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AERIAL OBJECT DETECTION USING RADAR SYSTEM

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Abstract: Radar is an object detection system which uses radio waves to determine the range, altitude, direction, or speed of objects. The radar dish or antenna transmits pulses of radio waves or microwaves which bounce off any object in their path. Arduino is a single-board microcontroller to make using electronics in multi disciplinary projects more accessible.

This project aims at making a Radar that is efficient, cheaper and reflects all the possible techniques that a radar consists of. 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. It operated by transmitting 40 kHz frequency pulse which is not audible to the human ear.

Keywords: Radar, Antenna, Arduino, microcontroller

I. INTRODUCTION

Radar is an object detection system which uses radio waves to determine the range, altitude, direction, or speed of objects .Radar systems come in a variety of sizes and have different performance specifications. Some radar systems are used for air-traffic control at airports and others are used for long range surveillance and early-warning systems. A radar system is the heart of a missile guidance system.

Small portable radar systems that can be maintained and operated by one person are available as well as systems that occupy several large rooms. Radar was secretly developed by several nations before and during World War II. The term Radar itself, not the actual development, was coined in 1940 by the United States Navy as anacronym for radio Detection and Ranging.

The modern uses of radar are highly diverse, including air traffic control, astronomy, air, antimissile systems marine radars to locate landmarks and other ships: aircraft anti-collision systems; ocean surveillance systems, outer space surveillance and rendezvous systems A processing software and an Arduino software is used with hardware system for detection of objects various parameters. One of the most common application of ultra-sonic sensor is range finding.

It is also called as sonar which is same as radar in which ultrasonic sound is directed at a particular direction and if there is any object in its path it strikes it and gets reflected back and after calculation time taken to come back we can determine distance of object, in real life this method is used by bats.So basically, an ultrasonic sensor sends ultrasonic waves which travels in air and gets reflected after striking any object. By studying the property of reflected wave, we can get knowledge about objects distance, position, speed etc.

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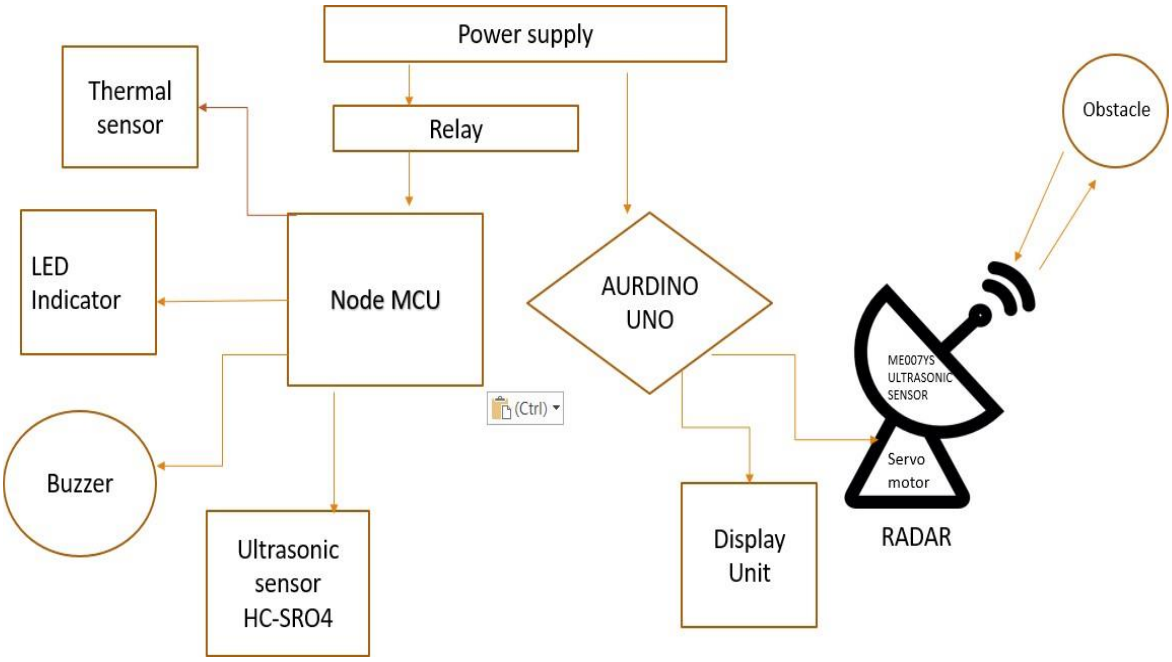
II. METHODOLOGY



- The system uses an ultrasonic sensor to detect objects within its range and a servomotor to rotate the sensor and cover a 180-degree angle.
- An Arduino controller is used to trigger the sensor and receive data from it. The controller has digital input and output pins that can be used to connect hardware and software components.
- The Arduino sends a 10 microsecond pulse on the TRIGGER pin of the ultrasonic sensor to generate ultrasonic waves that propagate through the air until they encounter an obstacle and reflect back towards the sensor.
- The sensor measures the width of the pulse on the ECHO pin to calculate the distance to the object.
- The position of the servomotor is controlled by code on the Arduino to cover a 180-degree angle and detect objects within that range.
- The calculated distance and angle of rotation are displayed on an LCD screen.
- A buzzer and two LEDs are used to indicate whether an object is near or far. The buzzer plays different tones (Tone1 and Tone2) depending on the distance of the object.

III. RESULT

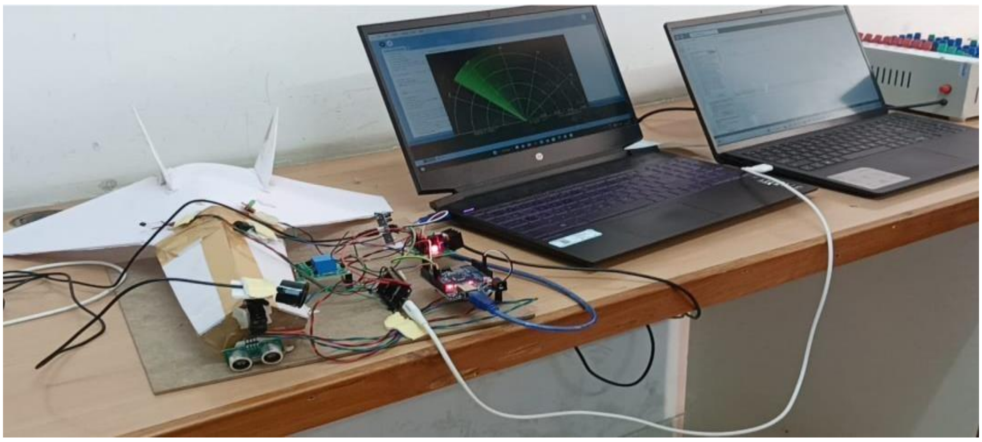


FIG.1 Model setup

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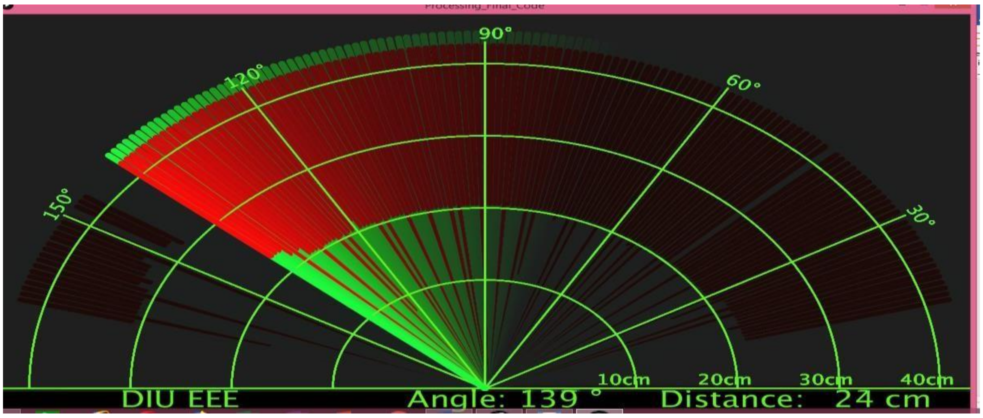

FIG.2 Object detection and Distance calculation

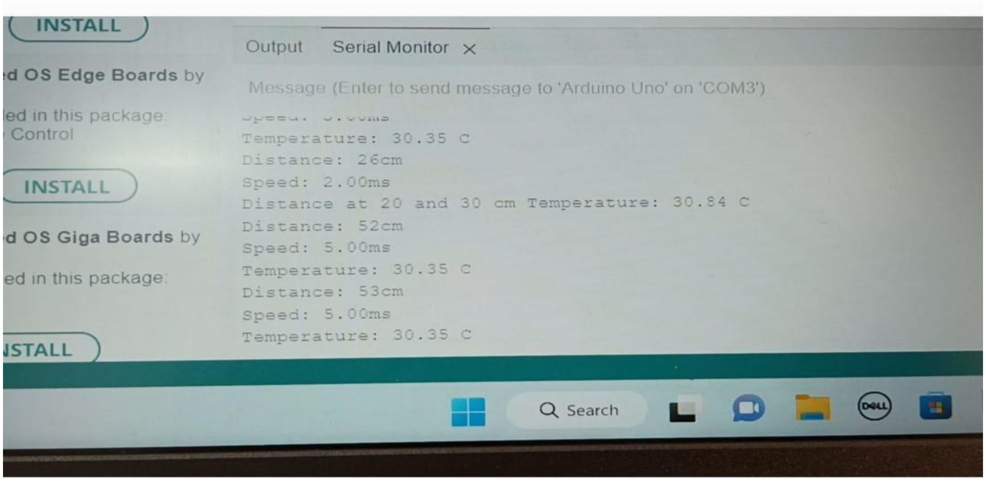

FIG.3 Speed , Temperature and Distance calculation

IV. CONCLUSION

In this paper, a lab scaled radar system was designed and implemented using an Arduino, a servomotor and an ultrasonic sensor. The developed system is able to read the distance of the obstacles and the angle of incident and convert this data into visually represented information .The system performance measures up with other systems at its level as it adequately reports any obstacle it find sin its path and provides an estimated range of the object. A very handy application for this system would be in the area of object detection and avoidance systems for robotics or maybe in intrusion detection systems for location sizes where it may not be economical to use multiple units to provide adequate coverage. The system's range is dependent on the range of the ultrasonic sensor that is used. In this system, the HCSR04 ultrasonic sensor was used which has a range between 2cm and 350cm.

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