ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24MAY1055

# Detection of Obstacle Distance and Position in Surveillance Radar Using IOT

Putta Ramya Sri
Dept. of Electronics and Communication Engineering
Jawaharlal Nehru Technological University
Hyderabad, India

Banothu Bapuji
Dept. of Electronics and Communication Engineering
Jawaharlal Nehru Technological University
Hyderabad, India

Ashangari. Rakesh
Dept. of Electronics and Communication Engineering
Jawaharlal Nehru Technological University
Hyderabad, India

Bommidi Sridhar
Dept. of Electronics and Communication Engineering
Jawaharlal Nehru Technological University
Hyderabad, India

**Abstract:- Surveillance radar is most prominently utilized to detect aircraft and ships, including those in aviation, military, maritime, and security applications. Surveillance radar systems are cutting-edge technology for detecting various entities using radio waves. The main intention of this project is to design and construct a radar system to detect stationary objects by measuring their distance and angle of rotation. These mechanisms consist of a sonar-established tracking system that continuously supervises the object. This project will employ an ultrasonic sensor that is placed on a servomotor for the rotations. If the sensor detects the object, it will display the target distance and angle of rotation on the LCD with a graphical representation. The main directing tool is the Arduino UNO, which is filled with programs written in embedded C.**

***Keywords***:- *Arduino UNO, Ultra Sonic Sensor, Servo Motor, Arduino IDE.*

## I. INTRODUCTION

Radar technology is the cornerstone of military operations since it plays an important role in crucial data transmission in military stages, is used in target tracking, and is also used in surveillance. [1] And these radar systems have numerous applications in defence and civil technology. In this implementation of radar systems, the aspects of exploring defence technology with the combination of radar systems.

Since RADAR systems are prominent in the different domains for various purposes. RADAR stands for Radio Wave Detection and Ranging; the word itself reflects the transmission of radio waves for the detection and location of particular objects.

With the integration of IOT, these radar systems are becoming more efficient and effective. In the demonstration of working, these include different components like Arduino UNO, servo motor, and Ultra Sonic sensor.

## II. VITAL COMPONENTS

- *Ultra Sonic Sensor*

The ultrasonic sensor is the most influential sensor that is being used in various applications. [2] It works on theprinciples of RADAR and SONAR navigation.

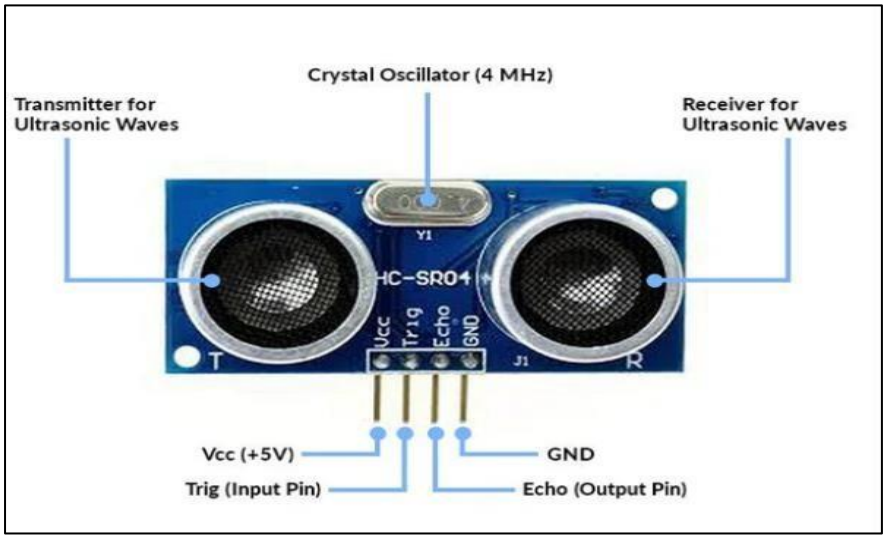


Fig 1: Ultra Sonic Sensor

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24MAY1055

These sensors produce high-frequency oscillations. It contains two modules, which include a transmitter and a receiver. Whenevertransmitter-produced waves strike an object, those waves are reflected back in the form of an echo signal to the receiver.

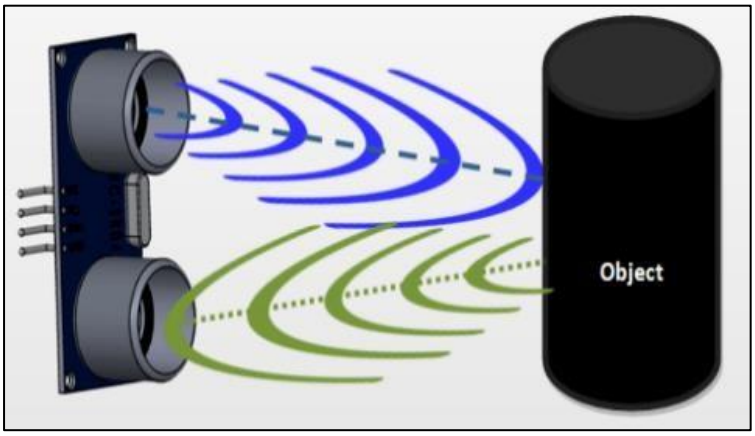


Fig2: Working of Ultra Sonic Sensor

The distance formula for the ultrasonic sensor is **Total Distance = (343 * Time of Height (ECHO) Pulse)/2. Distance=Speed*Time.**

## III. ENACTMENT

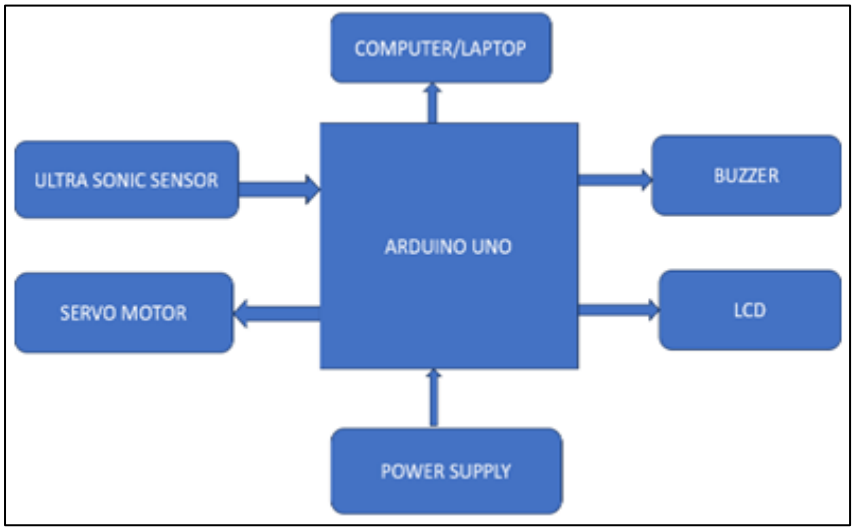


Fig 3: Layout Representation

The schematic view of the system demonstrates the workings of the radar system established on the ultrasonic sensor.

This demonstration of surveillance radar includes the Arduino UNO board, which inbuilt has various components like an ATMEGA 328p micro controller, USB port, crystal oscillator, etc. It's an accessible platform for different enhancement concepts.

It initially also had a servo motor, which is an electrical device used for the rotation of the object. We are employed with an SG- 90 servo motor that rotates from 0-180 degrees. And it's being moving with an angle of 500ms.

When we supply the power to the controlling device, which includes the Arduino UNO board, then it tends to move the servo motor as per the source code of the programming, and initially, we are placing the ultrasonic sensor on the servo motor for the rotation that accurately measures the circumvolution of the sensor for the observation. As per the working principle of an ultrasonic sensor, it emits radio waves through the transmitter, and those waves strike the stationary object and initially detect the obstacle. Simultaneously, the buzzer turns on and gives alertness. We are establishing the ultrasonic sensor range to the 1meter (100 cm) distance, and that distance can be calculated through the sensor distance formula. [5] Through the productive nature of the LCD display, it displays the object distance and the angle of rotation.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24MAY1055

## IV. OUTCOMES

The above figure depicts object detection and measuring its distance and angle of rotation.

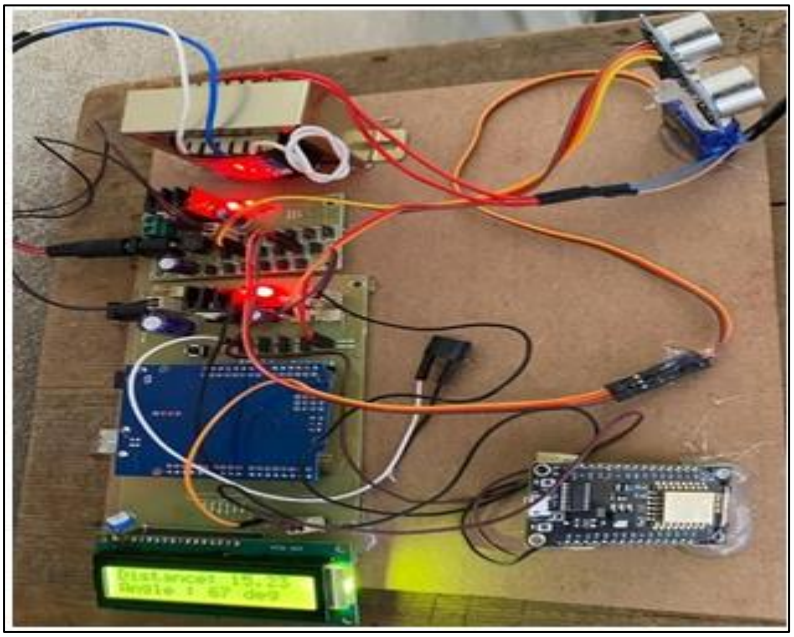

Fig 4: Physical Output of System

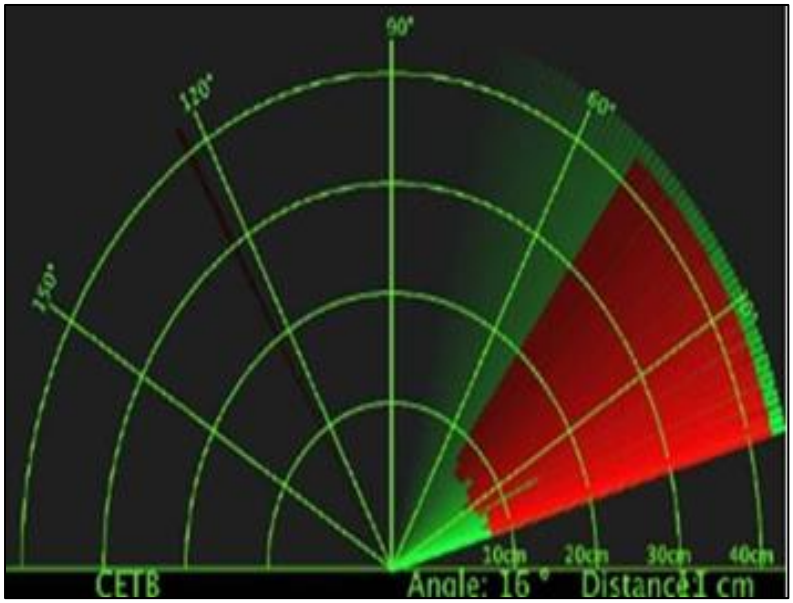


Fig 5: Radar Information

The above figure depicts the radar information for object detection distance and position. The red part includes the object.

## V. CONCLUSION

The main objective of this paper is to replicate situational awareness and response in various surveillance contexts. The represented system can detect stationary objects by measuring their accurate distance and the angle of rotation.

The downside of the project is that it only detects stationary objects and eventually rotates from 0-180 degrees. But with further modifications and customizations, these surveillance radar systems can be used to detect moving objects with an accurate angle of360 degrees.

The intention of this paper is to incorporate detecting and identifying the object and also enhance the connectivity and intelligenceof the awareness.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24MAY1055

## REFERENCES

[1]. A. Brown, B. Lee, and C. Chen, "Wideband Ultrasonic Radar for Nondestructive Testing of Concrete Structures," in Proceedings of the IEEE International Conference on Ultrasonics, pp. 256-259, Sep. 2019. DOI: 10.1109/ULTSYM.2019.8925644

[2]. Bencheikh et al., "High-Resolution Ultrasound Imaging Using Steered Frequency Modulated Signals," IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control, vol. 65, no. 1, pp. 47-56, Jan. 2018. DOI: 10.1109/TUFFC.2017.2754902

[3]. C. Chen, L. Wang, and J. Li, "Enhanced Target Detection in Ultrasonic Radar using Deep Learning Techniques," in IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control, vol. 67, no. 9, pp. 1701-1711, Sep. 2020. DOI: 10.1109/TUFFC.2020.2984551

[4]. F. Wang et al., "Design and implementation of a high-resolution ultrasonic imaging radar system for industrial nondestructive testing," IEEE Transactions on Instrumentation and Measurement, vol. 69, no. 2, pp. 529-538, Feb. 2020. DOI: 10.1109/TIM.2019.2911051

[5]. G. Yarovoy and P. W. A. Baltus, "Design of an ultrawideband synthetic aperture radar system," IEEE Transactions on Geoscience and Remote Sensing, vol. 41, no. 12, pp. 2807-2815, Dec. 2003. DOI: 10.1109/TGRS.2003.81919