ULTRASONIC RANGEFINDER USING ARDUINO

Abstract

In this paper, We will present the implementation of the Arduino-based Ultrasonic sensor distance measuring device as a project. This device can be used for pin point accuracy. The heart of this distance meter is the microcontroller ATmega328. Distance measurement from obstacle, moving object to the ultrasonic sensor or other equipment is used in a large number of applications such as RADAR, Robotic obstacle control, Medical application, Blind person using a walking stick, etc. An ultrasonic sensor is the cheapest among various sensors. In this project, measuring the distance of an obstacle by using an ultrasonic sensor and Arduino microcontroller is presented. This system has very large applications not only in various industries, luxury automobile sector. but, also same concept used in the armed forces or defense applications where accuracy and durability are of primary importance.

Keywords: Arduino Microcontroller, ATmega328, Ultrasonic Sensor, rangefinder

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I. INTRODUCTION

Distance size of a consistent or shifting item in front of ultrasonic sensor. Those gadgets can be simple and also pretty small. Wherein the space measuring is required, the use of this sensor we can locate it out easy aspossible. In this paper, we describe this sort of measurement system which makes use of ultrasonic transmitter and receiver devices hooked up at a very small distance among them and arduino board the use of ATmega328 microcontroller-based system.

This microcontroller is very effortlessly available at economically low and also equal to the popular 8051 microcontroller. Ultrasonic sensors are very versatile in distance dimension. Ultrasound waves are useful for both the air and underwater. Ultrasonic sensors also are quite rapid for some easy packages. In less complicated device, a low-cost model of 8-bit microcontroller also can be used within the machine. This device has been advanced.

II. EASE OF USE

A. Robotics

In robot software, ultrasonic sensor is used to measure the space from robot to the impediment. It's far used inside the robotic impediment manipulate system to keep away from the impediment without throbbing to the wall. It overcome the impediment like the wall, timber & different object and many others. It is also used inside the automatic robots which might be used in inns, departmental shops etc.

B. Blind Person walking using the stick

The usage of this modern era, it is also used in the medical field. From a few decades, blind human beings use the advanced sticks which are giving the indication to get facts approximately the impediment, walls, and so forth. It is also alarming to the blind humans with alarming sign or buzzer etc.

III. METHODOLOGY

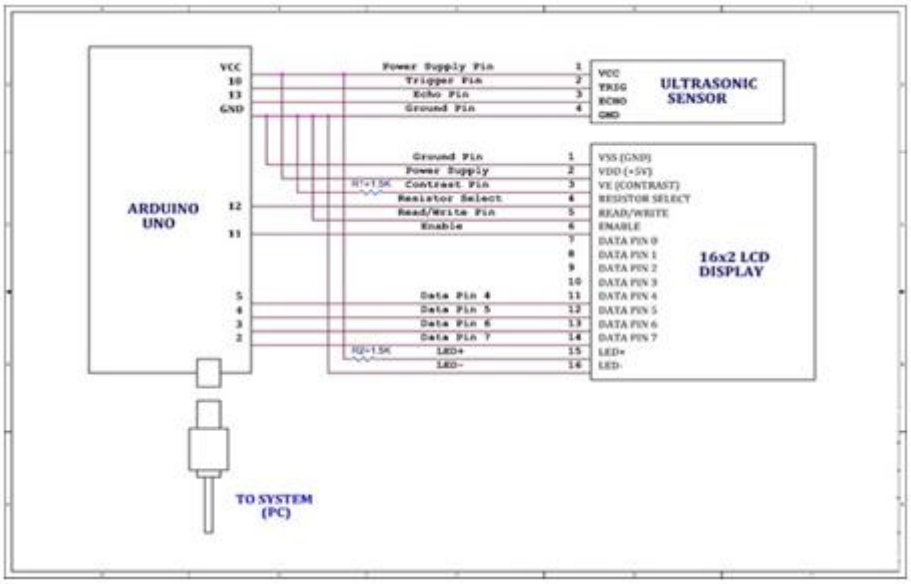

Figure 1: Ultrasonic Rangefinder using Arduino

Ultrasonic rangefinder with arduino idea is about same as the RADAR generation. Once, the pulse is transmitted in the open area. If any spacecraft, any missile isn't always there. Then, the person will now not discover any display danger message. Radar again transmits the wave. Again, it will come back, If any spacecraft or missile is in the area or incoming. That wave bombarded on the object & come back again. Then, they will get buzzer & alarming notification or threat. This process going on continuously like transmitting & receiving. this identical concept is used within the ultrasonic rangefinder using arduino. As shown in the

figure2, that's how ultrasonic sensor works as transmitting through trigger pin & receiving through the echo pin.

Block diagram explains the description about connections of the arduino, ultrasonic sensor & liquid crystal display show. Wherein pin description is displayed. Connections are completed through the male-to-male wires. Resistor is also used for the contrast adjustment for display as in keeping with person. In this diagram, input voltage, Ground, Output voltage, Data pins, Read/write pin, echo pin & trigger pin extensively utilized.

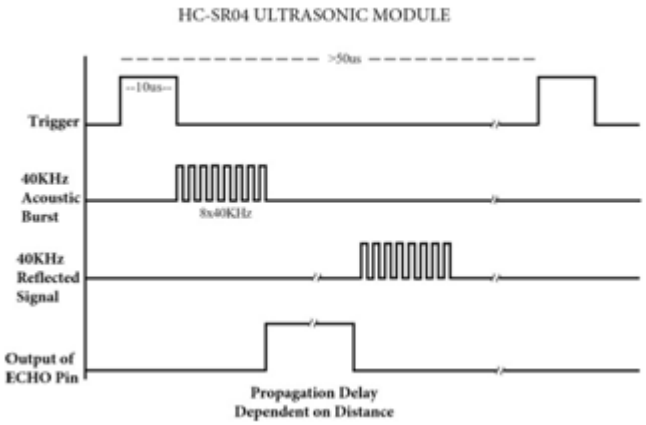

Figure 2: Ultrasonic sensor waveforms

After energized the circuit, ultrasonic sensor transmits ultrasonic waves and also receives contemplated waves from the surface of object in the front of it. If sensor senses object. it informs controller and then, it will show the distance between sensor and item on the LCD display screen connected to controller. It calculates the time of ultrasonic waves transmitted through the transmitter and obtained on the receiver and then, it shows distance between the object and the sensor. Code written inside the arduino IDE utility & dumb in ATmega328 the use of USB cable.

IV. RESULT

After a success completion of circuit assembly, operating of circuitry or ultrasonic rangefinder we were given the result as required as the accuracy distance from sensor to the item or obstacle. As proven inside the table it's far a result of the ultrasonic rangefinder. Accuracy of ultrasonic sensor may be very excessive. Consequently, the favored cost results are equal as the located fee. All of the effects are displayed at the liquid crystal display show.

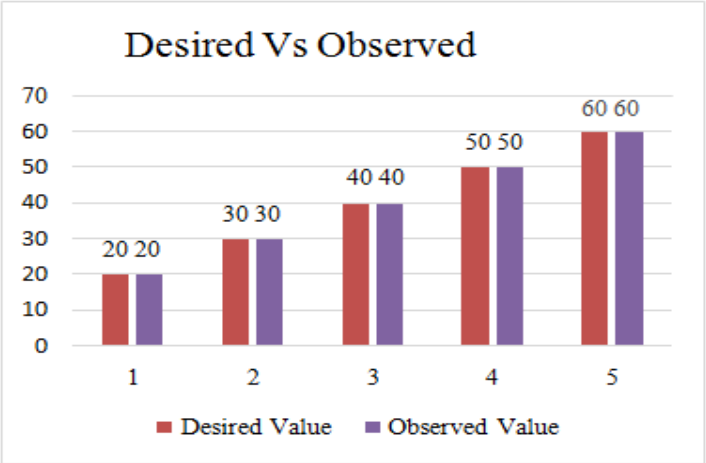

Figure 3: Graph of results

Table 1: Observations

Serial No.	Desired Value (cm)	Observed Value (cm)
1.	20	20
2.	30	30
3.	40	40
4.	50	50
5.	60	60

V. CONCLUSION

It is also smooth to use. Meeting of the ultrasonic sensor is likewise quite simple. At night time or in black surroundings sensor capability will not effect. Speed of locating the gap is very less. Accuracy of the ultrasonic sensor is very high. Downside is more power deliver is needed. After a certain restriction, sensor isn't always able to calculate the gap. It is not always capable of ship ultrasonic waves to the discover the object or impediment and many others. It's far used in the aircraft floor best, internal water it is not operating.

It is maximum generally used inside the distance locating dimension & for destiny utility, it'll be used for finding the intensity of the manhole (street). It's far used to test the extent of tank or bottle to understand how a whole lot it is packed with oil, paint, water or milk like beverages. Inside the today's automatic cars, ultrasonic sensors are used to get information approximately in where to park the automobile.

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REFERENCES

[1] G. C. Bakos, N. F. Tsagas, J. Lygouras & J. Lucas, “Long distance noncontact high precision measurements”, International Journal ofElectronics, Volume 75, Issue 6. Pages 1269-1279, 1993.
[2] P. Khoenkaw, P. Pramokchon, “A software based method for improving accuracy of ultrasonic range finder module”, Digital Arts, Media and Technology (ICDAMT), International Conference, Chiang Mai, Thailand, Electronic ISBN: 978-1-5090-5210-3, 1-4 March2017.
[3] P. Olivk, M. Mihola, P. Novák, T. Kot, J. Babjak, “The Design of 3D Laser Range Finder for Robot Navigation and Mapping in Industrial Environment with Point Clouds Preprocessing”, Lecture Notes in Computer Science book series (LNCS, volume 9991), First Online: 18 October, Online ISBN 978-3-319-47605-6, 2016.