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Smart Door Using Ultrasonic Sensors

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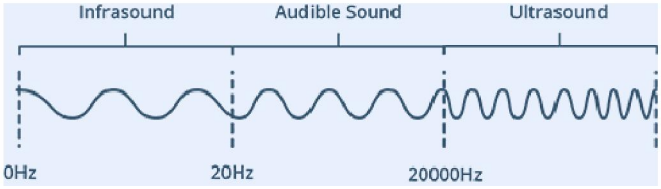
Abstract: *Opening the door and closing the door by hands is very dangerous ,it may be the cause of getting virus if someone opens the door by his/her infected hands so, Automatic Door opening without pulling the door or pushing the door is an important aspect, it can be done by placing the sensors near by the door areas from where Sensors can detect the movement of an object within the range of sensors, after that a signal is sent to the microcontroller of Arduino by the sensors which controls the servo motor to open the gate and close the gate. We can place these kinds of sensors in Hotels, Malls, Theatres where a person needs to open the door by some other person hands or himself after installing this technology we don't need to open the door by hands but the doors will automatically opens/close by sensing the objects within the range of infrared rays, and Ultrasonic sensors. This results shows that implementation of this smart sensing technology is cheap, effective and reliable for the systems like Hotels, Malls , shopping centers etc, it can also be used at our home .*

Keywords: Ultrasonic sensors(HC-SR04), Arduino Uno board, Jumper cables, servo motor, Arduino IDE

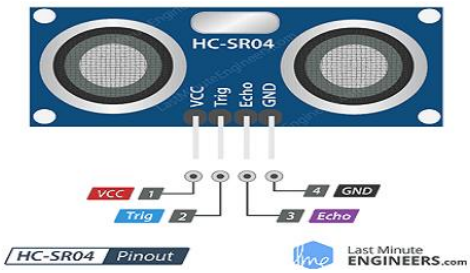
I. INTRODUCTION

Ultrasonic sensors (HC-SR04) works on Electrical Energy and a Ceramic Transducer to emit and receive mechanical energy in the form of sound waves. Sound waves are the pressure waves that can travel through solid, Liquid and Gases. Ultrasound is high-pitched sound waves frequencies higher than the audible limit of human hearing.



Human Ears can hear sound waves that vibrate in the range from 20 times a second to around 20,000 times a second. However, Ultrasound has a frequency of over 20,000 Hz. Ultrasonic seneros HC-SR04 works on operating voltage DC 5V, Operating Current 15 mA, Operating frequency 40KHZ, Maximum Rage 4M, Min Range 2cm, Ranging Accuracy 3mm, measuring Angle 15 degree and Dimension 45X20X15mm.

1.1 PIN OUT Diagram of HC-SR04



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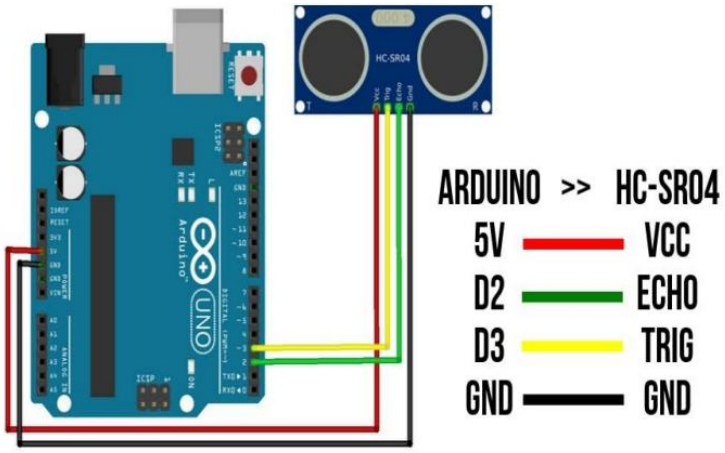
- **VCC** is used the power supply for Ultrasonic sensor which we connect the 5V pin to the Arduino.
- **Trig** (Trigger) pin is used to trigger the Ultrasonic sound pulses.
- **Echo** pin works by producing a pulse after receiving a signal
- **GND** should be connected to the Ground of Arduino.

1.2 Wiring connect of Arduino Uno to Ultrasonic Sensors



A. Arduino IDE:

Arduino IDE is open source software make it easy to write codes and upload it to the board. The software can be used any type of Arduino board UNO ,NANO etc. The software can be easily downloaded from the internet and the new version of this software is Arduino IDE 2.0 Beta . This software is more powerful in addition to a modern editor and a more responsive interface

II. Aims and Objectives

The main Aim of using the sensors for smart opening and closing of the door is to do function automatically .The door will automatically open when ultrasonic sensor will detect any object in front of it with certain distance and when object moves away from ultrasonic sensor it will detect no object in front of it and door will automatically close

III. Working Principle

Make the connection of Arduino to Ultrasonic sensors as given in the diagram i.e. 5V to VCC, D2 to Echo, D3 to Trig, GND to GND. Connect Arduino board to the PC/Laptop the open Arduino IDE and do the following code for this program and upload on Arduino board ,after uploading the program the code will store in the microcontroller of Arduino.

The servos are the automatic gate which opens without touch and the first PIR sensor is for counting the number of people who entered and the second PIR sensor is for counting the number of people who left the room, at a time only 5 people can enter the room, the lcd display is for displaying the number of people in the room and arduino uno controls the whole gate system.

IV. Conclusion

The Ultimate aim of the paper was to design prepare a system in which the doors of Malls, Home, Markets will automatically opens. So people don't need to use hands for opening the door and closing the door, so when this system implements will feel much more secure after using this automatic door open system in the field of Internet of Things(IOT). This project is based on Arduino and the coding is done on Arduino IDE platform. The overall cost is low

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and can be easily operated as well as implemented .Even our home will undergo its own transformation towards the smart homes that will be in constant interaction with the grid in an effort for better energy management and full home automation system.

V. FUTURE SCOPE

In order to increase the range and to monitor and security, we can use NodeMCU(ESP8266) for the wifi and we can also add the voice regignization technique in order to put strong security.

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