



ULTRASONIC RADAR SYSTEM USING ARDUINO UNO

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Abstract : Radio detection and ranging in various places such as a military installation, commercial use is made of a RADAR SYSTEM that uses electromagnetic waves to detect various physical components such as distance, speed, position, range, direction. Size etc. which can be stationary or mobile. The use of the radar system has greatly advanced, especially in the field of navigation. In this study, we investigated existing navigation technologies and proposed an Arduino-based radar system. It has an advantage over other radar systems because the kit reduces power consumption and integrates a wide range of programmers or Arduino programmers and open source. The system consists of a basic ultrasonic sensor housed in a servomotor that rotates at a specific angle and speed. This ultrasonic sensor is connected to the digital input output pins of the Arduino and the servo motor is also connected to the digital input output pins.

Index Terms - Arduino UNO, Ultrasonic Radar System, Ultrasonic Sensor, Servo Motor

I. INTRODUCTION

We know everything produces sound wave fair by presence and impact stream of discuss around them with their normal recurrence. These frequencies are past hearing run of people. Wave of recurrence extend of 20000hz and something like that are called ultra-sonic wave and these waves can be recognized by an ultrasonic sensor which makes a difference us to get different knowledge. An Ultrasonic locator ordinarily has a transducer which changes over sound vitality into electrical vitality and electrical vitality into sound vitality. They are utilized for measuring question position and introduction, collision evasion framework, observation framework etc. Ultrasonic innovation give help from issue such as straight estimation issue, as it permits client to get non-contact estimations in this way remove between question and its speed etc can be effectively measured. [4] Speed of travel of sound wave depends upon square root of proportion between medium thickness and solidness. Moreover, property of speed of sound can moreover be changed by common environment condition like temperature. So fundamentally, an ultrasonic sensor sends ultrasonic waves which voyages in discuss and gets reflected after striking any question. By examining the property of reflected wave, we can get information almost objects separate, position, speed etc. [7] A handling computer program and an Arduino computer program is utilized with equipment framework for location of objects different parameters. One of the most common applications of ultra-sonic sensor is extend finding. It is too called as sonar which is same as radar in which ultrasonic sound is coordinated at a specific heading and if there is any question in its way it strikes it and gets reflected back and after calculation time taken to come back, we can decide separate of object.

II. EFFORTS DONE TILL NOW

2.1 LITERATURE REVIEW

The advancement and inquire about endeavors in radar have been hugely effective, and have fundamentally changed computing. Inevitably the analysts working on radar to plan and create and move forward security and client interfacing and able sufficient fulfill the aiming execution criteria desired in the distinctive environment. Radar is an protest location framework that employments electromagnetic waves to distinguish the run, elevation, heading, or speed of both moving

and settled objects such as airplane, ships, engine vehicles, climate arrangements, and landscape and when instep of electromagnetic waves, we utilize ultrasonic waves, it is called an ultrasonic radar. The fundamental components in any Ultrasonic radar are the Ultrasonic Sensors. Ultrasonic sensors work on a guideline comparative to radar or sonar which assesses traits of a target by translating the echoes from radio or sound waves. This venture points on the utilize of Ultrasonic Sensor by associated to the raspberry PI board and the flag from the sensor encourage given to the screen shaped on the portable workstation to degree the nearness of any deterrent in front of the sensor as well as decide the extend and point at which the impediment is identified by the sensor. [1] In 1842, Christian Doppler impact is the clear alter in recurrence or pitch when a sound source moves either toward or absent from the audience, or when the audience moves either toward or absent from the sound source. [2] In 2010, Milenko S. Andrić, Boban, P. Bondžulić, and Bojan M. Zrnić's paper the database of radar echoes from different targets has been portrayed. The database is accessible for open download. The unearthly examination conducted in this paper is utilized to extricate exceptionally fundamental data that seem be utilized for classification. [3] In 2012, Alexander Angelov, Andrew Robertson, Roderick Murray-Smith, Francesco Fio's paper has displayed comes about for classification issues in the car radar setting utilizing diverse neural organize structures.

III. PROPOSED METHODOLOGY

3.1 HARDWARE REQUIREMENTS

1. Arduino UNO
2. Ultrasonic Sensor
3. Servo Motor
4. Wires



Ultrasonic Sensor



Arduino UNO



Servo Motor

Figure: 1 Components Used for the Circuit.

3.2 CIRCUIT CONNECTIONS

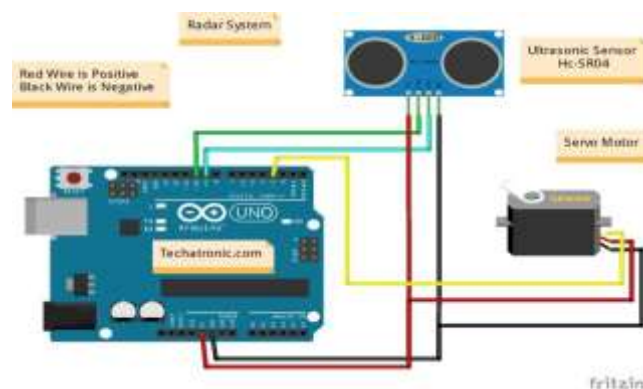


Figure:2 Proposed Circuit Diagram.

Figure shows hardware system design which was designed using fritzing environment. It shows the connection of different electronics components. In the figure triggering pins of ultrasonic sensor is connected to D8 pin of Arduino, control line of servo motor is connected to D6 pin of Arduino and D7 pin of Arduino is connected to echo pin. VCC pins of servo motor and ultrasonic sensor is connected to 5V pin of Arduino while ground pin of Arduino is connected to ground pin of both servo motor and ultrasonic sensor.

3.3 WORKING OF THE CIRCUIT

The point of this venture is to calculate the separate position and speed of the question set at a few remove from the sensor. Ultrasonic sensor sends the ultrasonic wave in distinctive headings by pivoting with offer assistance of servo engine. This wave voyages in discuss and gets reflected after striking a few question. This wave is once more detected by the sensor and its characteristics is examined and yield is shown in screen appearing parameters such as separate and position of question. Arduino IDE is utilized to type in code and transfer coding in Arduino and makes a difference us to sense position of servo engine and posting it to the serial harbour along with the separate of the closest protest in its way. The yield of sensor is shown with the offer assistance of handling computer program to grant last yield in show screen.

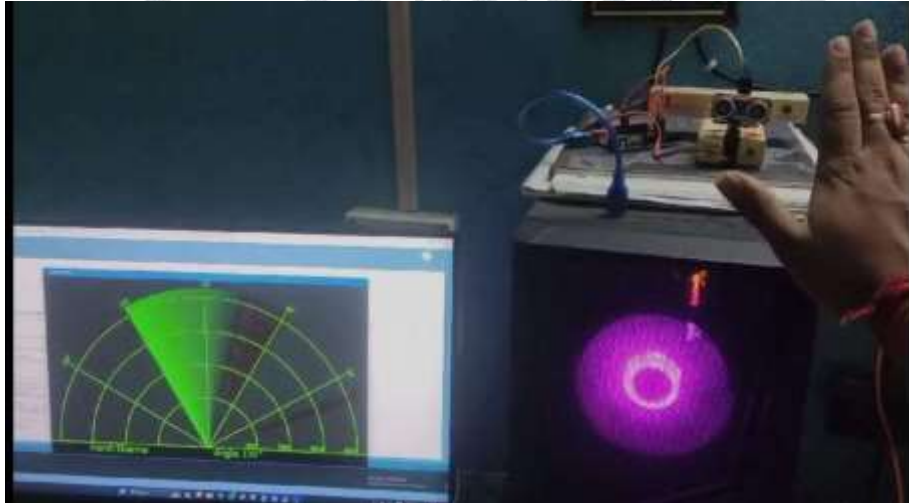


Figure: 3 Working Procedures and Result

IV. FUTURE SCOPE

The inception of radar, or radio detection and ranging, occurred 110 years ago under proprietary development. Over time, its applications diversified, and system concepts adapted to evolving technologies to meet specialized needs. These applications span velocity management, traffic control, artificial aperture radar, mobile and space missions, military operations, and remote sensing. Ongoing research in medical applications focuses on advancements in cancer detection and tumor localization. [5] The automotive sector sees millions of radar systems produced annually for safety and autonomous driving purposes. The coming years hold the potential for significant advancement in radar technology, potentially revolutionizing current concepts. Despite notable progress, radar technology has not experienced the same level of development as communication or other fields over the past two decades. However, emerging technologies may soon infiltrate radar systems, ushering in new features and signal processing capabilities.

V. CONCLUSION

In this paper a framework radar framework was outlined with the offer assistance of Arduino, servomotor and ultrasonic sensor which can identify the position, separate of impediment which comes in its way and changes over it into outwardly representable form.[6] This framework can be utilized in mechanical technology for protest location and shirking framework or can too be utilized for interruption location for area sizes. Range of the framework depends upon sort of ultra-sonic sensor utilized. We utilized HC- SR04 sensor which run from 2 to 40 cm

VI. REFERENCES

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