DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING

College of Engineering and Technology

SRM Institute of Science and Technology

MINI PROJECT REPORT

ODD Semester, 2023-2024

Lab code & Sub Name   :18ECO108J EMBEDDED SYSTEM DESIGN USING ARDUINO

Year & Semester   : Year 3 / Sem 5

Project Title   : RADAR using Ultrasonic Sensor and Servo

Lab Supervisor   : **Mr.A.Joshua Jafferson** AP/ECE

Team Members   : 1. Sai Saathvik Medepalli (RA2111026010522)
2. Chevella Aravind Reddy (RA2111047010228)
3. Aarohi Kothari (RA2111047010227)

Particulars	Max. Marks	Marks Obtained	
		Name: Sai Saathvik Medepalli Chevella Aravind Reddy Aarohi Kothari	
		Rgn No : RA2111026010522 RA2111047010228 RA2111047010227	
Program and Execution	20		
Demo verification and viva	15		
Project Report	05		
Total	**40**		

RADAR using ultrasonic sensor and servo

OBJECTIVE:

The RADAR is built using Arduino UNO R3 and a C++ code is written and executed. It is built using an Ultrasonic sensor which works by emitting sound waves at a frequency too high to hear for humans.

ABSTRACT:

The RADAR is built using arduino UNO R3 which connects with the computer and will execute the code given to it and will identify object around it.
This abstract summarizes a project involving radar functionality implemented with an Arduino UNO R3, utilizing an ultrasonic sensor and a servo motor. In this setup, the ultrasonic sensor provides distance measurements while the servo motor enables a scanning motion. Together, they create a basic radar system for detecting and tracking nearby objects.

INTRODUCTION:

Radar is a fascinating technology that helps us detect objects and measure distances. With just an Arduino Uno R3, an ultrasonic sensor, and a servo motor, you can create a simple radar system. The ultrasonic sensor sends out sound waves, and when they bounce back from an object, it calculates the distance. The servo motor then rotates the sensor, scanning the area and creating a 360-degree view. By connecting these components and writing some code, you can build your own basic radar system that can find nearby objects and display their positions, opening up exciting possibilities for projects and experiments.

HARDWARE/SOFTWARE REQUIREMENTS:

- Arduino UNO R3
- PC
- Bread Board
- Ultrasonic Sensor
- Servo
- Jumper Wires

CONCEPTS/WORKING PRINCIPLE

A radar system using an Arduino UNO R3, ultrasonic sensor, and servo operates by emitting high-frequency sound waves (ultrasonic pulses) from the sensor. The sensor then measures the time it takes for these waves to bounce off an object and return. By calculating the time delay, the Arduino determines the distance to the object. The servo motor rotates the sensor horizontally, allowing it to scan different angles. This process is

repeated to create a complete scan, creating a 2D representation of the surrounding objects' positions. By analyzing the data, the Arduino can detect and display objects within its range, providing a simple radar-like system for object detection and tracking.
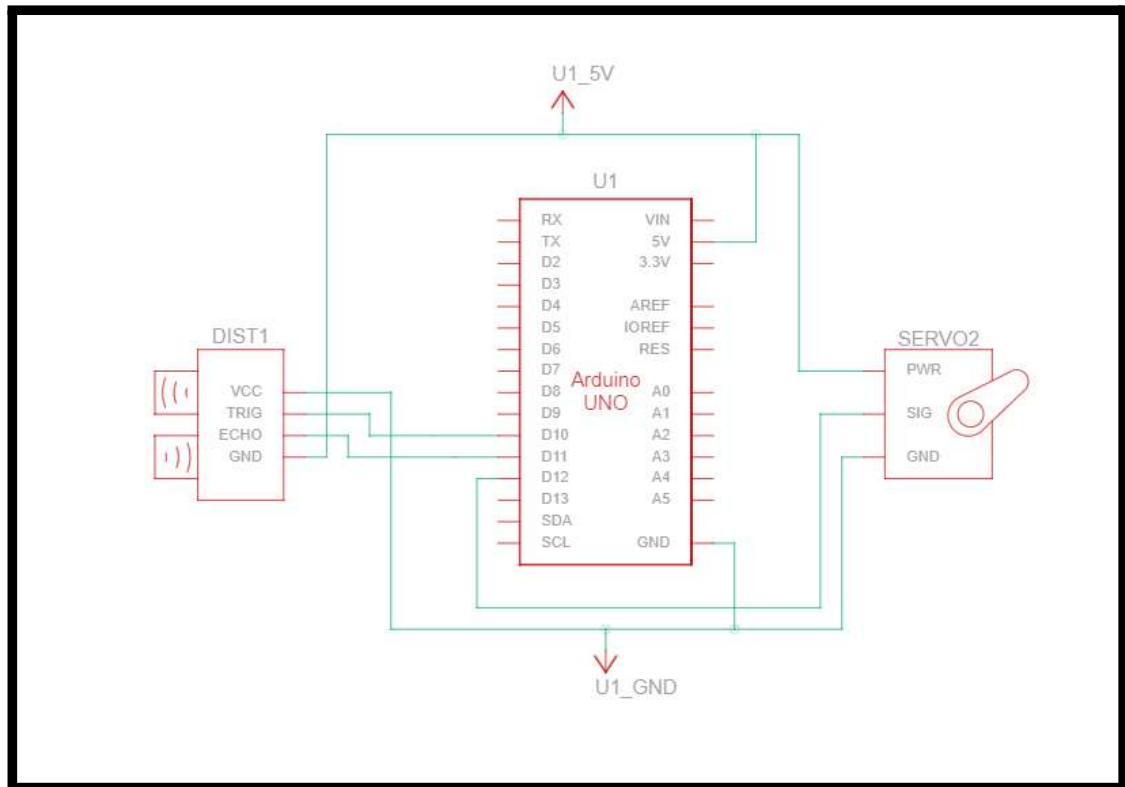
APPROACH/METHODOLOGY/PROGRAMS:

```
#include <Servo.h>
const int trigPin = 10;
const int echoPin = 11;
long duration;
int distance;
Servo myServo;
void setup() {
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  Serial.begin(9600);
  myServo.attach(12);
}
void loop() {
    for(int i=0;i<=180;i++){
  myServo.write(i);
  delay(2);
  distance = calculateDistance();
  Serial.print(i);
  Serial.print(",");
  Serial.print(distance);    Serial.print(".");
```

```arduino
    }
     for(int i=165;i>15;i--){
   myServo.write(i);
   delay(2);
   distance = calculateDistance();
   Serial.print(i);
   Serial.print(",");
   Serial.print(distance);
   Serial.print(".");
   }
}
int calculateDistance(){

  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);
  duration = pulseIn(echoPin, HIGH);
  distance= duration*0.034/2;
  return distance;
}
```
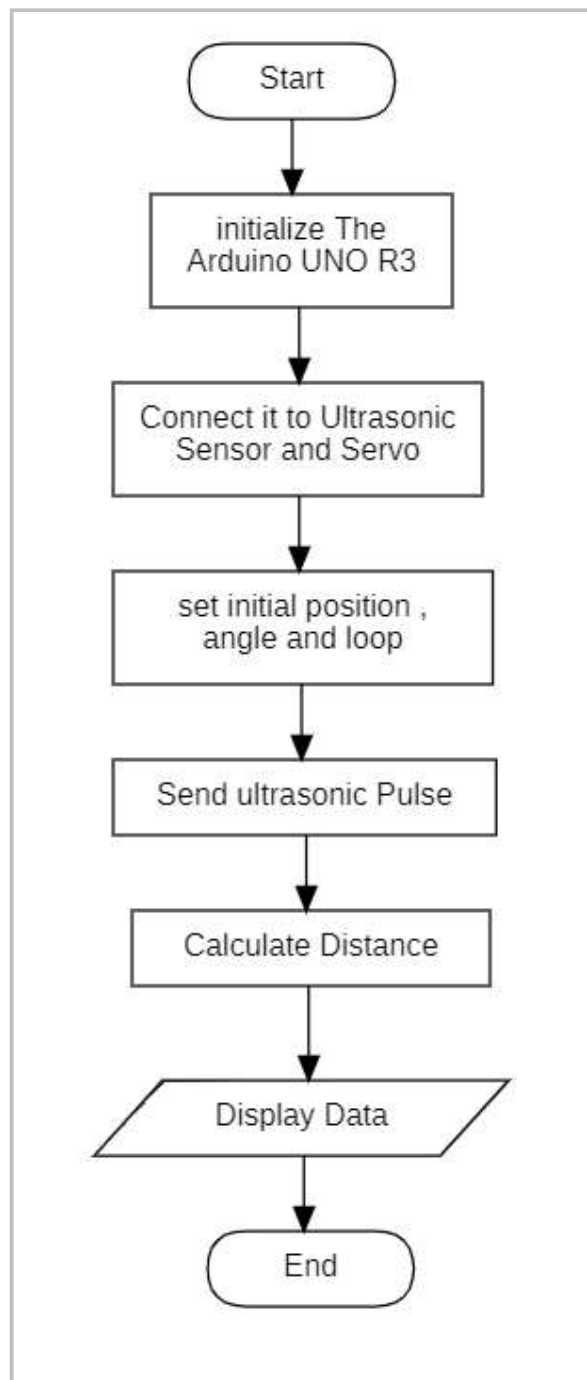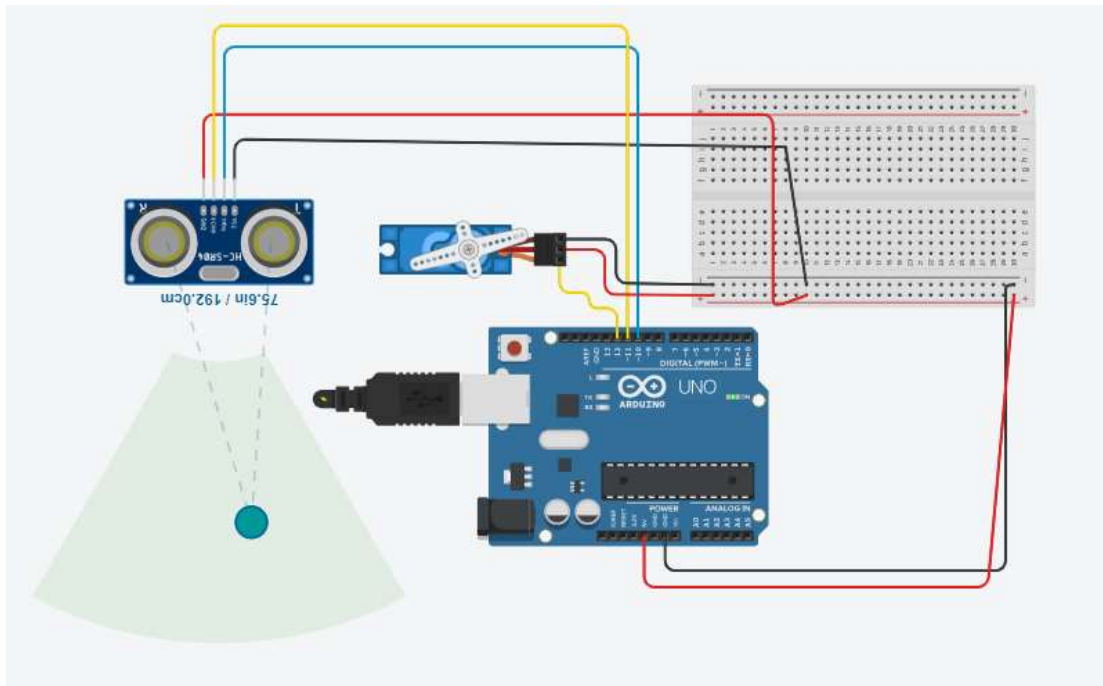
FLOWCHART:

OUTPUT:

CONCLUSIONS:
Thus the RADAR is constructed and the distance of the object is detected and distance is measured with its range.

REFERENCES:
https://projecthub.arduino.cc/nimishac/ultrasonic-radar-with-arduino-19baa3