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A Survey on Range Finder with Ultrasonic Sensor and Arduino

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***Abstract*: A range finder is a device used to find the distance from a point to the nearest obstacle. This device uses ultrasonic technology to measure the distance. You can also consider like an electronic, hassle-free version of short or long range measuring tape. It is ideal for projects involving navigation, object avoidance and home security. Typically, we can also further use this range finder as parking sensor, obstacle warning system, level controller, etc. Our project employs a LCD to display the distance.**

***Keywords*: Arduino Uno, LCD display, bread board, battery, connecting wires.**

1. Introduction

Ultrasonic sensor is a tools to measure distance without actual contact with any object. Also we can use it at several places like water level measurement, distance measurement and many more. This is the way to measure small distances precisely. With the help of our project in which we have used an Ultrasonic Sensor through which we can easily determine the distance of an obstacle from the sensor. Ultrasonic distance measurement is worked on basic principle based on ECHO. When sound waves are transmitted in environment then waves are return back to origin as ECHO after striking on the obstacle. So we just have to calculate the travelling time of both sounds means outgoing time and returning time to origin after striking on the obstacle. Distance measurement sensor is use to indicate the position of object and material. The echo time response of ultrasonic sensor detector is based on travel time when trigger pulse to the surrounding object. Ultrasonic sensor is non-linear and depends on the reflectance characteristics of the object surface. Ultrasonic sensor can be used in various fields as it has unique characteristics. One can use it in vehicles so that one can get the approximate distance between vehicle and any object. The sensor is perfect for distance measurements of stationary objects. We can measure the distance of the objects in air through non-contact technique with the help of ultrasonic sensor. Ultrasonic sensor is very reliable also it can measure the distance without any damage and it is super easy to use.

2. Literature review

In the real world Distance measurement is the activity of obtaining and comparing. It is important function in science engineering and astronomy to business activities. There are many different types of distance measurement systems which are used in our environment. Basic concept of distance measurement system is choose to take up in many areas like aviation, navigation and many more. Direct feedback system is required for linear positioning and motion control application for aviation. The example for distance measurement in navigation is GPS systems which is used in satellites. So there is no copied about the usefulness of distance measurement technology in our environment. The review literature of this project have been performed to secure more understanding to construct ultrasonic distance measurement system. The areas that were focused are on behaviour of ultrasound through journals, books, and internet.

Although many different type of ranging systems available in market, the major type of ranging systems used in technology which is Ultrasonic Ranging System.

Algorithm

Step 1:

Reset the device and emit the ultrasonic waves.

Step 2:

Arduino will command the transmit to emit ultrasonic waves of a predefined frequency.

Step 3:

It has a 2 condition

1) If the receiver doesn't receive any signal with in a particular period of time. If will display not found or false condition. (go to step 5)
2) It will record the time interval between emission and receiving.
3) The recorded time frame has dependent on wave travelling factor, which has travelled doubled of its distance.
4) Therefore, we calculate the distance as below:
   Distance= Time taken/2
5) The frequency of wave in air puts a dependency and plays a major role.

Therefore, distance = time taken / 2* 0.0344

Where 0.0344 is wavelength of ultrasonic waves

Step 4:

Arduino uno will make the calculation in background and generate the distance.

Step 5:

Compare whether value is
Dist = 0 or Dist > 0

Step 6:

If dist = 0, return (" no object found" ,return step 1)
If the dist >0, print the value and transfer the value to LCD

Step 7:

Reset.

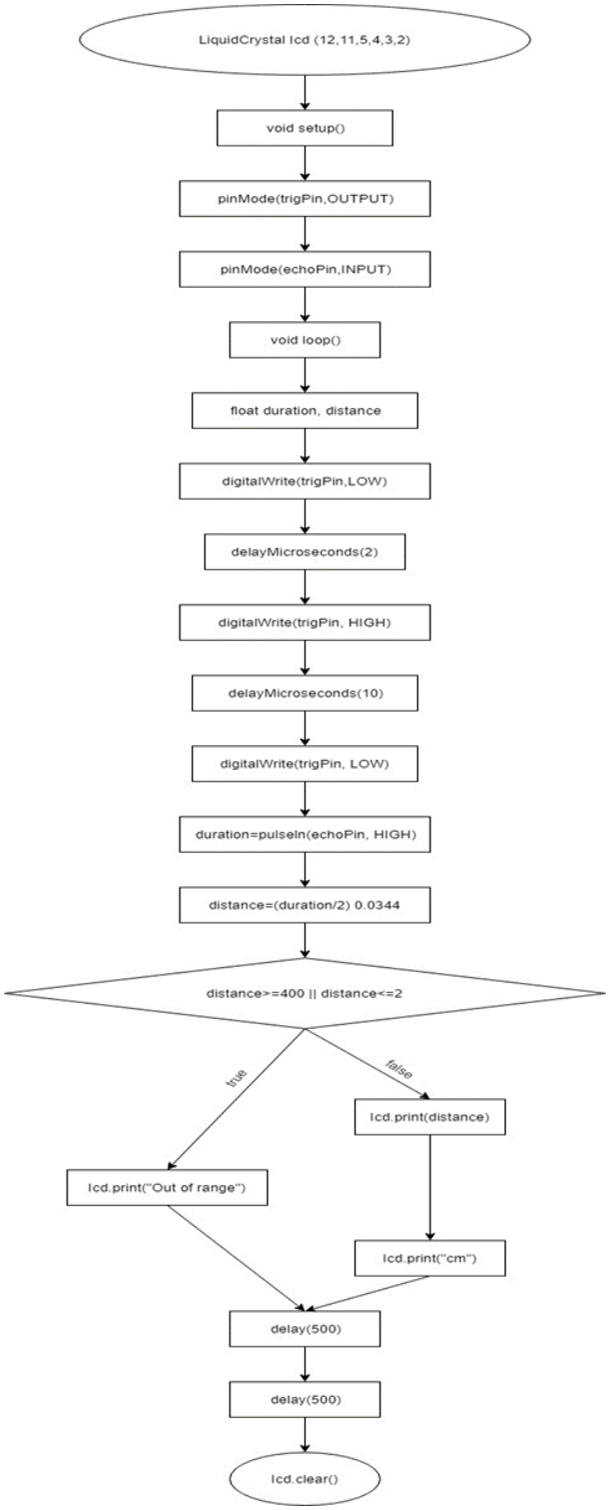

Fig. 1. Flowchart

3. Conclusion

The objective of the project is to design and legislate an ultrasonic distance meter. The device confound here can detect the target and also it can calculate the distance of the target. The ultrasonic distance meter is a low cost; it is a simple device for distance measurement. The device calculates the distance how much time taken to the object. It is a handy system for measurement of distance. The device has its application in many fields. It can be used in car backing system, automation and robotics, detecting the depth of the snow, water level of the tank, production line. This device is also used in civil and mechanical field for precise and small measurements.

For calculating the distance using this device, the target whose distance is to be measured should always be perpendicular to the plane of propagation of the ultrasonic waves. Hence the orientation of the target is a limitation of this system. The ultrasonic detection range depends on the size and position of the target when the object has not detected properly. The bigger is the target, stronger will be the reflected signal and more accurate will be the distance calculated. Hence the ultrasonic distance meter is a useful device. A sensor system was developed using inexpensive and easily available components. Based on the information obtained while designing, manufacturing and testing the prototype, it can be concluded that the system proved to be sufficiently capable for use in robots. Future research will include achieving positioning control of a small robot using the present system.

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