).

[4] Geetha Ramadas, Manoj Kumar Nadesan, Sukhi Yesuraj, and Jeyashree Yesuraj, "High power factor electronic ballast using resonant converter for compact fluorescent lamp", *International*

January - February 2020
ISSN: 0193 - 4120 Page No. 14927 - 14931

Journal of Circuit Theory and Applications, Vol. 45, 2016, pp. 95-109

[5] DuyTran.,WeihuaSheng.,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).

[6] Sukhi Y, and Y.Jeyashree, "Analysis and implementation of series –parallel resonant converter for regulated power supply", *Journal of The institution of engineers (India)*, Vol. 90, Mar 2010.pp18-22

[7] 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).

[8] Sukhi Yesuraj, Jeyashree Yesuraj, Perarasi Muthaiah, and Sarojini Balaraman "Standalone PV-fed LED Street Lighting Using Resonant Converter", *Electric Power Components and Systems*, 2017

[9] 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, January2016.

[10] Ashutha K., ShettyArpitha., et. al "Novel wireless data communication for fisherman", International journal of computer science and mobile computing (IJCSMC),Vol. 5, Issue 4, pp. 511- 517, April2016.

[11] Ashutha K., AnkithaK., "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, May2016

AUTHORS PROFILE

Geetha Ramadas received her B.Tech. Degree in Electrical Engineering from N S S College of Engineering, Palakkad / Calicut University in 1986. She obtained M.E in High Voltage Engineering from College of Engineering, Guindy, Anna University in 2002. She obtained PhD in Electrical Engineering from College of Engineering, Guindy, Anna University in 2002. Presently she is working as an Professor & Head, Department of Electrical and Electronics Engineering. R.M.K Engineering College. Chennai. Tamilnadu, India.

Sukhi Y received her B.E. Degree in Electrical and Electronics Engineering from Government College of Engineering / Madurai Kamaraj University in 1993. She obtained M.E in Mechatronics from Madras Institute of Technology, Anna University, Crompet in 2000. She obtained PhD in Electrical Engineering from Sathyabama University, Chennai in 2010. Presently she is working as an Professor, Department of Electrical and Electronics Engineering. R.M.K Engineering College. Chennai. Tamilnadu, India.

Alex J received his B.E. Degree in the Department of Civil Engineering from Velammal Engineering collge/ Anna University in 2009. He obtained M.E in Structural Engineeiing from Velammal Engineering College in Structural Engineering in 2011. He worked in Velammal Engineering College as Assistant Professor. Presently he is the Managing Director of the Kirubai Foundations.

Srikanth received his B.E. Degree in Electrical and Electronics Engineering from R.M.K. Engineering College / Anna University in 2019. Presently He is working KPIT, Bangluru.