Diminishing Road Accidents On Sharp Curves Using Arduino

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Abstract: The basic aim of this system 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.

Key Words: Sensor, India, Mountain Curves, Accidents, System, ATMega, Microcontroller, Arduino.

1. INTRODUCTION

During the calendar year 2010, there were close to 5 lakh road accidents in India, which resulted in more than 1.3 lakh persons. These numbers translate intone road accident every minute, and one road accident death every 4 minutes. Unfortunately, more than half the victims are in the economically active age group of 25-65 years [1]. In India 137,000 people are killed because of road accidents. That is about 377 people per day. In that 3.7% because of failed to look the road [2].

Fig 1: *Drivers cannot see the vehicles on the side [*]*

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 [3]. To avoid these problems in curve 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. 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.

2. SYSTEM REQUIREMENTS

This system mainly consists of two parts: Hardware and software. Hardware design consists of sensors like ultrasonic sensor, Arduino UNO and LED. Ultrasonic sensor uses +5V DC supply. Arduino UNO need a power supply of 6-12V Arduino UNO 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.

2.1 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 [4]. The power for Arduino can be derived from Non- conventional sources like solar energy.

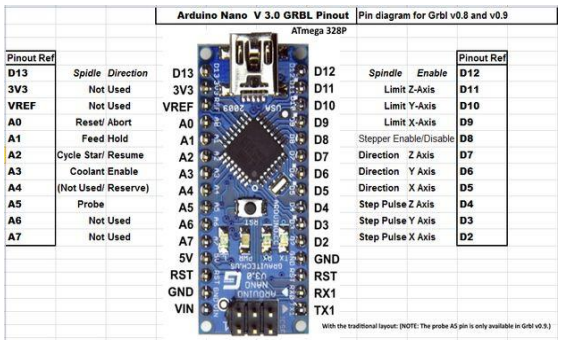

Fig 2: *Arduino Nano Specifications [*]*

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 [5].

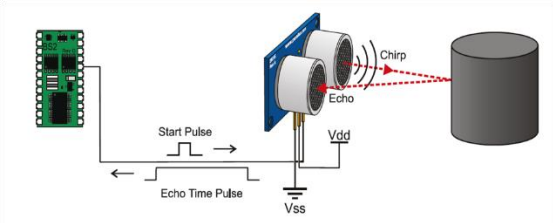

Fig 3: *Working of an Ultrasonic sensor.*

2.2 SOFTWARE

Arduino IDE

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.

3. 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 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 flow chart of working of the system is shown in the following figure.

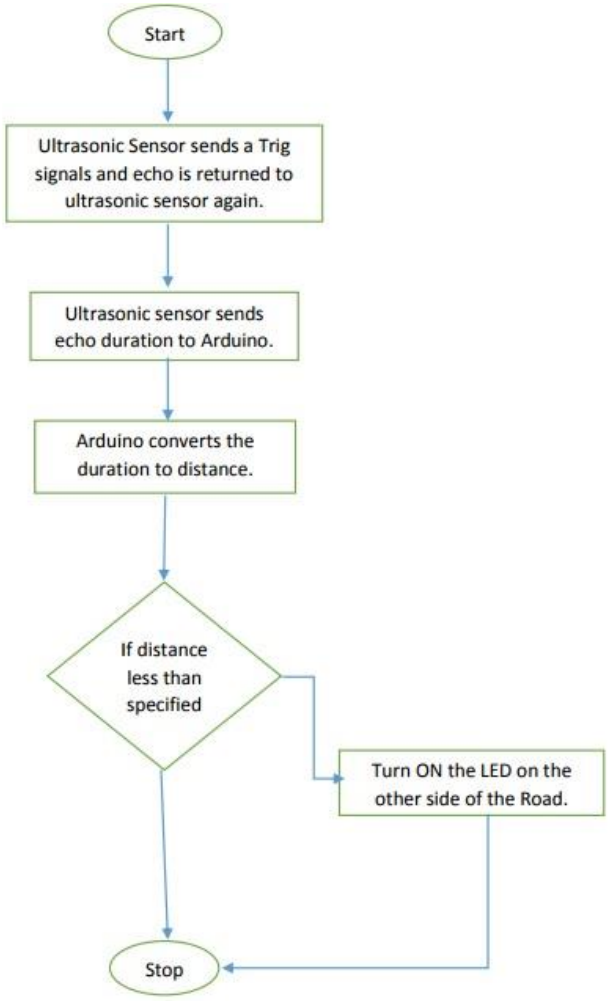

Fig 4: *Flow chart of the working of system.*

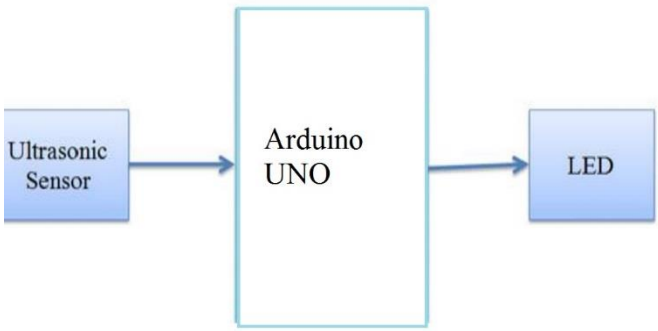

Fig 5: *Block diagram of the system*

Figure 6 shows the circuit design, and the schematic diagram of the Arduino system.

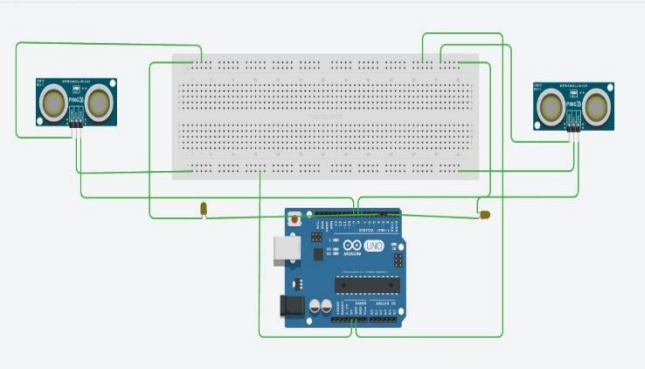

Fig 6: *Schematic circuit of the Arduino system and Ultrasonic sensors with LED's.*

4. RESULTS

Writing the coding for Arduino UNO using Arduino IDE. The programming language is simple and easy which consists of set of commands to process the data from sensor and to operate the LED as shown in figure7.

Fig 7: *programming in Arduino*

5.

After running the code, the results are observed in the serial monitor. A model setup is done to elaborate clearly. The following figures show Arduino serial monitor and the model fixing the circuit to the model i.e. fixing microcontroller Arduino UNO, ultrasonic sensor and LED light to the model of curve road.

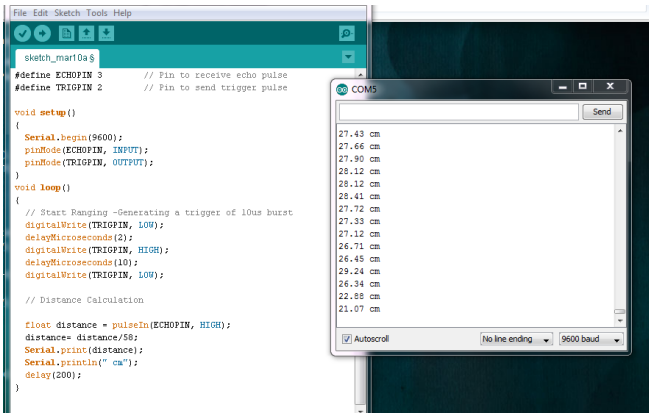

Fig 8: *Serial Monitor shows the distance of objects.*

Fig 9: *Model setup of Ultrasonic sensor and Arduino on a curved road.*

Fig 10: *Accidents also occur when animals pass through the narrow and curved roads.*

6. CONCLUSIONS

The purpose of this project is to decrease the number of accidents occurring on hilly and curved roads. 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 this we can save thousands of lives including animals.

6.1 Advantages

1. Avoid accidents in curve roads mountains roads and hill roads.
2. Easily implementable to the existing roads.
3. Fully automated (No person is required to operate).
4. Installation cost is very less.
5. Vehicle monitoring systems can be implemented easily.
6. Can work irrespective of weather and climate.
7. Maintenance is easy.
8. Greater flexibility.

6.2 EXTENSIVE WORK

In future, system can be turned completely automated and can be controlled from a remote area.

This system can also use for counting the number of vehicles and the usage of solar energy can be a great extension for this system.

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RANGA SREEDHAR GALLA is currently pursuing his BTECH EEE student in Gokaraju Rangaraju Institute of Engineering and Technology. He has undergone training in BHEL, Hyderabad and also Ordnance Factory, Medak. His area of Interest is Electrical Machines and Power Electronics