ISSN 2349-7815

International Journal of Recent Research in Electrical and Electronics Engineering (IJRREE)
Vol. 6, Issue 2, pp: (8-12), Month: April - June 2019, Available at: www.paperpublications.org

Low-power and compact Ultrasonic reader for sensing applications in space

S.Bhanu Sireesha[1]*, Abhinava Sriram[2], Phani[3], Lavanya[4], Bhargavi[5]

[1]Asst Professor, Dept. of ECE, LIMAT, Vijayawada, India

[2,3,4,5] UG Student, Dept. of ECE, LIMAT, Vijayawada, India

Abstract: **The proposed system "ultrasonic radar for the object detection, distance and the speed measurement" employs an ultrasonic module that includes an ultrasonic transmitter and receiver along with the Arduino Uno. It operated by transmitting 40 kHz frequency pulse which is not audible to the human ear. Module rotate with step angle of the stepper motor with specific angle for a specific time interval, microcontroller receive an echo signal back as response of the transmitted signal by transmitter and the distance between the object and system is measured by calculating time interval taken by the signal to transmit and the echo reception. Whereas the detected signal is shifted toward the module or away from the module which give the information about the speed of that detected object which is shown on PPI DISPLAY.**

Keywords**: Ultrasonic sensor, Servo motor, Led, ARM CONTROLLER.**

1. INTRODUCTION

A basic concept in automatic gun targeting system is to detect presence of living object and target its position. Targeting mechanism is automated as it uses ultrasonic sensor to detect the living object, its range and Ultrasonic sensors emit short, high-frequency sound pulses at regular intervals [1]. The echo signals are reflected back to the sensor, when the object is hit, which itself computes the distance to the target [2] based on the time-span between emitting the signal and receiving the echo. The Border security forces serve as first line of defense.

It has a land frontier of 15,200 km (9,445 mi) and a coastline of 7,516.6 km(4,671 mi) and hence it becomes necessary to secure this area[3] . The proposed system does not take full responsibility but is an effort to reduce mistakes by security personnel at border. In the robotic system the sensor is mounted at the front side of the system to detect an object it provides information about the distance between the target [6] and the Laser that is mounted on sensor. This information is displayed on the LCD screen of type 16X2 which means two rows of 16 characters each. It has LED back light. If the distance is very far, then there is no change in the speed of the dc motor. If the distance[7] is little far, then the speed of the motor is slow down. If the distance is very near, then the motor is stopped. In future the system can be enhanced using and increase the credibility of the system.

ISSN 2349-7815

International Journal of Recent Research in Electrical and Electronics Engineering (IJRREEE)
Vol. 6, Issue 2, pp: (8-12), Month: April - June 2019, Available at: www.paperpublications.org

2. SYSTEM OVERVIEW

Block Diagram of proposed method

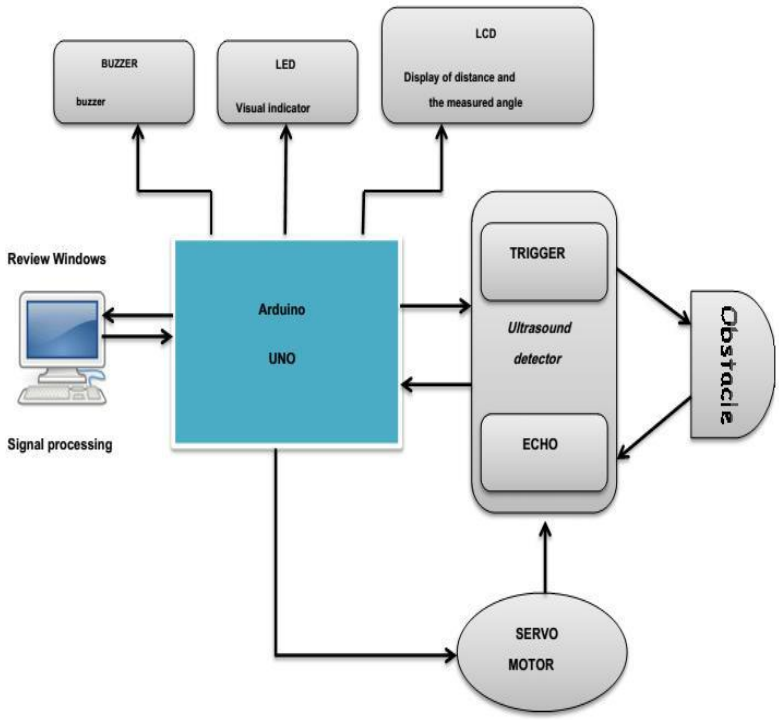

Fig 1: Block diagram of ultrasonic radar

Circuit diagram of ultrasonic radar

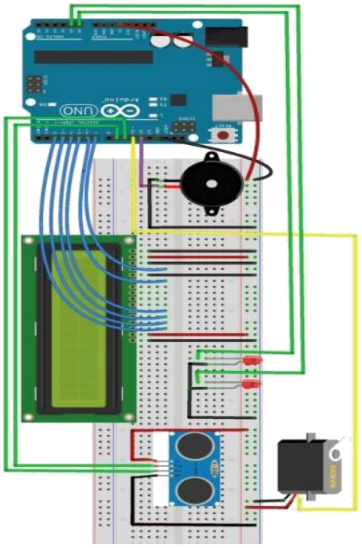

Fig 2: Circuit diagram of ultrasonic radar

As shown in the figure the living object is detected by presence of sensor which uses sound waves. The HC SR04 sends a ping as the submarine does and measures the time between sending and receiving anything back when an object (target) is in front of the sensor. Because using sound for its measurements we can reach up to 4 meters. The module has 4 pin connection. To power the module with 5volts, two pins are needed. One pin is trigger ping and last one is to read result of measurements, the echo pin. The measuring angle from HC SR04 is 15 degree and we mount this structure onto stepper motor so the angle can be effectively maximized for object detection. One ping of the HC-SR04 actually exists of 8 pulses

at 40 kHz to do the measurement. To start a ping u need to provide a 10 us pulse on the trigger input. When the distance is measured by 8 pulses the HC-SR04 puts a pulse on echo pin and calculate length of echo pulse and speed of the sound. The speed of sound is 340 m/s and to divide length of pulse by this value to obtain results in mm. The ping is travelling towards a target and back to sensor again. Because of this we need to divide result by two. Multiple sensor modules can detect a single object and generate codes which in result generates signal on the multiple ports of the microcontroller. Under such situation, it depends on the microcontroller to take the input of multiple sensors at a time and then decide the correct location of the object on the basis of received data

Conversion of echo signal for target detection

The arduino along with servo motor measures to move the ultrasonic sensor. The following is based on arduino and executes all measuring procedure, it generates signal of trigger, start of timer, measures the length of echo signal conversion of it to distance in specified unit. It certainly depends on how much of the motor rotates and targets itself to the object location and then, as the targeting function is complete with the help of interface between the ULN2803 IC and the microcontroller. The targeting system (LASER) gets activated, and light source starts focusing over the destined location. The fire lasts (beam lasts) until the sensor stops sensing the OBSTACLE.

Software

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing an other open-source software. This software can be Used with any Arduino board.

FLOWCHART

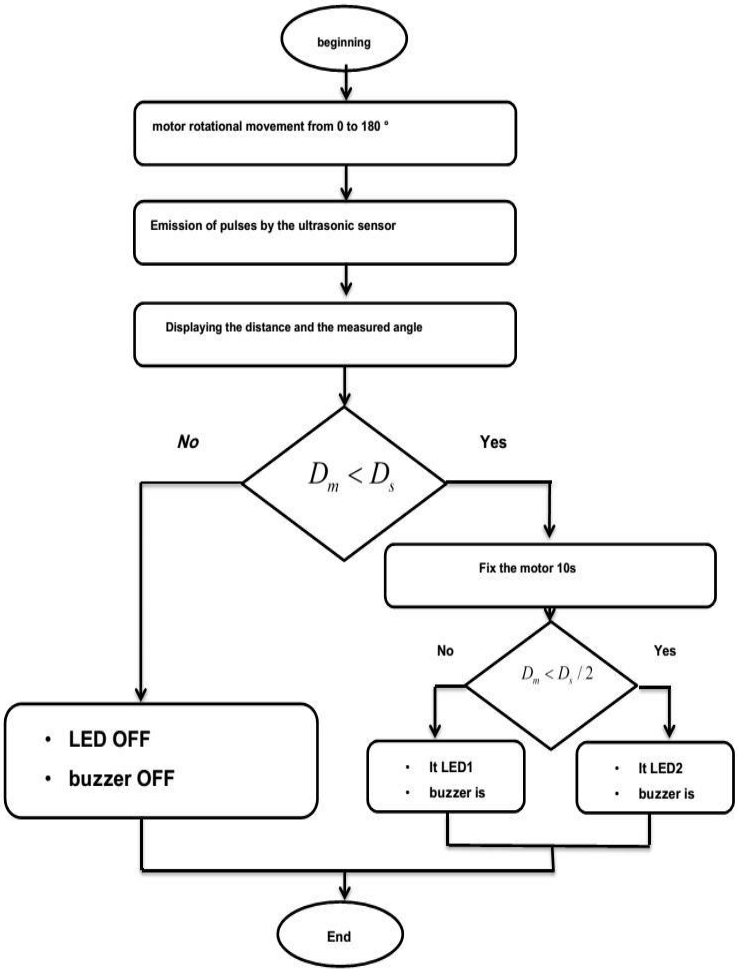

Fig 3: flow chart of ultrasonic radar

ISSN 2349-7815

International Journal of Recent Research in Electrical and Electronics Engineering (IJRREE)
Vol. 6, Issue 2, pp: (8-12), Month: April - June 2019, Available at: www.paperpublications.org

2.1.2 Rotating of servo motor and conversion of echo signal for target detection

The following is based on arduino and executes all measuring procedure, it generates signal of trigger, start of timer, measures the length of echo signal conversion of it to distance in specified unit.

It certainly depends on how much of the servomotor rotates and targets itself to the object location and then, as the targeting function is complete with the help of arduino focusing over the destined location. The fire lasts (beam lasts) until the sensor stops sensing the OBSTACLE.

3. RESULT

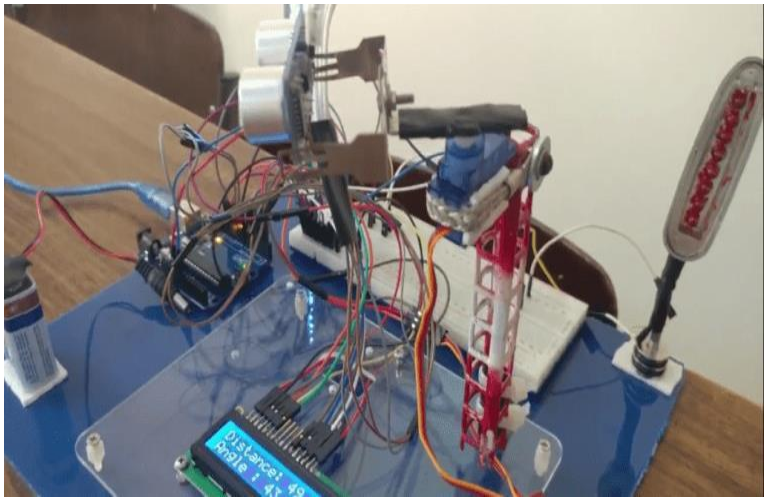

Fig 4: Hardware Implementation of the proposed model

The Arduino sends a HIGH pulse width of (10 S) on the TRIGGER pin of the sensor to regenerate a series of ultrasonic waves which propagate through the air, until it touches an obstacle and returns in the opposite direction towards the sensor pin ECHO. The sensor detects the width of the pulse to calculate the distance. The signal on pin ECHO the sensor remains at the HIGH position during transmission, thereby measuring the duration of the round trip of ultrasound and thus determine the distance. The LCD display displays the calculated distance and the angle of rotation. The buzzer is an additional component, it rings when there is a detection (Tone1 and Tone2) along with LEDs. These both LEDs along with buzzer determine the field where the object is located (near or distant).

Fig 5: Displays the status of LCD showing the name of project

4. CONCLUSION

Placing real-time radar information networks and viewing the data through Internet-like interfaces may open new possibilities in disseminating radar to those who need it and blending information from one radar system with another or other kinds of sensors.

ACKNOWLEDGEMENT

We gratefully acknowledge MR M.UMASHANKAR the Head of Department of Electronics and communication engineering for extending the support.

REFERENCES

[1] Ajay S. Mirchapure "Automatic Gun Targeting System" Vol-2, Issue-5, 2016 ISSN: 2454-1362, 2016.

[2] C. E. Daniell, D. H. Kemsley, W. P. Lincoln, W. A. Tackett, and G. A. Baraghimian, "Artificial neural networks for automatic target recognition," Opt. Eng., vol. 31, no. 12, pp. 2521–2531, Dec.2012.

[3] W. M. Brown and C. W. Swonger, "A prospectus for automatic target recognition," IEEE Trans. Aerospace Electron. Syst., vol. 25, no. 3, pp.401–410, May 2011.

[4] http://www.engineersgarage.com/contribution/automatic -gun-targeting-system

[5] http://www.academia.edu/4857984/AUTOMATIC_TA RGETING_SYSTEM4.

[6] https://learn.adafruit.com/pir-passiveinfrared...motionsensor/overview

[7] S. Blackman and R. Popoli , Design and analysis of Modern Tracking Systems , pp.309 -313 , 1999 :Artech House or heads unless they are unavoidable.