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JSS SCIENCE AND TECHNOLOGY UNIVERSITY MYSURU

Topic: Vehicle Safe Parking System

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Abstract

This paper illustrates the configuration of a parking sensor that help the driver while reversing the car for parking. Sometimes it can be difficult to judge the distance when reversing the car. On off the change that the driver is inexperienced in driving it can cause potential damage to the car or can lead to some other casualties when reversing the car for parking. This sensor can prove quite helpful in such situations. This sensor can be installed without much of a stretch at the rear of your vehicle. An additional feature of this sensor is that the number of beeps increases as the car nears any object so that the driver can estimate the distance between the object and the car. This article discloses on how the Reverse Parking Sensor is configured.

Introduction

Nowadays, parking a vehicle is one of the most important skills for any driver or car owner as it is very difficult to measure the space around the vehicle and to know the bumpers. Parallel parking often requires a lot of practice therefore to solve this problem; a parking sensor has to be developed that makes it easier to park the vehicle. Parking sensors are proximity sensors that the driver can use to identify nearby vehicles when parking. As a rule, the car manufacturer places these sensors on the rear bumper of the vehicle, which is why this system is also known as a driver assistance system. Currently, the popularity of these sensors has increased due to the increase in vehicle size and the decrease in parking spaces. So, for this purpose we have made use of ultrasonic sensor along with Arduino in order to detect and park the car carefully without any problem.

Literature Survey

The development and high growth of the Internet of Things (IoT) have improved quality of life and strengthened different areas in society. Many cities worldwide are looking forward to becoming smart. One of the most popular use cases is the implementation of smart parking solutions, as they allow people to optimize time, reduce fuel consumption, and carbon dioxide emissions. Smart parking solutions have a defined architecture with particular components (sensors, communication protocols, and software solutions). Although there are only three components that compose a smart parking solution, it is important to mention that each component has many types that can be used in the deployment of these solutions.

With the enlargement of automobile field, the number of owned cars is greatly increasing with correspondingly; the number of rookie drivers is strengthening as well. Many of them grumbled that their valuable cars are easily damaged by obstacles that are barely seen through their rear view mirror such as bikes and cycles. On the basis of market researcher survey that in 2010 the world's car number belabours 6.9 billion, the number of cars yet to appear in the succeeding 8 years will be 1.16 times the current one. Multitudinous people specially pedestrians (person on foot) struck and injured from revoking vehicles each year all over the world. These causalities happen frequently because of immense population in addition many drivers are not fitly edified (toddlers). Many people use bikes or bicycles which are firm to sense while reversing a car for this reason the root notion of this research is to design a device, which will let a person to avoid accident, caused while parking in reverse by the help of ultrasonic sensor we can detect an object, and the collected frequency is detected and amplified. This amplified frequency is given to controller for additional outfits. The beeping as well as LCD display inside the car apprises the driver of the peril and avert a possible mishap.

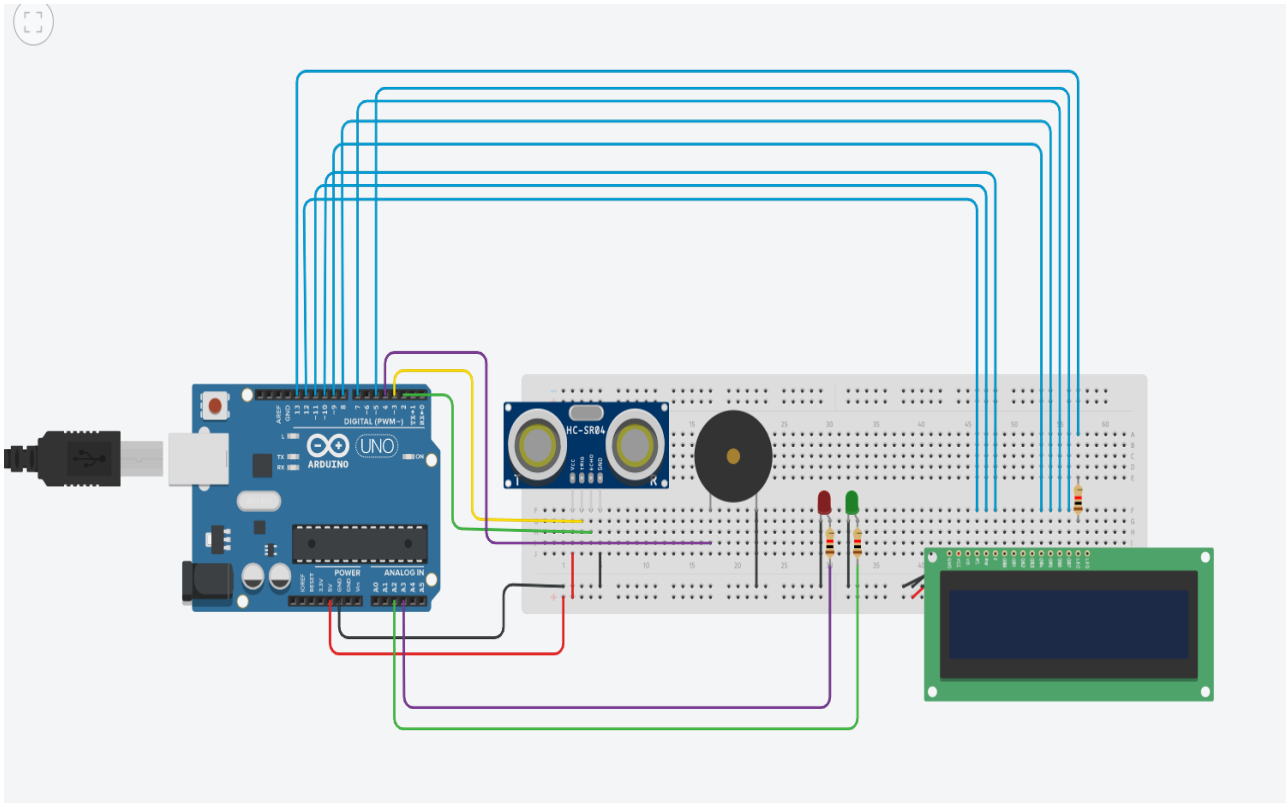
Proposed Method

The system consists of ultrasonic sensor which plays a key role in detecting objects using high frequency sound waves. It generates sound pulses that ricochet off nearby objects. The receiver perceives the reproduced waves and estimates the distance between the car and the object. It is connected to an alarm device. In order to warn the driver if an obstacle is approaching the vehicle. When the driver engages reverse gear, the parking sensor automatically activates and sends ultrasonic signals. When these signals hit a nearby object, they are immediately replicated and recorded by the parking sensors. signals, the engine control unit measures the distance between the vehicle and the object. When the car approaches the object, the alarm system warns the driver with a beep and displays in the screen.

COMPONENTS

Name	Component	Quantity
Arduino	Arduino UNO	1
Distance Sensor	Ultrasonic Sensor HC-SR04	1
Display	LCD 16x2	1
Buzzer	Piezo Buzzer	1
LED's	LED	2
Resistors	10Ω resistor	2
Wires	Jumper cables	30+

Circuit Setup



System Architecture and Operations

Design of Reverse car parking sensor: The implementation of the reverse car parking sensor is quite simple. Firstly, the ultrasonic sensor comprises of 4 pins: VCC, TRIG, ECHO and GND. Out of these pins, VCC and GND pins are connected to a +5V and GND. TRIG and ECHO pins are then connected to digital I/O. In the circuit, the buzzer used is a 5V buzzer, along with 1N4007 Transistor and 1KΩ resistor (at the base) to control the buzzer. Two LED's are used to show the mode (i.e. safe or danger). LCD display is used to show the mode and distance from the object.

The measurement of the distance is done by the Ultrasonic Sensor. Controlling the ultrasonic sensor, calculation of the distance and the activation of the buzzer is done by Arduino UNO. The emission of acoustic pulses is done by the ultrasonic sensor. The Arduino calculates the interval of each reflected signal. The estimating of the distance to the object is done by the Arduino on the basis of the time delay. When the distance between the installed sensor and the object is less than the specified range the Arduino triggers the buzzer. The Arduino estimates the range of the hindrance in front of the ultrasonic sensor, when the circuit is activated.

If the calculated distance is less than 150 cm, the Arduino activates the buzzer, in order to increase the frequency of the acoustic signals as the distance decreases, and the distance is displayed in the screen along with distance.

Distance can be calculated using:

Speed of ultrasonic = 0.034 cm/µs

Distance = time * speed

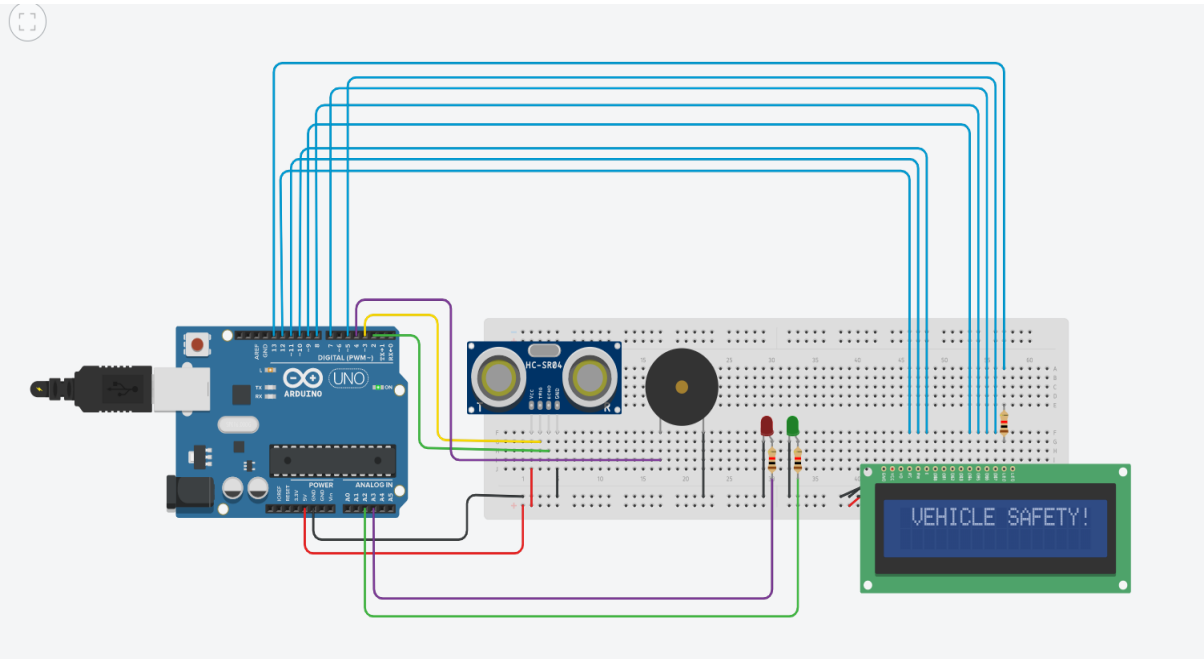
Distance(cm) **= (time/2)** (µs) *** 0.034**(cm/ µs)

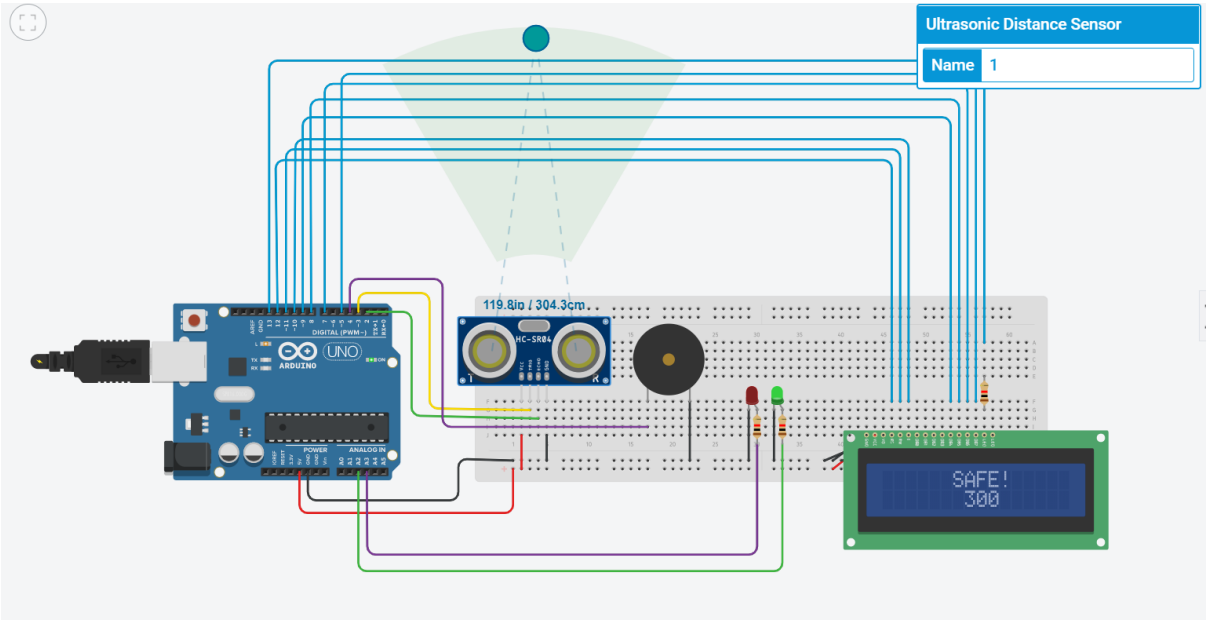
Code

```
#include <LiquidCrystal.h>


#define buzzer 4
#define echoPin 2
#define trigPin 3
#define green A2
#define red A3
#define backLight 13


long duration;
int distance;


LiquidCrystal lcd(12, 11, 10, 9, 8, 7, 5);



void setup() {
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  pinMode(backLight, OUTPUT);
  pinMode(red, OUTPUT);
  pinMode(green, OUTPUT);

  digitalWrite(backLight, HIGH);
  lcd.begin(16,2);
  lcd.clear();

  lcd.setCursor(1,0);
  lcd.print("VEHICLE SAFETY!");

  Serial.begin(9600);
  delay(5000);
}


void loop() {

  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(2);
  digitalWrite(trigPin, LOW);
  duration = pulseIn(echoPin, HIGH);
  distance = duration * 0.034 / 2;
  Serial.print("Distance:");
  Serial.println(distance);
```

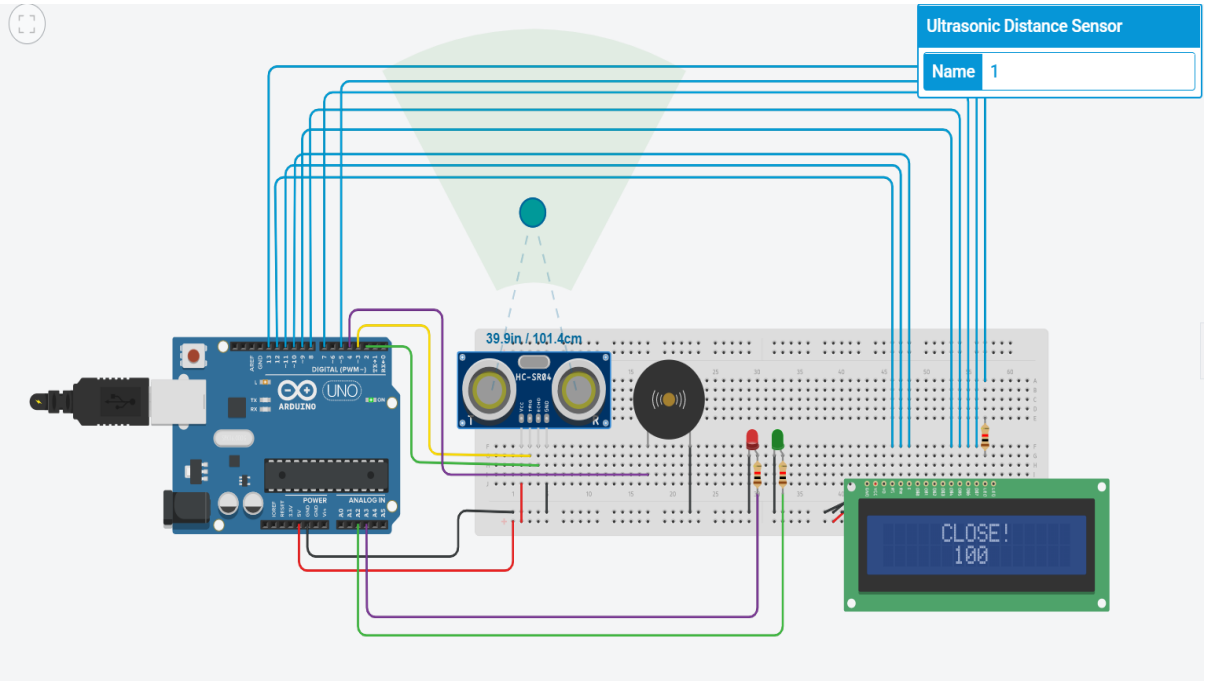
```
  if(distance > 150 ){

    lcd.clear();
    lcd.setCursor(6,0);
    lcd.print("SAFE!");
    lcd.setCursor(7,1);
    lcd.print(distance);

    noTone(buzzer);

    analogWrite(green,255);
    analogWrite(red,0);

  }

  if(distance < 150){

    lcd.clear();
    lcd.setCursor(5,0);
    lcd.print("CLOSE!");
    lcd.setCursor(6,1);
    lcd.print(distance);
    lcd.display();

    tone(buzzer,500);
    delay(500);
    noTone(buzzer);

    analogWrite(green,0);
    analogWrite(red,255);

  }

  delay(500);
}
```

Output





Green LED is glowing indicating safe mode which is displayed in LCD screen along with the distance. Buzzer is not ringing.



Red LED is glowing indicating danger mode which is displayed in LCD screen along with the distance. The buzzer is ringing.

Serial Monitor

```
Distance:100
Distance:105
Distance:108
Distance:112
Distance:125
Distance:129
Distance:146
Distance:148
Distance:169
Distance:169
Distance:169
Distance:190
Distance:196
Distance:196
Distance:208
Distance:225
```

Conclusion

Although science and technology have developed and evolved a lot, it is more about computers, cars etc. We know that in the automotive sector, many countries are doing well and bringing new products (vehicles)to the market. Although there are many features available in these vehicles, one specific feature that is not quite available in budget-oriented vehicles is the reverse parking one. To tackle this issue, we have developed a sensor that assists the driver while reversing the car while parking. Finally, we would like to conclude our design process briefly. Obstacle in the desired are, using the Arduino controller, using the Arduino controller, controlling these ultrasonic sensors via our pre-installed program. The buzzers are used to indicate the obstacles that are under its beam.

References

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