Department of Electronics and Telecommunications Engineering

Mechatronic Project

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Project Title :   Radar Using Arduino and Processing

Name of Facilitator :   Prof.Rajesh Bulbule

Total Cost : Rs 700

Duration : 1 Week

Github : https://github.com/aniljames/Radar-Using-Arduino-Pricniple.git

Media Links -
https://drive.google.com/drive/folders/1mOa1lQivjw4GPW05Lis6eay4bPTd
Jwcz?usp=sharing

Overview of the project :

An Arduino radar project is more than a visual project because of its circuit
implementation. There are different hardware uses to accomplish the Arduino Radar
Sensor. Like as, Arduino UNO. HC-SRo4 Ultrasonic Sensor including a Servo Motor. The
process is shown in the block diagram

Servo Motor

Arduino UNO

PC

Ultrasonic Sensor

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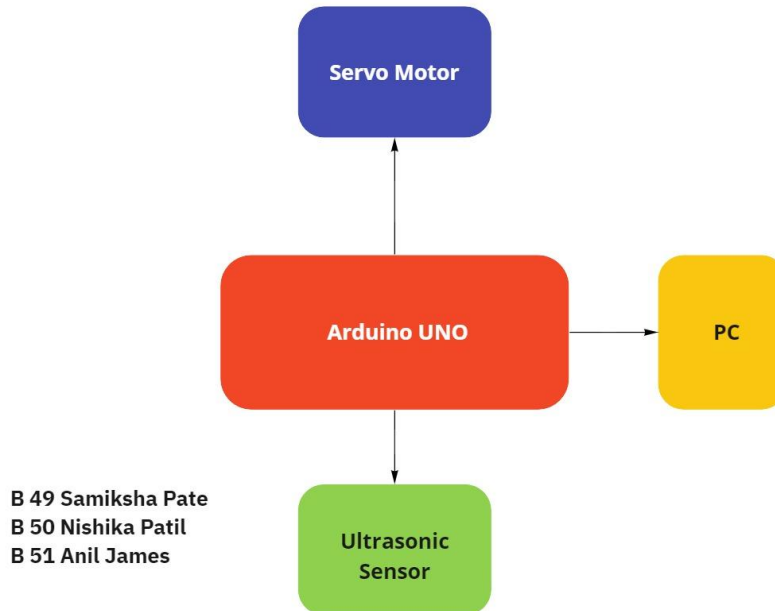
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Components and Specifications :

1) Arduino UNO

- Operating Voltage 5V
- No. Of I/O Pins 14
- Clock Speed 16MHz

2) HC-Sro4 Ultrasonic Sensor

- Power Supply: DC 5V
- Working Current: 15mA
- Working Frequency: 40Hz
- Ranging Distance : 2cm – 400cm/4m

3) Servo Motor SG90

- Operating Voltage is +5V typically
- Torque: 2.5kg/cm
- Operating speed is 0.1s/60°

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- Gear Type: Plastic
- Rotation : 0°-180°
- Weight of motor : 9gm
- Package includes gear horns and screws

4) Bread Board

5) Connecting Wires (M to F) (M to M)
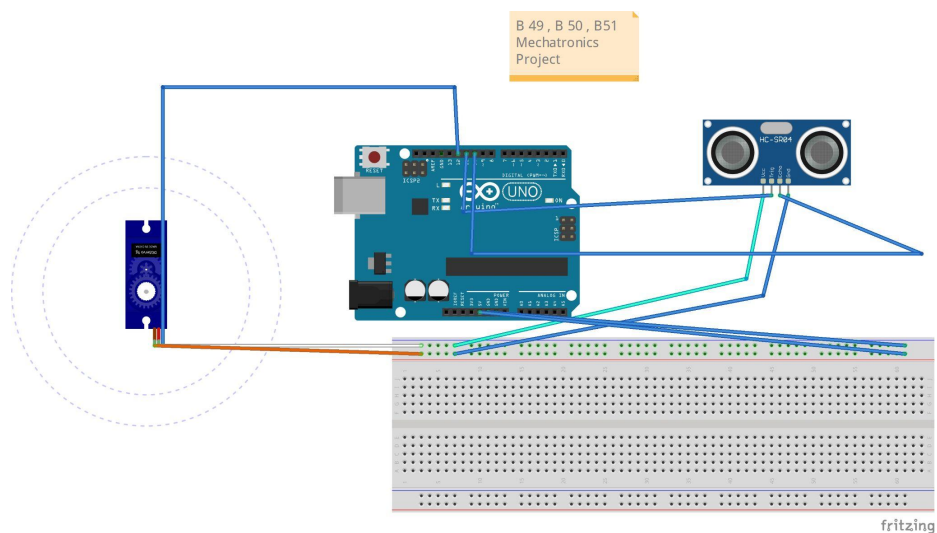
6) USB Cable for Arduino

7) Arduino IDE

8) Processing Applications

<u>Circuit Diagram</u> :

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Working :

To start the Arduino Radar Sensor, you should know the programming code. There are two programming codes needed to start the radar. One is the Arduino UNO and another one is the processing.After uploading the code to Arduino, the servo sweeps from 00 to 1800 and back again to 00. Since the Ultrasonic Sensor is riding the Servo. Now open the processing application and run the code. If there is no error then another processing window opens up. This is a Graphical representation of the data. The Ultrasonic Sensor is represented in a radar type display. When the Ultrasonic Sensor detects any object within its range, the object will be shown on screen as a graphically.

Advantages of the Arduino Radar Sensor:-

1. It is not affected by color or transparency. Basically, the Ultrasonic Sensors transmit the sound off of the object, hence the color and transparency have no effect on the radar reading.

2. Any dark environments have no effect on this Arduino radar sensor's detection procedure. So, it can also use at night.

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3. Easy to design and low price. The ultrasonic sensors are available at the market with very cheap price.

4. It has high frequency, high sensitivity, therefore, it can easily detect the external or deep objects.

5. This radar sensor is not affected by dust, rain, snow, and many more..

6. The Arduino Radar Sensor is easy to use. Also, it is completely safe during the operation to nearby objects, humans or equipment.

7. The Ultrasonic sensor can easily interface with any type of microcontroller.

Disadvantages and Limitations:-

1. The Arduino Radar Sensor conducts sound to continue the work. So, it is not working in a vacuum as there is no air for the sound to travel through.

2. A very soft fabric can absorb more sound waves. Therefore, it is hard to detect objects which are covered with soft fabric.

Roll No - B 49 , B 50 , B 51

3. Another limitation is the detection range. This depends on which Ultrasonic sensor

has been used to make the Arduino Radar Sensor.

Images and Videos :

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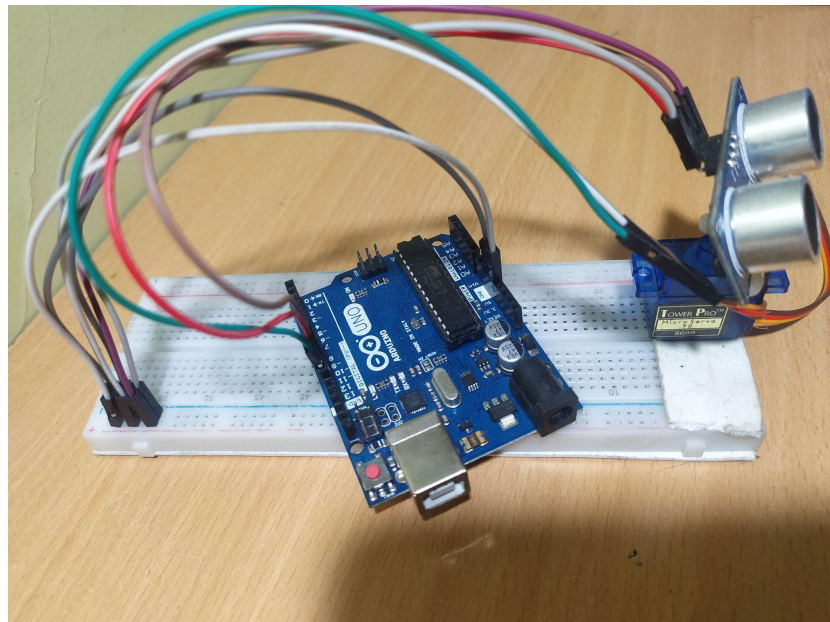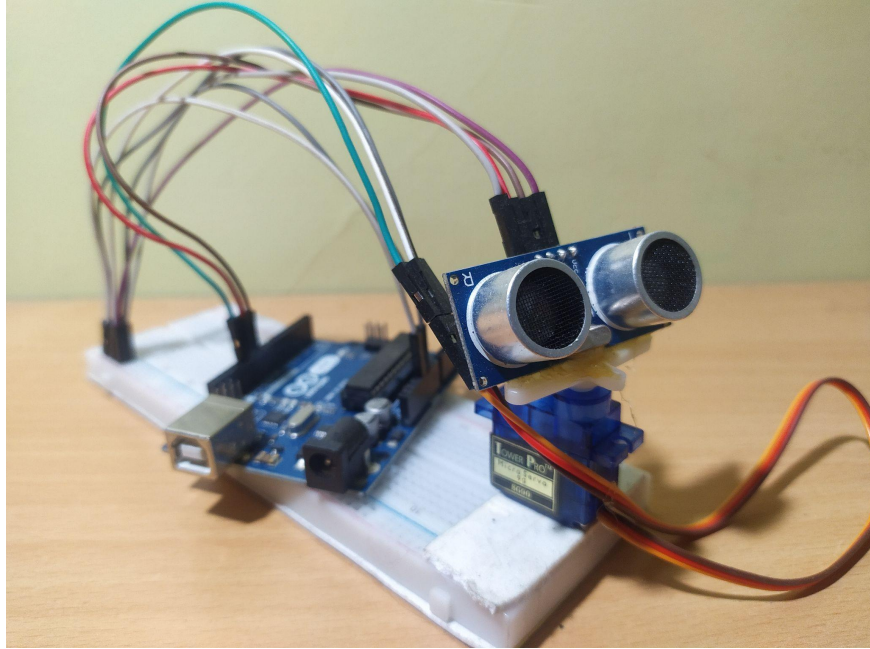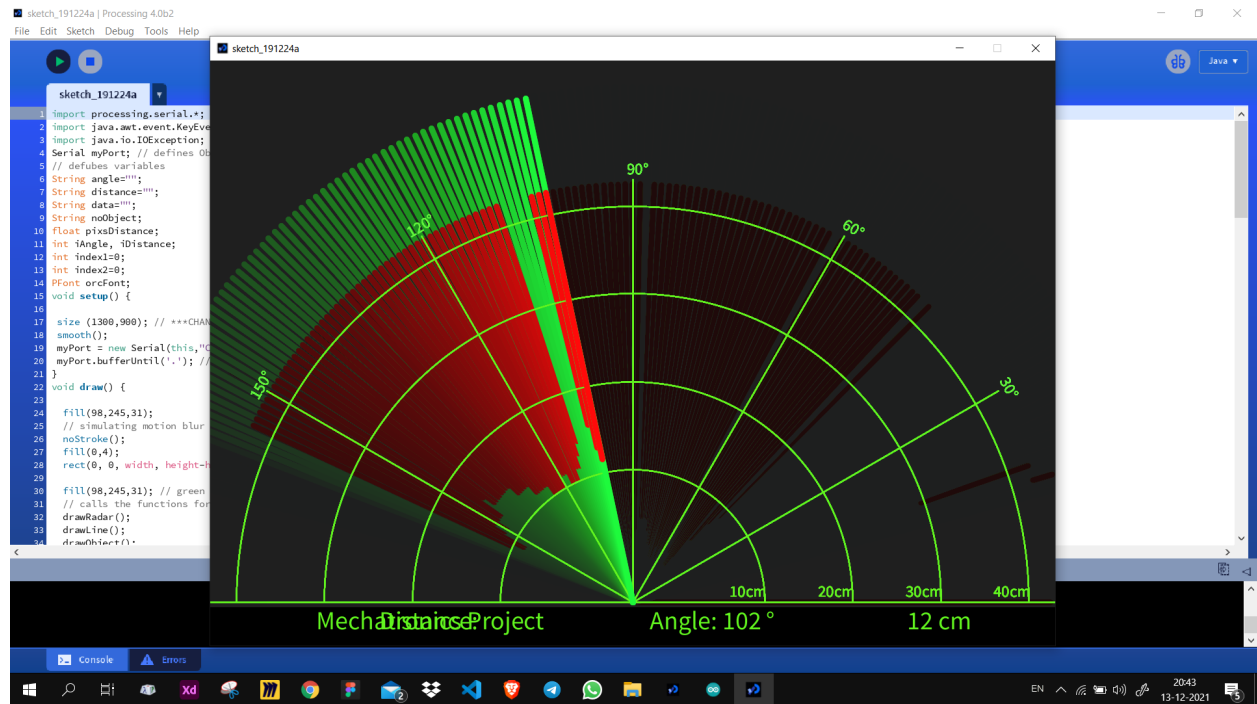
```
// Includes the Servo library
#include <Servo.h>.
// Defines Trig and Echo pins of the Ultrasonic Sensor
const int trigPin = 10;
const int echoPin = 11;
// Variables for the duration and the distance
long duration;
int distance;
Servo myServo; // Creates a servo object for controlling the servo motor
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);
```

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Video Link

https://drive.google.com/file/d/1meVoLTzPKNu-cuwpUZN3tOQCSSP6ODms/view?usp=

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