

Light Automatic Door Opening System

D. Manoj Reddy¹, M. Shanmuka Sai², Mr. P. Kamalakar³ and Mr. T. Sanjeeva Rao⁴

^{1,2} Final Year B.Tech, Department of Electrical and Electronics Engineering, Malla Reddy Engineering College (A), India

^{3,4} Assistant Professor, Department of Electrical and Electronics Engineering, Malla Reddy Engineering College (A), India.

E-Mail: kamalakar.mrecee@gmail.com

Abstract - This project shows the design of the automatic sliding door operator and power supply for module circuit. Automatic sliding door operator performs for opening or closing the door automatically. Automatic door is an automated movable barrier installed in the entry of a room or building to restrict access, provide ease of opening a door or provide visual privacy. Automatic doors are specially designed to reduce congestion and increase access and can make the door use easier. Sensors are detected when people approach the doors and trigger them to slide open. When someone enters in front of the sensors inside or outside the room, control module in door operator receives the signal and controls through the motor which drives the door sliding.

Keywords -.PIC 16F887 Microcontroller, DC Motor, H-Bridge (L298), Sensors, Sliding Door.

I. INTRODUCTION

Nowadays, Security has always been a major concern for all of us and there are many Hi tech and IoT based security and surveillance system are available in the market. Intruder or Burglar Alarm is one of the classic and popular projects among the Electronics students and hobbyists. We have also built many Burglar Alarms based on various technologies:

- Laser Security Alarm Circuit
- IR Based Security Alarm
- Burglar Alarm using PIR
- GSM Based Security System

Today we are adding one more Security Alarm in our list which is based on Ultrasonic Sensor. This Arduino Controlled Door alarm can be installed near the door to detect the presence of anybody at the door. Whenever somebody comes in the range of Ultrasonic sensor, buzzer starts beeping. You can adjust the sensor detection range according to your door. This system can also serve the purpose of Motion Detector.

II. REQUIRED COMPONENTS

- Breadboard
- Ultrasonic Sensor
- Buzzer
- Arduino Mega (any model)
- Jumper Wires
- USB cable for Arduino or 12v, 1A adapter.

Ultrasonic Sensor Module:

Ultrasonic sensor HC-SR04 is used here to detect the presences of any person at the door. The sensor module consists of ultrasonic transmitter, receiver and the control circuit. Ultrasonic Sensor consists of two circular eyes out of which one is used to transmit the ultrasonic wave and the other to receive it.

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We can calculate the distance of the object based on the time taken by ultrasonic wave to return back to the sensor. Since the time and speed of sound is known we can calculate the distance by the following formulae.

$$\text{Distance} = (\text{Time} \times \text{Speed of Sound}) / 2$$

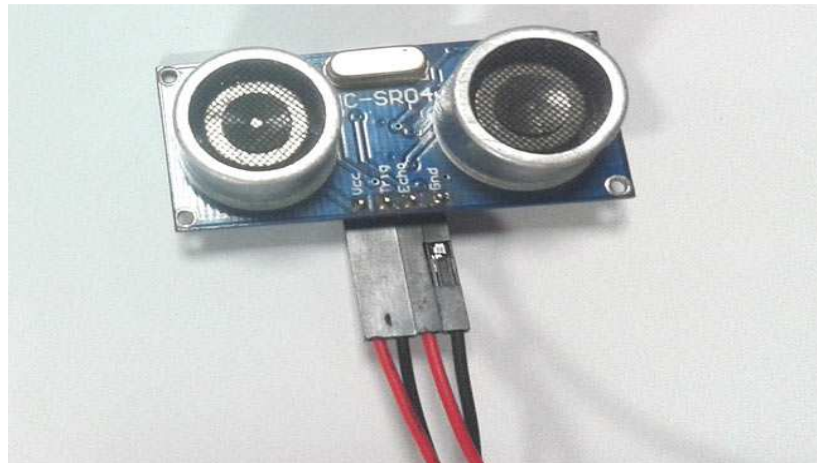
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The value is divided by two since the wave travels forward and backward covering the same distance. But in this project we have used NewPing.h library, and this library takes care of this calculation and we just need to use some key words, explanation is given in programing section below.

Check the below project to measure the distance of any object and to properly understand the Ultrasonic sensor working:



- Arduino Based Distance Measurement using Ultrasonic Sensor
- Distance Measurement using HC-SR04 and AVR Microcontroller

III. RESULTS AND DISCUSSION

In this project, LDR's are working as light detectors. Before we go into detail, we will have to understand how the LDR's work. LDR (Light Dependent Resistor) also known as photo resistor is the light sensitive device. Its resistance decrease when the light falls on it and that's why it is frequently used in Dark or Light Detector Circuit. Check the various circuits based on LDR here.

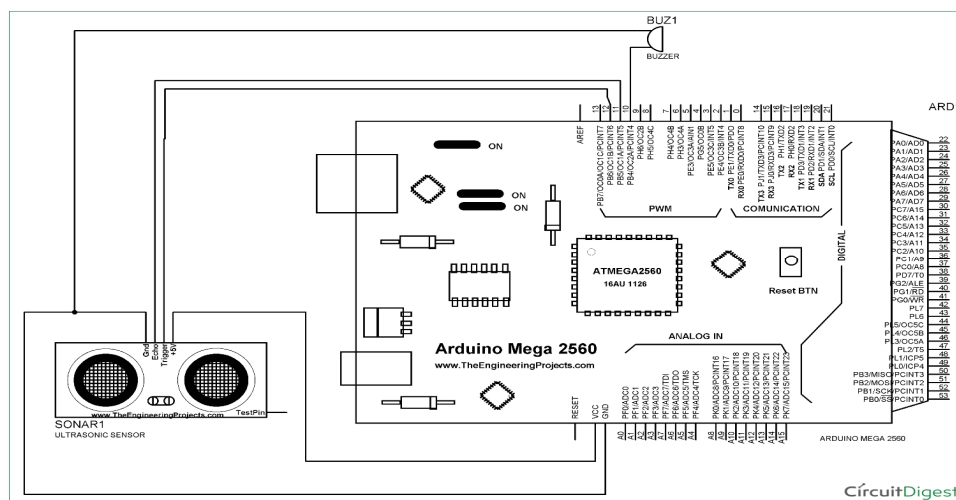


Fig. 1. Circuit Diagram And Explanation

Circuit connections for this Ultrasonic Alarm are very simple. Trigger pin of ultrasonic sensor is connected to pin no. 12 of Arduino and Echo pin of sensor is connected to pin no 11 of Arduino. Vcc of sensor is connected to 5V pin of Arduino and GND of sensor is connected to GND of Arduino. One pin of buzzer is connected to GND of Arduino and the other pin is connected to 8th pin of Arduino.

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IV. RESULTS AND DISCUSSION

To make the prototype, you will have to follow the below steps:



Fig. 2. Working Model

Working Explanation:

Working this Arduino Door Alarm is very easy. Whenever anyone comes in the path/range of Ultrasonic Sensor, microcontroller detects the distance of object from the sensor and if the object is in the defined range, it sends the High signal to the buzzer and buzzer starts beeping.

The working principle of this circuit is, when light falls on the light dependent resistor, then its resistance will be decreased, which results in an increase of the voltage at pin2 of the 555 IC. This 555 IC is inbuilt with a comparator, which associates between the i/p voltage from pin2 of the IC and 1/3rd of the power supply voltage. When i/p falls below 1/3rd then o/p is fixed to high otherwise it is fixed to the lower.

The proposed circuit is built with ATmega microcontroller, DS1307 IC, LDR, LCD, PIR sensor, Array of LED. This circuit is very useful in our day to day life like highways, real time street lights, the parking areas, restaurants and hotels.

V. CONCLUSION

The test the circuit by putting any thing in front of sensor within the range, check the Video for demonstration. This function of Ultrasonic Sensor can also be used to build Obstacle Avoiding Robot.

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