International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Special Issue: 1 Volume No.7 April – 2023
DOI:10.46647/ijetms.2023.v07si01.033 ISSN: 2581-4621

Spying Purpose Radar using Ultrasonic Sensor

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***Abstract*—**The RADAR SYSTEM uses electromagnetic waves to detect different physical components such as distance, speed, position, range, direction, size, and others in places such as military installations and commercial settings. A variety of physical components can be detected using electromagnetic waves, such as range, distance size, position, speed, direction, and those that are fixed or in motion. A significant advancement has been made in the use of radar systems, particularly in navigation. In this study, we investigated existing navigation technologies and proposed an Arduino-based radar system. Ultrasonic sensors are mounted on servo motors that rotate at specific angles and speeds. This system outperforms other radar systems in terms of power consumption and compatibility with Arduino programmers. This ultrasonic sensor is connected to the digital input and output pins of the Arduino, as is the servo motor.
Keywords—*RADAR , Arduino , Ultrasonic sensor*.

INTRODUCTION

As we all know, everything by its very existence emits sound waves whose natural frequency affects the airflow around them. Humans are not able to hear these frequencies because they are outside their range of hearing. Ultrasonic waves have a frequency range of 20000 Hz and more, and these waves can be detected by an ultrasonic sensor, which allows us to obtain various information. A transducer converts sound energy into electrical energy and electrical energy into sound energy in an ultrasonic detector . They are used to determine the position and orientation of objects, as well as for collision avoidance and surveillance systems.

Ultrasonic technology solves problems such as linear measurement by allowing the user to make non-contact measurements, making it easy to determine the distance between objects, velocity, and other factors

The speed at which a sound wave propagates is determined by the square root of the ratio between the density and the stiffness of the medium. The sound velocity property can also be affected by natural environmental factors such as temperature. Thus, an ultrasonic sensor emits ultrasonic waves that travel through the air and are reflected when they strike an object. Based on the characteristics of the reflected waves, we can determine the distance, position, and velocity of objects . For object detection, a processing programme and Arduino software are combined with a hardware device.

Distance measurement is one of the most common applications for ultrasonic sensors . It is also known as sonar and is similar to radar in that ultrasound is sent in a specific direction. If an object is in its path, it collides with it and bounces back, so we can determine the distance of the object by calculating the time it takes to return. Bats use this technique in the wild .The same technique we are going to use here in our project.

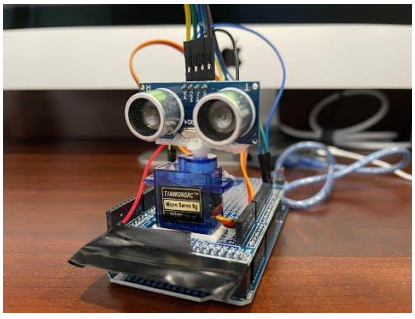

Figure 1: Radar model using Ultrasonic sensor

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EXISTING SYSTEM

This paper is about an Arduino-controlled radar system. The basic components of this RADAR system are an ultrasonic sensor and a servo motor. The main purpose of the system is to detect objects within a certain range. The servo motor is coupled with an ultrasonic sensor that rotates 180 degrees . In the existing system the sensor is used to find the distance and position along with the direction of the object with in the range of the Radar.

The sensor sends the sound waves into the air those will crash with the objects and reflected back .This wave is captured by the sensor and its properties are examined, with the results displayed on the screen as metrics such as object distance and position. The Arduino IDE is used to write and transmit code in Arduino that allows us to detect the position or angle of a servo motor transmitted through the sequential port along with the separation by the nearby object in its path. The output is displayed in the processing program that shows the input/output and the range of the object. The sensors are designed to have an ultrasonic sensor connected to the servo motor to detect the object and its distance.The ultrasonic sensor and servo motor are controlled by an Arduin, and both are powered by the microcontroller.

The ultrasonic sensor is connected to the servo motor in this system. The Arduino board controls the combination to determine the distance between an object and the sensor.

This Radar systems application is to identify the object and provide the output as distance , position etc . These are mainly used in applications like tracking, spying etc .But it also have drawbacks like

1. It only detects but doesn't provide any alert so continuous monitoring of the output is required.
2. It won't provide any protection to the areas where these are used .
3. It takes more action time in case of threats and require more man power
4.

PROPOSED SYSTEM

Our system's main motto is to make an automatic radar system that will improve the performance of the Radar system in terms of the protection .In our system we are having Ultrasonic sensor mounted on the the servo motor that is capable of rotating with a wide angle of 180°. Since it will be will be rotating continuously the waves will be spontaneously sending of receiving of waves will be done.

Everytime wave reaches the receiver of the sensor the data of the wave will be sent to the controller . In the Arduino a code will be written to find the distance of the object from the sensor , it provides the angle based on the rotation of the servo motor.

Now our actual goal comes into action . The data of the reflected waves is examined and the wave will be classified as object detected in the field or away from the field . The area that is being protected by our radar will be in the shape of semi-circle and when any object enters into that range our defense system will activate.

Now we have three LED's in the block diagram that gives us the information on the ranges of the distance of the object. Let us assume that the object is not yet entered into the range that is to be protected the the green LED will be in ON state and the Buzzer will be in OFF state. If any object entered into the protected are then the buzzer gets activated and give short beep and the yellow LED

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will glow . If the object travels towards the center and reaches near to the home point then buzzer gives long beep and Red LED will glow indicating the emergency of action to be taken.

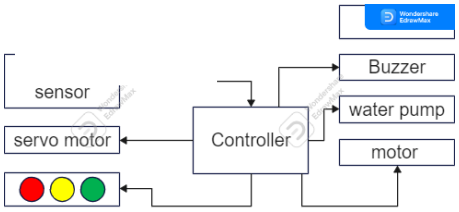

Figure 2 :block diagram of enhanced system

Figure 3: Flow representing the process of mail alert

The area is being divided into three regions and each region will have a defense mechanism that will gets activated when an objected into that region and this will represent the automatic detection and destroying . Our system will also send a mail alert to the concerned authority that someone has entered into our area that is under protection as shown in the above figure.
Let us consider object is being detected in the region that have a mechanism of the water pump this pump will spray poisonous liquid to the whole region under its control so that if any human being present will be affected. In the same way if object is detected in the region that comprises of the defense mechanism of the motor . It makes to object stuck inside by locking them instantly.
This concept of dividing region into parts will reduce the power consumption and improves accuracy . The concept of using different mechanisms of defense is to give brief idea on how can we activate defense systems . we can place any kind of defense equipment in its place like Machine gun, Grenade launcher.

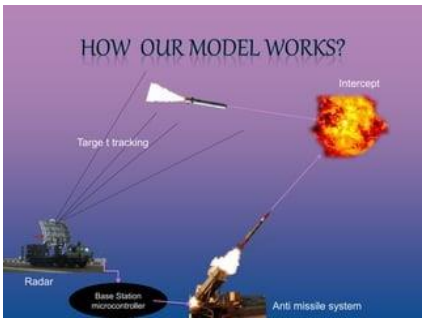

Figure 5:Demonstration of our system in real life

IV CONCLUSION & FUTURESCOPE

We have represented the Radar system that detects and destroys the object but we have a lot more to update in future for this project by using technologies like WiFi and internet monitoring etc..
We can improve the system in such a way that it automatically reloads the artillery and boosts protection.We can expand our systems detection range and the reduce the action time of the system in future by adapting new technologies.

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We represented an Ultrasonic RADAR proposal for a security system that detects human or object interference in a limited range. The system has been executed successfully, and the goal has been met without any deviations. We may enhance this system by making it transportable and adding an alert system that activates when an impediment is identified. Additional improvements could include an obstacle-circumventing robot with an investigation system.

REFERENCES

[1] Manimegalai L,S.G.Hymlin Rose,Abinaya B "Enhanced Military Spying Sonar Radar System using Ultrasonic Sensor"2022 International Conference on Computer Communication and Informatics (ICCCI), Jan. 25 – 27, 2022, Coimbatore, INDIA.
[2] P. Andrew Karam. Radar Mapping of Solar System. 2020.
[3] Joshi M., Agarwal A.K., Gupta B. (2019) Fractal Image Compression and Its Techniques: A Review. In: Ray K., Sharma T., Rawat S., Saini R., Bandyopadhyay A. (eds) Soft Computing: Theories and Applications. Advances in Intelligent Systems and Computing, vol 742. Springer, Singapore.
[4] R .J. Mailloux, Phased Array Antenna Handbook, 3rd ed., Artech House, London, 2018.
[5] Wisland, Dag T., et al. "Remote monitoring of vital signs using a CMOS UWB radar transceiver." New Circuits and Systems Conference (NEWCAS), 14th IEEE International. IEEE, 2016.
[6] Ch. Alexandrov, "Radar imaging and radar image processing," in Proc. 7th Int. Conf. CEMBEF, Niš, Serbia, August 28-31, 2013.