



DISTANCE MEASURING MACHINE USING IOT

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ABSTRACT

The project is designed to develop distance measurement system using ultrasonic waves and interfaced with arduino. We know that human audible range is 20 Hz to 20 kHz. We can utilize these frequency range waves through ultrasonic sensor HC-SR04. The advantages of this sensor when interfaced with arduino which is a control and sensing system, a pro per distance measurement can be made with new techniques. As large amounts are spent for hundreds of inflexible circuit boards, the arduino will allow business to bring many more unique devices. This distance measurement system can be widely used as range meters and as proximity detectors in industries. The hardware part of ultrasonic sensor is interfaced with arduino. This method of measurement is efficient way to measure small distances precisely. The distance of an obstacle from the sensor is measured through ultrasonic sensor. After knowing the speed of sound the distance can be calculated.

Keyword: - Frequency, Circuit, Arduino, and Ultrasonic Sensor.

1. INTRODUCTION

Today's the developing world shows various adventures in every field. In each field the small requirements are very essential to develop big calculations. By using different sources we can modify it as our requirements and implement in various field. In earlier days the measurements are generally occur through measuring devices. But now a day's digitalization as is on height. Therefore we use a proper display unit for measurement of distance. We can use sources such as sound waves which are known as ultrasonic waves using ultrasonic sensors and convert this sound wave for the measurement of various units such as distance, speed. This technique of distance measurement using ultrasonic in air includes continuous pulse echo method, a burst of pulse is sent for transmission medium and is reflected by an object kept at specific distance. The time taken for the sound wave to propagate from transmitter to receiver is proportional to the distance of the object. In this distance measurement system we had ultrasonic sensor HC-SR04 interfaced with arduino UnoR3. Programming and hardware part of ultrasonic sensor interfacing with arduino UnoR3.

2. WORKING PRINCIPLE

The HC-SR04 Ultrasonic (US) sensor is an ultrasonic transducer that comes with 4 pin interface named as Vcc, Trigger, Echo, and Ground. It is very useful for accurate distance measurement of the target object and mainly works on the sound waves. As we connect the module to 5V and initialize the input pin, it starts transmitting the sound waves which then travel through the air and hit the required object. These waves hit and bounce back from the object and then collected by the receiver of the module. Distance is directly proportional to the time these waves require to come back at the receiving end. The more the time taken, more the distance will be.

The waves will be generating if the Trig pin is kept high for 10 μ s. These waves will travel at the speed of sound, creating 8 cycle sonic burst that will be collected in the Echo pin. The echo pin remains turned on for the time these

waves take to travel and bounce back to the receiving end. This sensor is mainly incorporated with Arduino to measure the required distance. Following formula is used to calculate the distance of the object.

$$S = (V \times t)/2 \quad \text{Eq-1}$$

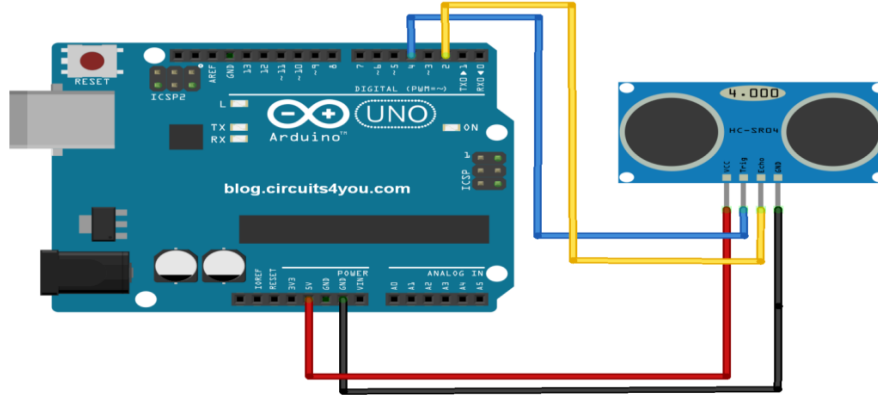


Fig:1 Port Connections

Where S is the required distance, V is the speed of sound and t is the time sound waves take to come back after hitting the object. We need to divide the value by 2 because time will be double as the waves travel and bounce back from the initial point. Dividing it by 2 will give the actual distance of the target object.

3. APPLICATIONS

HC-SR04 comes with a wide range of applications mainly targeting distance and direction measurements. Following are the major applications it can be used for.

- Speed and direction measurement
- Wireless charging
- Humidifiers
- Medical ultrasonography
- Burglar alarms
- Embedded system
- Depth measurement
- Non-destructive testing

4. FLOW DIAGRAM

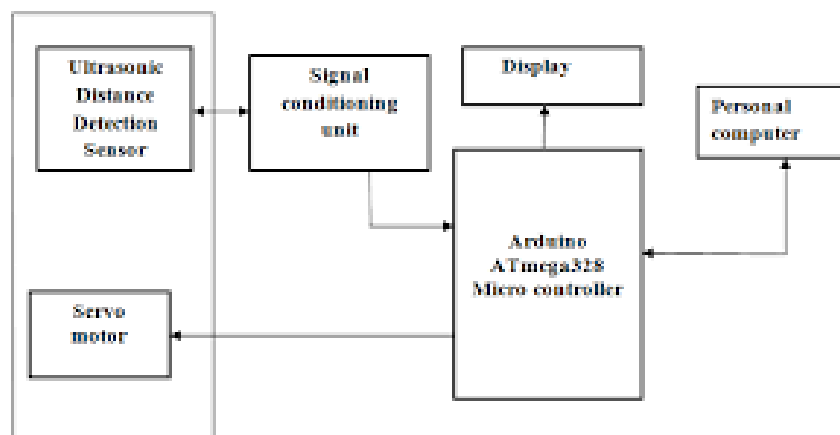


Fig 2: Block Diagram

5. RESULT AND DISCUSSION

The HC-SR04 ultrasonic sensor uses SONAR to determine the distance of an object just like the bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package from 2 cm to 400 cm or 1" to 13 feet.

6. CONCLUSION

Distance measurement using ultrasonic sensor and arduino consist of a transmitter part of ultrasonic module units ultrasonic high frequency waves in the form of pulses after collision of these waves with any object, these waves detected by microphone time taken by these waves from transmitter and receiver is used to measure distance from any object. We had used a ultrasonic sensor module of HC-SR04, because this ultrasonic module is initiated with pulse of 10us. The distance from any object is calculated from $\text{Distance} = \text{speed} * \text{time}$. The human audible range can be converted measure the distance precisely manner.

6. FUTURE SCOPE

1. New prototyping hardware & capability & interfacing with other consumer elatrone/tv/smartphones & flooding of shields.
2. Mining equipment's may require where entail.
3. Ac ready compatible with many major simulation software like MATLAB & lab view, we may see even move flexible programming environment & development option.
4. Using temp. Compensation, it can be used over wide temp range

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