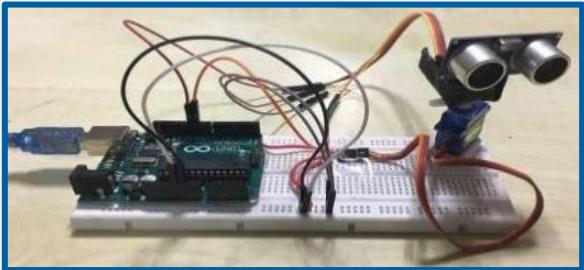


# ArduinoBasedUltrasonicRadar



UndertheSupervisionof

**SKMP PROJECT  
MANAGEMENT  
TEAM&SUPERVISER  
DEPARTMENT  
OF SKMP GROUP**

Under the supervision of:-

PREPARED FOR:-

SKMP PROJECT  
MANAGEMENT  
TEAM AND  
SUPERVISER  
OFFICER

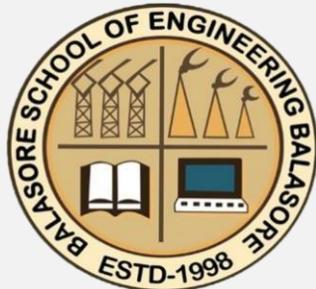
DIPLOMA STUDENT GROU  
SEM  
BALASORE SCHOOL OF  
ENGINEERING,BALASORE



**Department of  
ComputerScience&Engineering**

**BalasoreSchoolofEngineering**

# **BALASORE SCHOOL OF ENGINEERING, BALASORE**



## **CERTIFICATE**

**THIS IS TO CERTIFY THE STUDENT OF 6TH SEMESTER (COMPUTER SCIENCE & ENGG.) HAVE COMPLETED OUR PROJECT WORK TITLED "**ARDUINO BASED ULTRASONIC RADAR**" SATISFACTORILY IN PARTIAL FULFILMENT OF REQUIREMENT OF DIPLOMA COURSE IN THE YEAR **2021-2024**.**

**Date:**

---

**(Er. Priyanka Panda)  
Head of the Department**

---

**(SKMP PROJECT MANAGEMENT SUPERVISER)  
(Guide)**

---

**(Internal Examiner)**

---

**(External Examiner)**

# CANDIDATE'S DECLARATION

I declare that semester report entitled “Arduino Based Ultrasonic Radar” is my own work conducted under the supervision of the SKMP project management department team and supervisor

I further declare that to the best of my knowledge the report for diploma final semester does not contain part of the work which has been submitted for the award of diploma either in this or any other college without Balasore School of Engineering, Ranipatna, Balasore.

---

SING OF SKMP PROJECT MANAGEMENT  
SUPERVISER / MD(managing director)

# **GUIDE CERTIFICATE**

This is to certify that the project report entitled “**Bluetooth Controlled Car with Arduino**” submitted by **All the Students of Comp. Sc & Eng.** Partial fulfillment of their work for the award **Diploma (Sem-6) of Balasore School of Engineering, Balasore** has been completed under skmp project management team supervision & guidance.

To the best of my knowledge the matter presented by them is original in nature and not bee.

---

SING OF SKMP PROJECT MANAGEMENT  
SUPERVISER / MD(managing 3

## **Acknowledgment**

This project was completed for the coursework of Diploma final year project, directed by the Department of Computer Science and Engineering, BalasoreSchool of Engineering. Our sincere efforts have madeus accomplish the task of completing the project. Most importantly, we would like to express ourgratitudeskmp project management department team for his advice and valuable comments regarding our project, which led us to the completion of the project. Our thanks and appreciation also goes to our classmates, who encouraged us to complete our project.

---

SING OF SKMP PROJECT MANAGEMENT  
SUPERVISER / MD(managing director)

## **Abstract**

As we know that Radar is an electronic device which consists or contains radio waves to detect the object means to find the distance, angle of the object and range as we know the radar is radio detection and ranging. So, In this project we use ultrasonic sensors in place of radar because both work the same but the main difference is that the ultrasonic sensor uses sound waves to find, detect the distance, angle of velocity and range of the object. So, In this project we will use an ultrasonic sensor, servo motor and Arduino. Now servo motor is used to rotate the ultrasonic sensor and arduino used for the processing of our project, all with this we also used two software that is Arduino IDE and other is Processing app. In this we use Arduino IDE to embed the code in arduino and with the processing app we process our project. So, In this project we will show how our projects work and show, detect the distance and angle of the object and how it is shown on the pc with the help of an arduino and ultrasonic sensor. There is small kind of the information that we will give on the abstract that in this project we put some object ahead of the ultrasonic sensor but when there is no object it will show only green graph only on the screen and not shown any thing in any position but when we put some object in some position than when the ultrasonic sensor means radar comes ahead of this object it will show a red lines on this graph on this position and also shows angle , distance of this object which is basically made for local patch areas like our borders.

# **CONTENTS**

**Certificate**  
**Candidate's Declaration Guide Certificate**  
**Acknowledgements**  
**Abstract**

<b><u>Chapters</u></b>	<b><u>PageNo</u></b>
<b>1.INTRODUCTION</b>	<b>7</b>
1.1INTRODUCTION	7
1.2OBJECTIVE	7
1.3PROBLEM STATEMENT	8
1.4SCOPE	8
1.5METHODOLOGY	8
1.6APPLICATIONS	9
1.7WORKING	10
1.8ADVANTAGES OFTHEPROJECT	11
1.9LIMITATIONOFTHEPROJECT	11
<b>2.OVERVIEWOFTHE PROJECT</b>	<b>12</b>
2.1THEORYOF OPERATION	12
2.2THE IDEA	13
2.3HISTORICALBACKGROUNDFRADAR	13
2.4 INTRODUCTION	13
2.5TECHNOLOGICALOVERVIEW	13
2.6SOFTWAREUSED	14
2.6.1ARDUINOIDEAND COING	14
2.6.2PROCESSINGSOFTWAREANDCODING	16
<b>3.SYSTEMARCHITECTURE</b>	<b>20</b>
3.1BLOCKDIAGRAMDESCRIPTION	21
3.1.1ARDUINO UNO	21
3.1.2ULTRASONICSENSOR	22
3.1.3SERVO MOTOR	22
3.2FLOWCHARTOFHARDWARESYSTEM	23
<b>4.LITERATURESURVEY</b>	<b>25</b>
<b>5.CONCLUSION</b>	<b>27</b>
<b>6.REFERENCES</b>	<b>28</b>
<b>7.APPENDIX</b>	<b>29</b>

# **CHAPTER1**

## **Introduction**

Firstly in this report we introduce our project which is Arduino based Ultrasonic Radar. We explain all the main points and all the parts of our project also with its hardware and software. So, we will start with Radar. Radar is an electronic device which uses radio waves to find, detect the range, distance and angle of the object. Now first we will tell why we use ultrasonic sensor in place of Radar because if we focus on the working of both of these than we assume that its same but only the difference is that Ultrasonic Radar uses sound waves because there are soft fabric layer on Ultrasonic radar that consume more sound wave so, it uses sound waves to detect the distance, angle and range.

Now if we focus on the software we use two software one name is Arduino IDE, with the help of this we embed the code in our arduino and the other name is Processing app which is used for the processing of our project. Now next comes to its implementation as we know that in arduino there are fourteen digital pins, eight analogue pins, one pin, one set reset, one analogue reference, one 3v, one 5v and three pins are ground and if we see in side of Ultrasonic sensor there are four pins total that is echo, trig, Vcc and ground. Also there are three connections in our servo motor signal, negative voltage and positive voltage.

Then we come to the working of our project where all the connections finish and our ultrasonic start working means start to rotate with the help of the servo motor. If there is no object in the range of the radar than it will show only a green line and green graph in the pc screen, but if we put some object in the range of the radar means ultrasonic sensor so, when it comes ahead of the object than it will show a red line in the graph with distance, range and angle of the object. So, our project is basically used in local path areas to detect the object distance, range and angle.

## **Objective**

The objective and goal of our project is that to detect the object in the range and pass the information to the Arduino microcontroller by adjusting the rotation of the servomotor, we allow the sensing to be in range from 0 to 150 degree. It can detect objects up to 400cm away from the ultrasonic sensor.

>> This project is basically used for the local patch areas means to detect the local objects range if we focus on the main functionality of our project that we seen that this is very helpful for near border villages or houses also in army bunkers because it not helps to detect enemy location but also not affected by any type of environment.

>>So, the main objective of our project is to find the location means distance, range and angle of the object or any things which come in range of the radar. We also think of making it as an advanced version or advanced things that are used at a higher level. So, this project helpful or used by our army soldiers for patrolling. So, these are the main objectives of the project.

1. To build up an ultrasonic RADAR.
2. To identify the fixed or moving item.
3. To quantify the distance of the article from the framework.
4. To gauge the point of the moving article.
5. Diminishing human time and exertion.

## **Problem Statement**

Since, electronic segments when used to shape any circuit require some measure of investigating to make the circuit work as indicated by our desires. In our task, there were a few issues that we needed to manage.

## **Scope**

There are a lot of scopes to develop our project. If we can use wireless Ultrasonic sensors it is possible to cover a full surrounding area. We can also see the object that come in the coverage area of radar by using a camera

## **Methodology**

To check the working of this undertaking, after its arranging, advancement and programming we put barely any articles before the ultrasonic sensor. As the ultrasonic radar moves with the help of a servo motor, our screen started to show the yield through getting ready IDE. From this time forward, when the sensor crosses the article then in the pc screen it shows a red portion with the distance and point where the thing is paced. The essential thing was gotten at the distance of 30.5cm assessed through a ruler and the system assessed the distance at 32cm. While the ensuing article was set a ways off of 20 cm and the structure assessed it as 21cm. Subsequently the decided efficiency wound up being 95%. Here, as it is shown the controller we are using is Arduino, with the data Ultrasonic sensor and the yield is the servomotor which turns 180 degrees. The microcontroller controls all the exercises of this system, from turn of the motors to the obstruction revelation of the ultrasonic and depiction of the result on the screen. Here, it tends to see how the work cycle in this radar system. The sensor will recognize the object distance and angle easily with the help of ultrasonic radar because as we know ultrasonic sensors are very sensitive and easily detect the deep objects. All the distance, range and angle can be shown on

our pc screen in which the rduino is connected. This all working depend upon the two software's one is Arduino IDE and other is processing app. In arduino we embed the code in arduino and with the processing app we help to process the project means ultrasonic radar. So, this is the working of the project.

## **Applications**

There are many types of applications of our project but we take some real life examples and that are very useful for our country and safety. Also in the coming time this project will be used in advance. In our project there are lots of instruments or components that are used in every electronics project in today time. So, if we focus on the main application of our project that is in the Air Force, Naval and Army. Our project is not only used in this field but also used by car companies like ford, audi and tesla. These types of projects are also promoted by google. So these are the important applications.

### **Application in Air Force**

In flight, airplanes are outfitted with radar gadgets that caution airplanes or different deterrents in or moving toward their way, show climate data, and give exact elevation readings. The main business gadget fitted to the airplane was a 1938 Bell Lab unit on some United Airlines aircraft. Such airplanes can land in mist at air terminals furnished with radar-helped ground-controlled methodology frameworks in which the plane's flight is seen on radar screens while administrators radio landing headings to the pilot.

### **Naval Application**

Marine radars are used to measure the bearing and distance of ships to prevent collision with other ships, to navigate, and to detect the location. This helps our navy with the help of this. It is also easy to find the enemy marine underwater because it also works under water and never gets affected by the temperature. So, this is also the main application of our project.

### **Application in Army**

Two camcorders naturally recognize and track the enemy easily. This will really help our army. This project is specially made for this purpose because it is used in night patrolling and detects easily the enemy and many types of movements that make it easy for our soldiers to detect the

location and range of the enemy. Also this is used in borders for the safety of army bunkers, weapons and localpatch areas. So, this is also the most important application of our project.

### **Meteorological Applications**

In Meteorology this is used for the purpose to monitor precipitation and wind. It is used as the main part to know the weather condition means this is also used for short term weatherforecasting and also used for severe weather like heavy rain, storms and wind etc. This is alsoused by geologists for the mapping of earth crust.

### **Working**

In this part weareexplainingtheworkingofour project. Firstlyweimplement all the components and write the codes in our softwares. Then in the next part we connect our project with the personal computer or laptop. Now it starts working. Our radar means the ultrasonic sensor moves with the help of a servo motor. It covers the surrounding areas easily. Now, in the nextitnotes and records the movement and detects the objects ifthere is no object it shows onlya green graph and a green line in this graph this is all with the help of arduino. Then we try to check its main working so we put an object ahead of our radar or ultrasonic sensor and when our radar comes in front of this object it will show the red line over the green graph in the pc screen and also shows the distance, angle and range of the object.

Thereisnochanceofstuckandlagginginworkingifusethebestarduinomodel,thereisno loose wiring and also not error in coding because sometimes there are a little error means to find distance, range and angle there is code and with a little mistakes it will gave a little bit error in values. So, if you tryto make this project mainly focus on the code that you write and the wiring. So, this is the working of the project.

## **AdvantagesoftheProject**

It does not get affected by any type of color and transparency. As we know that ultrasonic sensors transmit the sound off of the object, So its transparency or transparency does not affect the radar viewing. It works in any dark environment so we can also use this project into advanced levels like night patrolling purposes. Also, it does not get affected by rain, snow, dust and snow. The other advantage is that this project is made with ultrasonic sensor so it has high sensitivity and high frequency so it is easy to detect the deep objects and there is also a self cleaning system in this project. So, these are the advantages of Arduino Based Ultrasonic Radar.

## **LimitationsoftheProject**

The limitations of this project are like there is very soft fabric in the ultrasonic sensor so it absorbs more sound waves so it is tough or hard to detect that kind of objects that are covered with soft fabric. This project uses sound waves and conducts the sound to work continuously so it does not work in a vacuum because there is no air for the sound from its travel through. The other main disadvantage is that it's detection range, which is dependent on the quality of the ultrasonic sonic sensor, is used in the project. So, these are the main disadvantages of Arduino Based Ultrasonic Radar.

## **CHAPTER2**

### **OVERVIEWOFTHEPREJECT**

#### **TheoryofOperation**

This application of the ultrasonic radar is mainly based on the sound waves because as we know that radar is used radio waves as the name radio detection and ranging we understand that radar uses radio waves to detect the object distance, range and angle. So here we use ultrasonic sensors as a radar and it uses Sound waves to detect the object range and angle. The main objective of our project to cover the nearby areas means local patch areas as behind we are studying about the working and application of this project so i think this is easily understandable to all of us what is the overview of this project. This project is mainly used for night patrolling because ultrasonic sensors easily detect the object because it is a very sensitive component but one main disadvantage of our project is that it makes continuously sound because there is soft fabric in ultrasonic sensor and it is absorb more amount of sound waves so it makes continuously sound.

In coming this project is also used in robots, in cars and in our mobiles as a gps system to locate our exact or current location, in robots to navigate the map and to show the live location video. In cars this is used in car parking or when we try to back our car sometimes and there is wall behind the car so sometimes little accidents happen so in today's time many of the companies use the advanced version and use the sensor to detect easily and give a beep sound this will be used as a safety purpose. This project is also used in weather forecasting and prediction of the thunderstorms and heavy winds. This project is not only used in these purposes but also used by our army, air force purpose to detect the enemy tanks, missiles etc. The basic range of this radar is to detect two hundred meter but if we try to put this in an advanced version and try to convert this project in advance it will easily cover the distance of four hundred meters.

## **The idea**

The idea of this project mainly comes from our Indian armed forces means this is basically used for safety purposes by our army, airforce. Also but in today's time this technology is used in advanced ways such as in car companies like audi, ford etc. Also we want to make this project with some changes. We want to handle this on our mobile like home automation. This helps us to patrol from anywhere and also work as a GPS system. So, as we main focus on our project this is already built by many of the field but we try to make it with some changes. So, this is the idea about this project.

## **Historical Background of Radar**

The historical backdrop of radar (where radar represents Radio Detection and Ranging) began with tests in the 19th century that indicated that in radar the radio waves are backward or means to transmit or receive the radio waves by metallic articles. This chance was proposed in the original work on electromagnetism. In any case, it was not until the early 20th century that systems able to use these principles were becoming widely available, and also in history it is not much developed and only used as a radar to detect the location. If we focus on its historical background, we can see only the main use of radar but in this time it is mainly done by arduino and some types of sensors that can easily detect the deep objects. So, this is the historical background of our project or radar.

## **Introduction**

The main goal of our project is to use the ultrasonic sensor which is connected to the arduino uno board and the sensor will give the signal in which the arduino transfers it to the screen and that signal is shown in the screen of the laptop. Which is very helpful to calculate the presence of any object in front of the radar as well as shows the range, angle and distance where that object is displaced or located.

## **Technological overview**

In the Technical overview we explain that in this project both hardware and software are used. So, in the technological overview this project is well maintained by both the hardware and software. In which softwares we used and what are the main components that we use in our project. So, firstly we start with the software that we use one is an Arduino IDE which is used

to embed the code in arduino and the other is processing IDE which meansprocessing software in which we write the code and use it for processing our project functionality. Now comes to the hardware system which is Arduino required to connect with pc and transfer the signal with thehelpofotherhardwaresystems such as servo motorwhich is usedtorotateourradarandultrasonicssensorisusedtosense,detecttheobjectlocation, range and angle. This is the technological overview of our project arduino based ultrasonic radar.

## **SoftwareUsed**

### **2.6.1 ArduinoIDE**

The arduino IDE is a kind of software that is used to embed the code in arduino. Arduino IDE software is onlythe software that is used for the processing in arduino based projects. So, in our project we use this software. In this software we write our programs in two languages that are c and c++. This is also known as open source because as we know that arduino is an open source hardware and software where we work on both platform hardware and software. We can also say that the Arduino integrated development environment is a type of cross platform application written in java language and the name integrated development environment is for the processing of the arduino.

## **Code Segment**

```
//Includes the Servo library #include
<Servo.h>.
//Defines Trig and Echo pins of the Ultrasonic Sensor const int trig
Pin = 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(echoP
in, 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 calculate
Distance(){
digitalWrite(trigPin,LOW);
delayMicroseconds(2);
// Sets the trigPin on HIGH state for 10 microseconds
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;
}

```

## **2.6.2 Processing Software**



### **Processing**

project.

Processing software is a kind of software that is required for the main functioning of the project. In which we are required to write the program and perform it. It only allows the java programming and also known as processing integration development environment. As we focus on this name so we can know that it itself creates an inner output that is very helpful for the project.

This is also used for media labs and for live streaming it is little bit the same work as structured query language. So, this software means processing integration development environment is used in our

### **Code Segment**

```
importprocessing.serial.*;//imports library for serial communication
importjava.awt.event.KeyEvent;//imports library for reading the data from the serial port import
java.io.IOException;
Serial myPort;//defines Object Serial
// defines variables
String angle="";
String distance="";
String
data="";String noObj
ect;float pixsDistance
;
int iAngle,iDistance;
int index1=0;
int index2=0;
PFont rcFont;
void setup() {

size(1200,700);/**CHANGETHIS TO YOUR SCREEN RESOLUTION***/
smooth();
myPort=new Serial(this,"COM5",9600);//starts the serial communication
myPort.bufferUntil('.');//reads the data from the serial port up to the character '. So actually it reads this: angle,distance.
}
void draw(){
fill(98,245,31);
//simulating motion blur and slow fade of the moving line noStroke();
fill(0,4);
rect(0,0,width,height-height*0.065);
```

```

fill(98,245,31);//green color
//callsthefunctionsfordrawingtheradar
Radar();
drawLine();
drawObject();
drawText();
}

void serialEvent(Serial myPort){ //starts reading data from the Serial Port
    // reads the data from the Serial Port up to the character '.' and puts it into the String variable "data". data =
    myPort.readStringUntil('.');
    data = data.substring(0, data.length() - 1);

    index1 = data.indexOf(","); // find the character ',' and puts it into the variable "index1"
    angle = data.substring(0, index1); // read the data from position "0" to position of the variable index1 or that's the
    value of the angle the Arduino Board sent into the Serial Port
    distance = data.substring(index1 + 1, data.length()); // read the data from position "index1" to the end of the data
    perhaps the value of the distance

    // converts the String variables into Integer iAng
    iAngle = int(angle);
    iDistance = int(distance);
}

void drawRadar(){ pushMatrix();
    translate(width/2, height - height * 0.074); // moves the starting coordinates to new location noFill();
    strokeWeight(2);
    stroke(98,245,31);
    // draws the arc lines
    arc(0,0,(width-width*0.0625),(width-width*0.0625),PI,TWO_PI);
    arc(0,0,(width-width*0.27),(width-width*0.27),PI,TWO_PI);
    arc(0,0,(width-width*0.479),(width-width*0.479),PI,TWO_PI);
    arc(0,0,(width-width*0.687),(width-width*0.687),PI,TWO_PI);
    // draws the angle lines
    line(-width/2,0,width/2,0);
    line(0,0,(-width/2)*cos(radians(30)),(-width/2)*sin(radians(30)));
    line(0,0,(-width/2)*cos(radians(60)),(-width/2)*sin(radians(60)));
    line(0,0,(-width/2)*cos(radians(90)),(-width/2)*sin(radians(90)));
    line(0,0,(-width/2)*cos(radians(120)),(-width/2)*sin(radians(120)));
    line(0,0,(-width/2)*cos(radians(150)),(-width/2)*sin(radians(150)));
    line((-width/2)*cos(radians(30)),0,width/2,0);
    popMatrix();
}

```

```

voiddrawObject(){
pushMatrix();
translate(width/2,height-height*0.074);//moves the starting coordinatsto new location
strokeWeight(9);
stroke(255,10,10);//red color
pixsDistance=iDistance*((height-height*0.1666)*0.025);//covers the distance from the sensor from cm to pixels
//limiting the range to 40 cms
if(iDistance<40){
    // draws the object according to the angle and the distance
line(pixsDistance*cos(radians(iAngle)), -pixsDistance*sin(radians(iAngle)),(width-
width*0.505)*cos(radians(iAngle)), -(width-width*0.505)*sin(radians(iAngle)));
}
popMatrix();
}

voiddrawLine() {
pushMatrix();
strokeWeight(9);
stroke(30,250,60);
translate(width/2,height-height*0.074); // moves the starting coordinats to new location
line(0,0,(height-height*0.12)*cos(radians(iAngle)),-(height-height*0.12)*sin(radians(iAngle)));
//draws the line according to the angle popMatrix
();
}

voiddrawText(){//draws the text on the screen

pushMatrix();
if(iDistance>40)
{noObject="Out of Range";
}
else{
noObject="In Range";
}
fill(0,0,0);
noStroke();
rect(0,height-height*0.0648,width,height);
fill(98,245,31);
textSize(25);

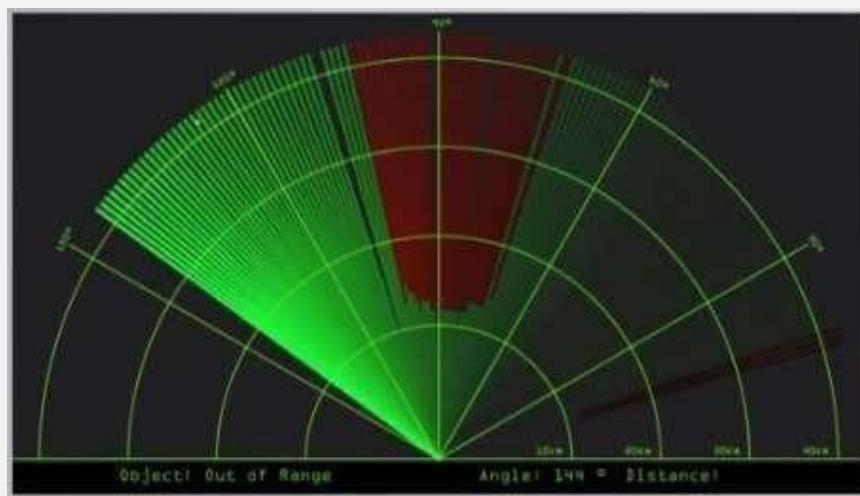
text("10cm",width-width*0.3854,height-height*0.0833);
text("20cm",width-width*0.281,height-height*0.0833);
text("30cm",width-width*0.177,height-height*0.0833);
text("40cm",width-width*0.0729,height-height*0.0833);
textSize(40);
}

```

```

text("Radar Project", width-width*0.875, height-height*0.0277);
text("Angle:" + iAngle + "", width-width*0.48, height-height*0.0277);
text("Distance: ", width-width*0.26, height-height*0.0277);
if(iDistance<40) {
text("    "+iDistance+"cm",width-width*0.225,height-height*0.0277);
}
textSize(25);
fill(98,245,60);
translate((width-width*0.4994)+width/2*cos(radians(30)),(height-height*0.0907)-width/2*sin(radians(30)));
rotate(-radians(-60));
text("30",0,0);
resetMatrix();
translate((width-width*0.503)+width/2*cos(radians(60)),(height-height*0.0888)-width/2*sin(radians(60)));
rotate(-radians(-30));
text("60",0,0);
resetMatrix();
translate((width-width*0.507)+width/2*cos(radians(90)),(height-height*0.0833)-width/2*sin(radians(90)));
rotate(radians(0));
text("90",0,0);
resetMatrix();
translate(width-width*0.513+width/2*cos(radians(120)),(height-height*0.07129)-width/2*sin(radians(120)));
rotate(radians(-30));
text("120",0,0);
resetMatrix();
translate((width-width*0.5104)+width/2*cos(radians(150)),(height-height*0.0574)-width/2*sin(radians(150)));
rotate(radians(-60));
text("150",0,0);
popMatrix();

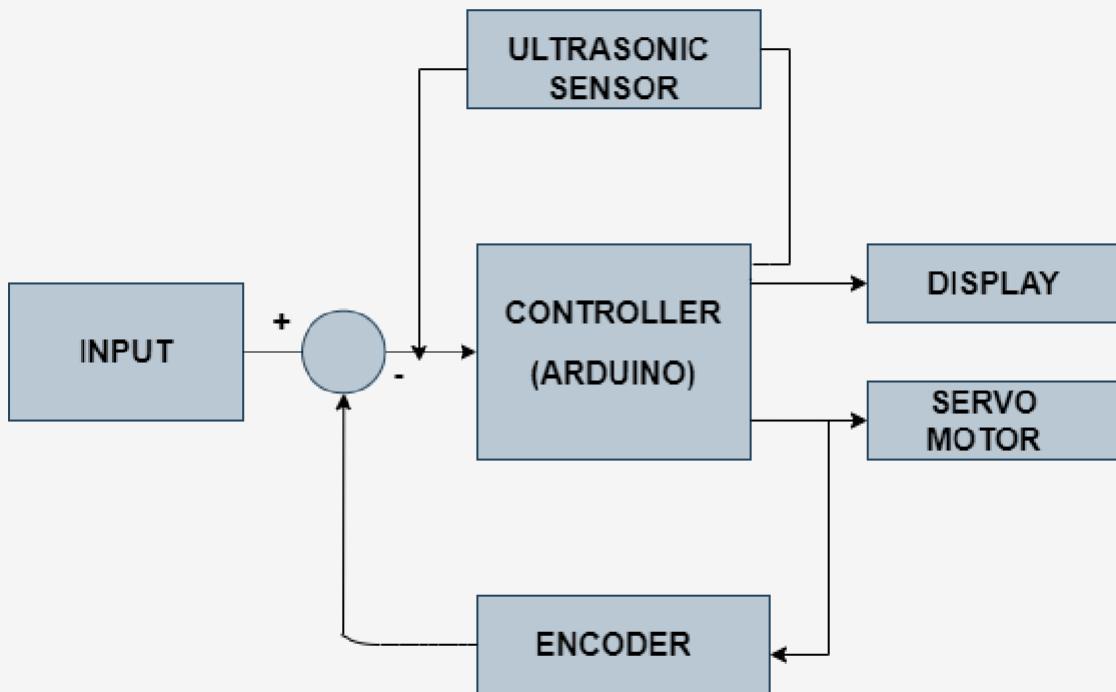
```



**Output from Processing Software**

## CHAPTER3

### SYSTEM ARCHITECTURE



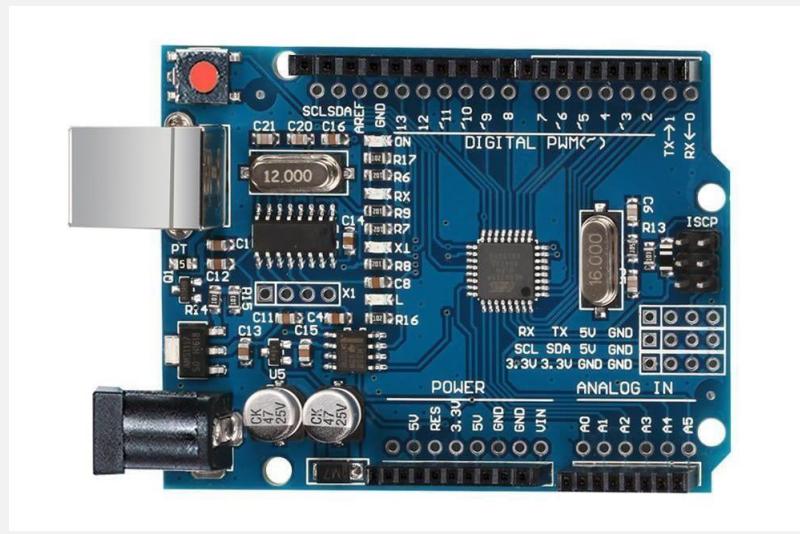
**Fig-1 Components of Radar Project**

## **BLOCKDIAGRAMDESCRIPTION**

The above fig.1 shows the Block Diagram of the short range radar system. Here we use an Arduino Uno microcontroller which is open source to implement an embedded based system. ATMEGA 328 microcontroller sends 10 microsecond pulse width to ultrasonic transmitter, echo back signal received by TXmodule of ultrasonic. After then receive pulse width calculated by the micro controller. Here we use a servo motor on which the ultrasonic module is mounted to receive 180 degree signal. Microcontroller communication through with a baud rate of 9600. This protocol works on ASCII values. So calculated distance transmitted from microcontroller . According to sensing different obstacles which are around 180 degree and 250 cm range, visible as a red spot.

## **ARDUINO**

Arduino is the open software hardwareand software which works as both platform hardware andsoftware. Aswefocusonthe pinsof arduinothere isfourteen digital pins,eight analog pins, three pins are ground pins which is used to ground the circuit, one is set rest pin, one is analog reference pin, one is 3.3 volt pin, one is 5 volts pin and one is power input. If we focus on the other partson the arduino portssothere isone baree jack that is used for the power input and rest switch which is used if sometimes there is error in values so we use reset switch. There is ausb port and also in the new version of the arduino there is a wifi connector. We can on off our arduino with a power indicator.

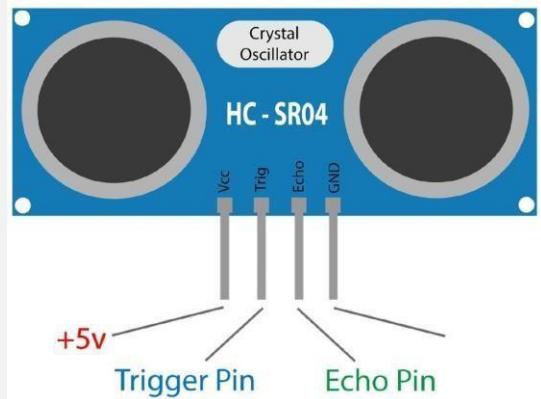


**Fig-2ArduinoUnoR3(Micropprocessor)**

## **ULTRASONIC SENSOR**

Ultrasonic sensor is an electronic object which is used in this project. We use ultrasonic sensors in place of radar because ultrasonic sensors use sound waves to detect the object the same as radar uses radio waves to find the object distance, angle and range. There is the soft fabric in the ultrasonic sensor so it absorbs the large amount of the soundwaves. So, it makes sound continuously to work continuously. There are the some points that is consist by the ultrasonic sensor.

- 1) Time offlight
- 2) Doppler shift
- 3) Amplitude attenuation.

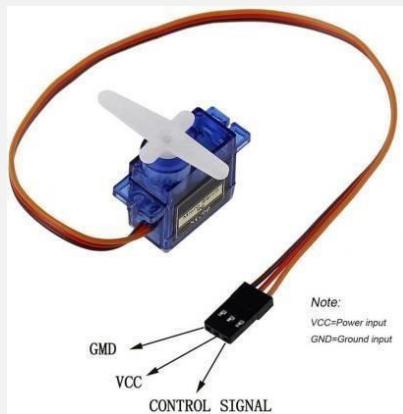


**Fig-03 Ultrasonic sensor HC-SR04**

In this we use the model of ultrasonic radar named HC-SR04. This is the best model of the ultrasonic sensor because in which there is a large amount of fabric added to easily sense the object not only the day but also in the dark environment and rain ,dusty environment.

Below we have given the different values and important parameters of the ultrasonic sensor. With these parameters we can easily understand the model quality. So in our project we used this model of ultrasonic sensor.

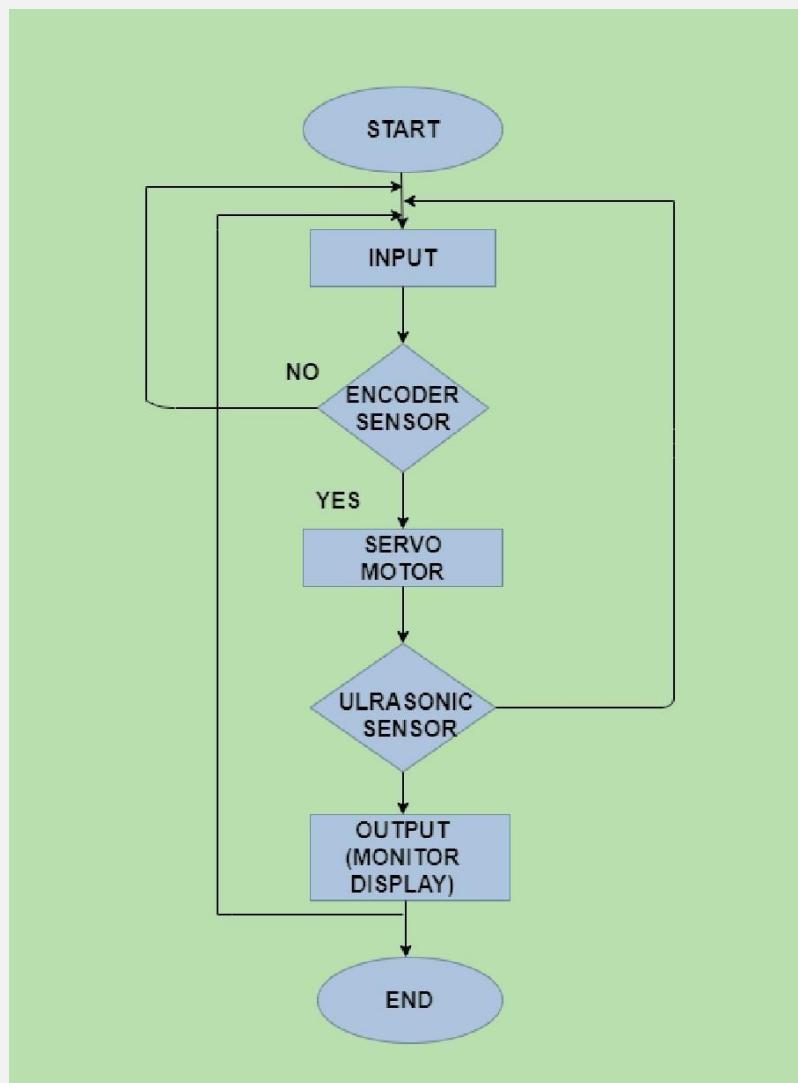
## **SERVOMOTOR**



**Fig-04 Servo Motor**

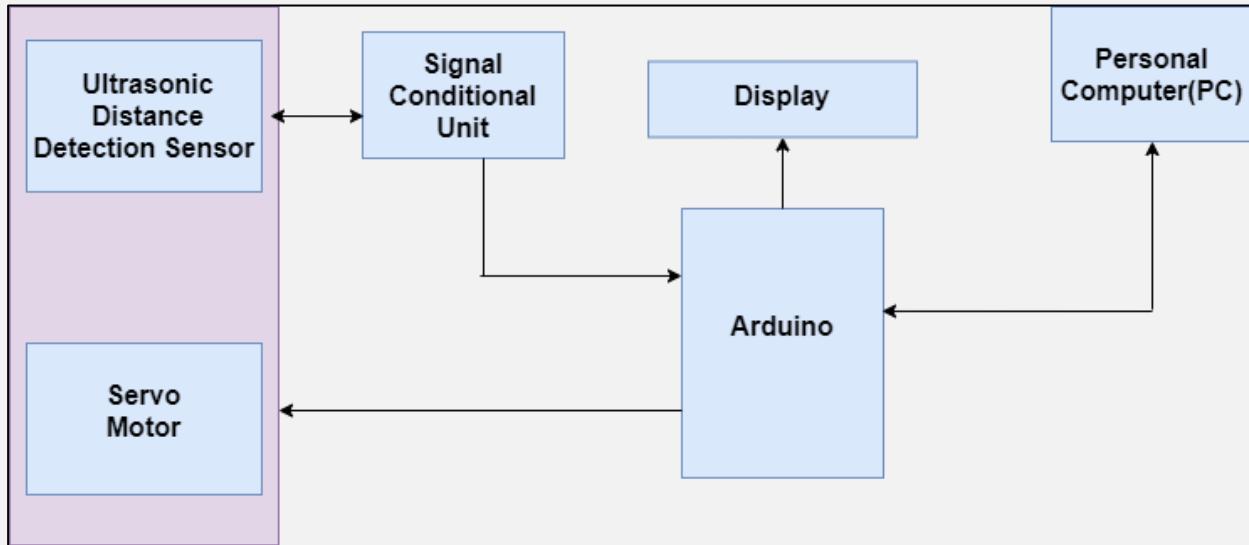
A servo motor is an electrical component that is used in our project. The main use of this component is that it is used to rotate our ultrasonic radar. There are three connections only in servo motors. There is one for negative voltage, one for positive voltage and other is the signal so we can connect all these connections with our ultrasonic sensor means our ultrasonic sensor is mounted over the servomotor. Inside it there is a motor which is also used in remote control toys. Servo motor is basically used in our project to move our ultrasonic sensor. So this is the main purpose of the servo motor in our project.

## **FLOWCHART**



**Fig-05 FlowChart of Radar Model**

As we know that flowchart is used to know or explain the process or better understand anything. So, In this flowchart we try to explain the process or entire process of our project. This helps us to better understand means firstly we start that comes to its input process means which is given by the ultrasonic sensor to detect the object and gives supply to our arduino, means gives input to the processing software. It detects the object by rotating with the help of a servomotor. Then next it comes to the output means to the monitor display it shows us the graphical representation of the output which also shows the distance and the range or angle of the object that is detected by your radar. So, this is the flow chart that helps us to better understand the process.



**Fig-05 Hardware system design of radar system**

#### Hardware system design:

In this project we are basingly using three hardware or our project mainly depends on three projects one is Arduino, Servo motor and Ultrasonic sensor. All these hardware are most important and also other hardware like jumper wire and breadboard are used in this project. On the previous page we make the hardware system design that is easily understandable to each of us. So, in this diagram we have given every step of hardware design that is used in our project.

#### System circuit design:

In the previous figure we also explain the circuit design of our project in which we connect the digital pin of the arduino with the trigger and the digital pin eight with the echo and the Vcc with the 3.3 volt pin and ground with the ground pin. Because in ultrasonic sensors there are four connections one is echo, trigger, Vcc and Ground. So in the previous page there is a circuit diagram or circuit design for our project.

## **CHAPTER4**

### **LITERATURE SURVEY**

Ensuring to encounter a segment of the papers as for utilization using, it was discovered thought is looked through a great deal and is a standard thought ahead of time. The uses are not simply beneficial and strong yet notwithstanding a monetarily feasible Arduino based radar framework. Not just this, here other helpful utilizations of ultrasonic sensors were noticed as well. This paper examines an observing framework which is intended to quantify the speed of waves and the stature of a waterway through a ultrasonic sensor utilizing a microcontroller (Arduino). If the stream can't oblige the volume of water, at that point it will lower with land and this wonder is called flood or flood. We can conquer issues by prior ID in the tallness of water and noticing speed. On the off chance that we recognize issues prior we can defeat this issue before it turns into an emergency. By testing the framework for example straightforward water level, it was seen that super sonic has a precision of . Be that as it may, when it is executed in the streams there are numerous blunders due to various kinds of water levels because of hefty waves and speed of water and furthermore because of drifting of weighty articles. Dissimilar to Previous testing results, the creator coordinated this examination on the adjustment. The test was finished. The Arduino was utilized as a regulator of utilization. For more examination, data of profundity this framework will be shipped off the information base worker site to be checked consistently.

A savvy driver observing and vehicle control framework is presented in this examination. This innovation is made to stay away from mishaps by observing the driver's exercises. The essayist expresses a portion of the fundamental purposes behind mishaps today. These are liquor utilization by the driver, heedlessness, sluggishness or clinical disease. The different structure, engines, transfers, attempts and are seen. Ultrasonic is used to caution the driver if any vehicle gravitate toward his vehicle. It is seen by the help of sensors executed in the vehicle and the

inconspicuous components are revived to the owner. This framework conquers all the various viewpoints because of which different advancements intended for this reason have fizzled, making the framework more helpful, proficient and less expensive and less tedious. In this exploration paper creators have given data about the location of radio waves and following or going through a radar set which is worked from segments like an ultrasonic sensor, a servo engine and an Arduino. The creator examined the direct estimation issue due to which distance estimation was unrealistic between certain items, and was settled with the presentation of Ultrasonic distance measure. It permits us to take non contact estimations. This radar framework can radically lessen power utilization. The writer says that this framework is an This paper represents a system for obstacle detection in a known environment. This system works through an android based mobile camera. People who are Arduino based radar systems visually impaired, face difficulties in detecting obstacles and navigation while they walk. They use sticks for this problem nonetheless this manner or technique is not the right way of doing it. Object indicator or detector can overcome accidents or collision problems of people or the other way is they can do

incredibly convenient radar framework, it can peruse or follow the distance and point of a hindrance and show it up on the screen. The ultrasonic was joined on top of the servo engine to recognize obstructions from option to left.

This paper speaks to a framework for snag location in a known climate. This framework works through an android based versatile camera. Individuals who are Arduino based radar frameworks outwardly hindered, face troubles in recognizing obstructions and route while they walk. They use sticks for this issue in any case this way or strategy isn't the correct method of doing it. Article pointer or finder can conquer mishaps or impact issues of individuals or the alternate way is they can do exact guide perusing. The calculation which is made for indoor planning. In the indoor climate all unmistakable floors are taken in thought and a solitary picture is kept or put away for particular floors. These pictures of the floor are taken as reference pictures. The creator makes reference to that this calculation is precise and works continuously. There are various strategies examined in this paper for hindrance location. For these kinds of issues we can utilize the methodology of SONAR sensor and furthermore laser camera. In this paper presented a figure for distinguishing prevention in known condition with an android based adaptable camera which sweeps a picked area before the camera for hindrance area.

## **CHAPTER5**

### **CONCLUSION**

Various progressed control strategies offered fashioners to have more order over various progressed applications. In our paper, the suggested planning strategy for the entire framework is surveyed on little standards. We have decided that our plan "Radar System" is an extremely tremendous field and the future extent of this innovation is high. We have colossal frameworks that have been executed or utilized . There is a top of future extent of this plan due to its security limit. It very well may be utilized in numerous applications. This system can likewise be created or altered by the rising requirements and requests . As we have planned a short reach radar consequently our exploration was determined and restricted. This framework can just identify objects from 0 to 180 degrees simply because the servoengine that we have utilized can pivot just to this reach. Along these lines, because of this constraint our plan can't be applied to spots or zones for deterrent location for a bigger scope. Utilization of a 360 degrees pivoting servo engine can make the framework more productive. We anticipate changing this framework and upgrading our examination work by utilizing a completely 360 degrees pivoting servo and a higher went ultrasonic sensor. We can additionally add highlights to this framework for example making it portable, mounting an alert framework to it which turns on when a deterrent is recognized. Further changes could be an impediment evading robots with reconnaissance frameworks.

### **DISCUSSION**

In this paper we have attempted to use ultrasonic sensors for implementation of RADAR and got a result that exceeds our presumed expectations. The basic systems created for preventing human effort. With some enhancements the system can be used for real time purpose

## **CHAPTER6**

### **REFERENCES**

- 1) AhmnEmmaelOja, AbdualamMyam, Olwadailol, Lukan Adwale-“Embedded System Based Radio Detection and Ranging (RADAR) System Using Arduino and UltraSonic Sensor” Embedded System and Application 2017.
- 2) Shreye Mehta, Shahank Tiwari- RADAR SYSTEM USING ARDUINO AND ULTRASONICSENSORIJNRD,Volume 3, Issue 4 April 2018 .
- 3) AntonoTedschi ;StefnoCalatera , FrancescoBeedeto- “ Ultrasonic RAdar System” : ArduinoIEEE Sensors Journal Volume: 17 , Issue: 14 , July15, 15 2017.
- 4) Kiruthkamani G, Saranya.B, Pandyan.P-“Intelligent Driver Monitoring and Vehicle Control System” IJSRD -International Journal for Scientific Research &Development,.Volume 5 , Issue 09, 2017
- 5) MohadMadiAbdulkaem, QusaAdil Mohamed, MuhanedMahmodShakir-“Short Range Radar System.
- 6) Srijn Dubey, Supragya Tiwari, Simit Roy -“ IMPLEMENTATION OF RADAR USING ULTRASONIC SENSOR” Indian J.Sci.Res. 2017.
- 7) AnujDutt,2014,ArduinobasedradarSystem.

## **APPENDIX**

>>Main hardware's used in this project are Arduino, Ultrasonic Sensor and Servo Motor.

>>This project is done by the Arduino IDE application.

>>This project is done by the Processing IDE software.

