
# DEPARTMENT OF APPLIED PHYSICS

## Microwave Engineering (EP306)

PROJECT PRESENTATION

# PROJECT TITLE :

## RADAR (Radio Detection and Ranging) USING ARDUINO UNO


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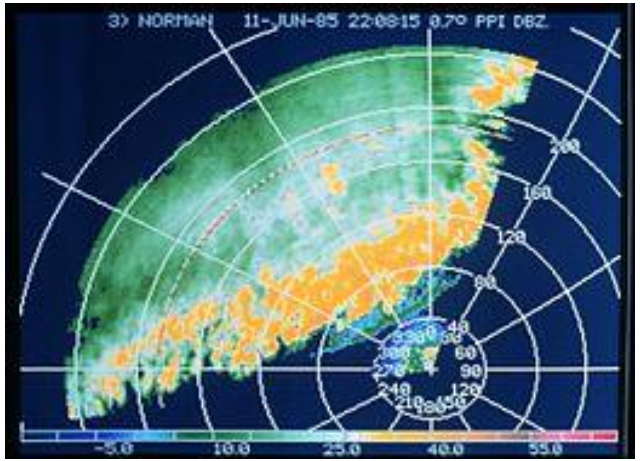
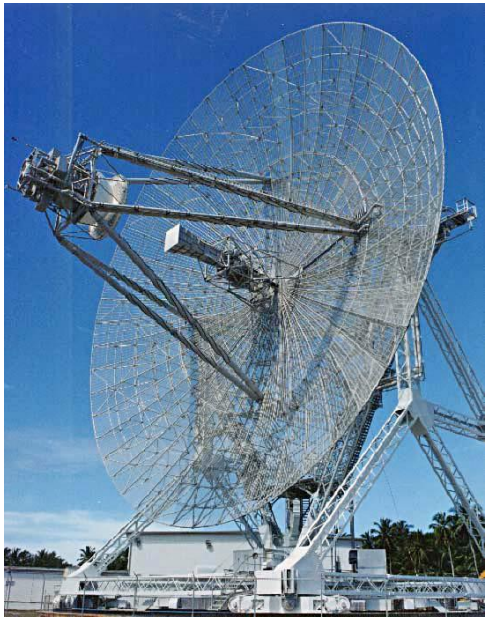
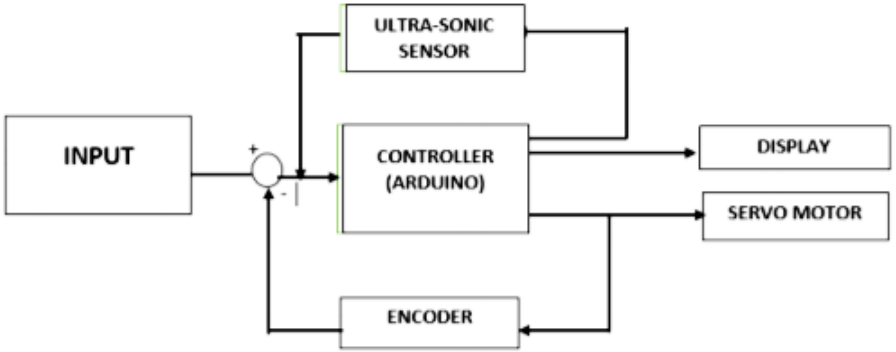


# RADAR :

RADAR system is an object detection or tracking system which uses radio waves to decide or get the range, height, heading, or speed of items or objects. Radar frameworks or system arrive in an assortment of sizes and have distinctive performance particulars. Some radars are utilized for aviation authority at air terminals and others are utilized for long range observation and early cautioning frameworks. There are some ways to show radar working data. There are also some modified radar systems which have advance technology of handling the systems. These modified system are used at higher levels to get or extract the helpful or important data.



## System Block Diagram:



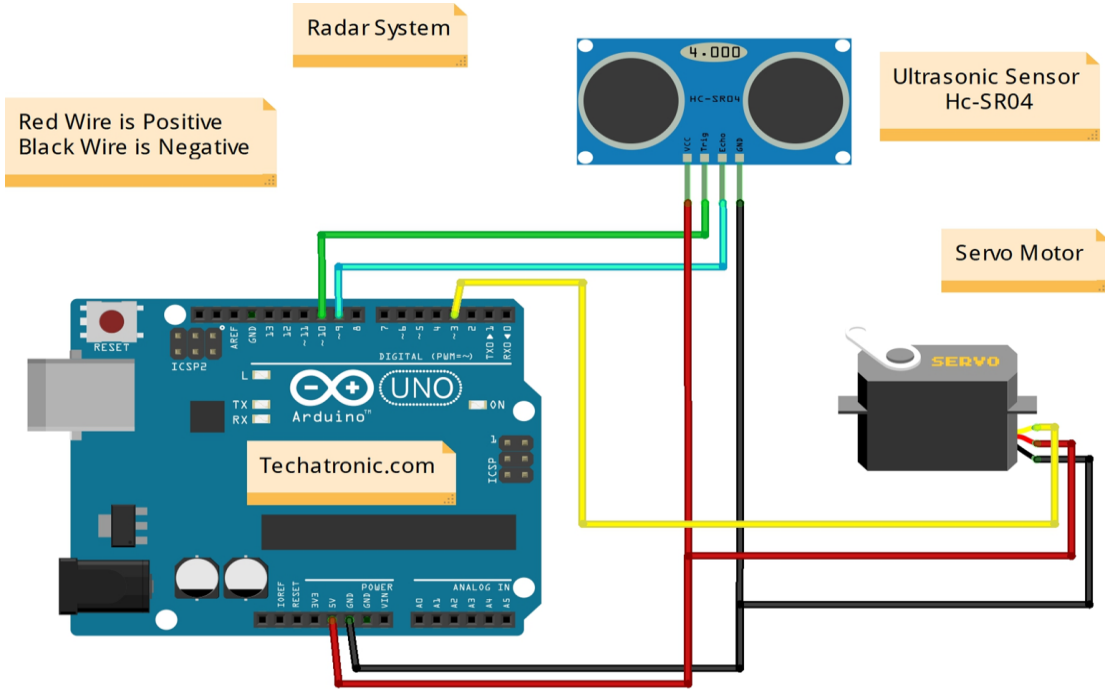

Here, it can be seen how the workflow in this radar system. The sensor is going to sense the obstacle and determine the angle of incident and its distance from the radar. The servo motor is constantly rotating to and fro, hence making the sensor move. The data obtained is encoded and fed to the processing IDE which represents it on the screen. All these operation are done by Arduino microcontroller from the rotation of the servo, data collection from the sensor, feeding the data to encoder to transferring it to the display

# Connections


- Connect the ultrasonic TRIG pin to arduino pin 10.
- Connect the ultrasonic ECHO pin to arduino pin 11.
- Take servo motor and connect signal pin to arduino pin 12.
- Connect both ultrasonic sensor and servo Vcc pin to Arduino +5V pin.
- Connect both ultrasonic sensor and servo GND pin to Arduino GND pin.

- Trigger pin is an Input pin. This pin has to be kept high for 10us to initialize measurement by sending US wave.
- Echo pin is an Output pin. This pin goes high for a period of time which will be equal to the time taken for the US wave to return back to the sensor.

# Schematic Diagram :



# Arduino IDE to program Arduino UNO

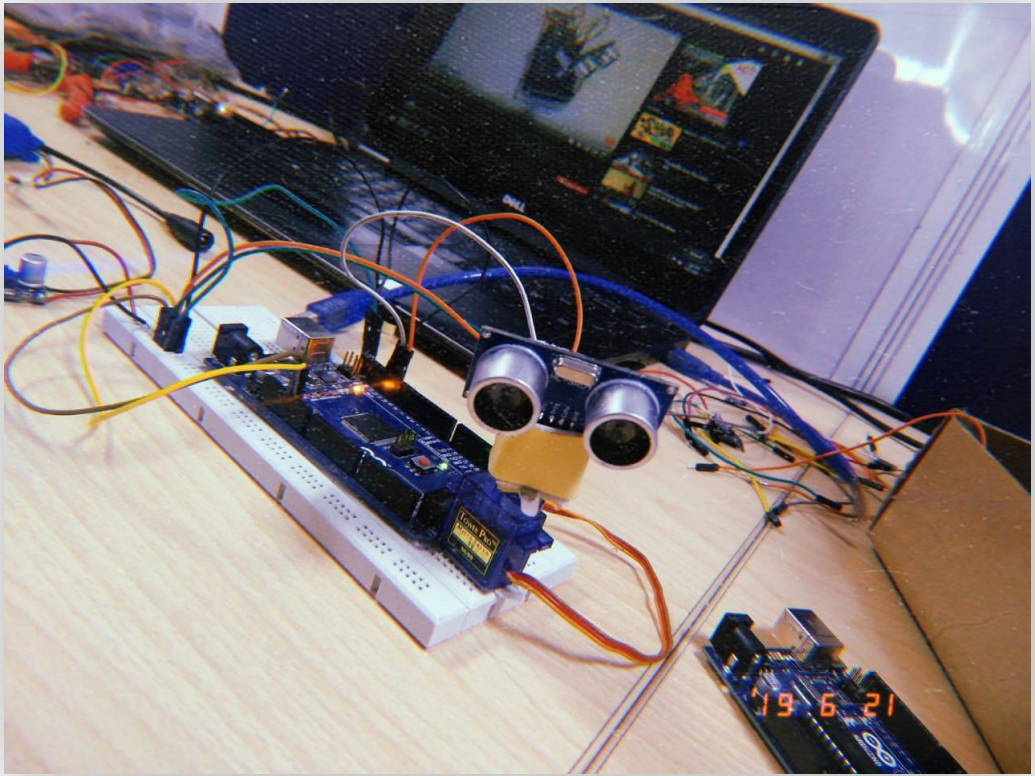
```
#include <Servo.h>.

// Defines Tirg and Echo pins of the Ultrasonic Sensor

const int trigPin = 10;

const int echoPin = 11;

// Variables for the duration and the distance

long duration;

int distance;

void setup() {

  pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output

pinMode(echoPin, INPUT); // Sets the echoPin as an Input

  Serial.begin(9600);

  myServo.attach(12); // Defines on which pin is the servo motor attached

}

void loop() {

  // rotates the servo motor from 15 to 165 degrees

  for(int i=15;i<=165;i++){

  myServo.write(i);

  delay(30);

  distance = calculateDistance();// Calls a function for calculating the distance measured by the Ultrasonic sensor for each degree
```

```
Serial.print(i); // Sends the current degree into the Serial Port

  Serial.print(","); // Sends addition character right next to the previous value needed later in the Processing IDE for indexing

  Serial.print(distance); // Sends the distance value into the Serial Port

  Serial.print("."); // Sends addition character right next to the previous value needed later in the Processing IDE for indexing

  }

  // Repeats the previous lines from 165 to 15 degrees

  for(int i=165;i>15;i--){

  myServo.write(i);

  delay(30);

  distance = calculateDistance();

  Serial.print(i);

  Serial.print(",");

  Serial.print(distance);

  Serial.print(".");

  }

}

// Function for calculating the distance measured by the Ultrasonic sensor

int calculateDistance(){

  digitalWrite(trigPin, LOW);

  delayMicroseconds(2);

  // Sets the trigPin on HIGH state for 10 micro seconds

  digitalWrite(trigPin, HIGH);

  delayMicroseconds(10);

  digitalWrite(trigPin, LOW);

  duration = pulseIn(echoPin, HIGH); // Reads the echoPin, returns the sound wave travel time in microseconds

  distance= duration*0.034/2;

  return distance;

}
```

# WORKING :

The objective of our design is to ascertain the distance position and speed of the obstacle set at some distance from the sensor. Ultrasonic sensor sends the ultrasonic wave in various ways by rotating with help of servo motors. This wave goes in air and gets reflected back subsequent to striking some object. This wave is again detected by the sensor and its qualities is analyzed and output is shown in screen indicating parameters, for example, distance and position of object. Arduino IDE is utilized to compose code and transfer coding in Arduino and causes us to detect position or angle of servo motor and it is communicated through the serial port alongside the covered distance of the nearest object in its way. Output of all of this working is shown in the software called processing, it will display the input/output and the range of the object .

# FINAL PROJECT :



# THANKYOU

2K18/EP/031 & 2K18/EP/033