Project Report on

ADIUVA

Submission to the THE ROBOTICS CLUB as a part of

POST INDUCTION' 19

TEAM -*13*

THE ROBOTICS CLUB

Integrating Knowledge....

THE ROBOTICS CLUB-SNIST

SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY

(AUTONOMOUS)

(Affiliated to JNT University, Hyderabad)

Yamnampet, Ghatkesar, Hyderabad – 501 301.

2019

CERTIFICATE

This is the project work titled ***ADIUVA*** by

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is a record of the project work carried out by them during the year 2019 as part of **POST INDUCTION .**

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Declaration

This project work reported in the present thesis titled *ADIUVA* is a record work done by Team -*13* in **THE ROBOTICS CLUB** as a part of **POST INDUCTION-19**

No part of the thesis is copied from books/ journals/ Internet and wherever the portion is taken, the same has been duly referred in the text. The report is based on the project work done entirely by TEAM -*13* and not copied from any other source.

ACKNOWLEDGMENT

This project report is the outcome of the efforts of many people, who have driven our passion to explore into implementation of ***ADIUVA*.** We have received great guidance, encouragement and support from them and have learned a lot because of their willingness to share their knowledge and experience.

We thank our Technical Heads **M M Sai Prakash , D Lohith** for being with us till the end of the project completion.

We thank the **Executive Body** and the **Technical Advisory Board** of **The Robotics Club** for helping us in crucial parts of the project. We are deeply indebted to **Mr .T.V. Hari Krishna ,** The President of **THE ROBOTICS CLUB**, **Mr. S. Sai Krishna ,** General Secretary of **THE ROBOTICS CLUB** and **Mr. Bhanu teja ,** Vice-President of **THE ROBOTICS CLUB** who spared their most valuable time without any hesitation whenever we wanted.

We also thank our Technical advisor **Dr. A. Purushotham**, Professor, Mechanical Department, who encouraged us during this project by rendering their help when needed.

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Abstract

The Problem: We the team-13 are thinking on providing a solution for the semi disabled people who can walk for some distance, but not more distance.

The team's approach to solve the problem: We are going to built a stand with wheels and a robotic arm Connected. The person can walk till he can by the support of the stand with wheels & if he is exhausted he will step on to the board connected to the stand and can go where ever he wish. The role of the robotic arm comes when he wants to take or lift any object from the ground.

Title of this project: ADUIVA (Means "help" in Latin)

What inspired you to select the problem? We see many people who can walk with difficulties. There are bots for fully disabled people. We thought of making one for semi disabled people. What do you feel is the most innovative part of the problem? The usage of robotic arm for giving objects that fell down near the person.

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CHAPTER 1
INTRODUCTION

1.1 AIM OF THE PROJECT:

To help old people in moving from one place to another and to pick the objects.

1.2 INTRODUCTION TO PROJECT:

We see many people (especially old people and semi-disabled) who are unable to walk for long time and pick objects which are placed on the ground. We brought a solution for these problems, this project includes a walker- helps in moving and a robotic arm- helps in picking the objects. The wheels of the walker and the robotic arm can be controlled by the joystick.

1.3 LITERATURE SURVEY:

We discussed about the problem statement and put our ideas to built the output of our problem statement. Various sources like internet, YouTube etc helped us while doing the project.

1.4 ORGANISATION OF THE PROJECT:

With the help of the walker, person is able to move. When he is unable to move on his own he can step on to the board connected to the stand and continue his travelling. The role of the robotic arm comes when he wants to take or lift any object from the ground.

Chapter 2

2.1: COMPONENTS USED

2.1.1 Hardware

Pvc pipes

Jumper pins

Side shaft motors

L-clamps

Worm and spur gears

Joysticks

Buttons

Wheels

Nuts and bolts

Wood

2.1.2 Software

L298N-motor driver

Servo motor

Arduino Leonardo

Arduino nano

2.2COMPONENTS DESCRIPTION

2.2.1Hardware

1. PVC pipes: These are commonly used as insulation on electrical cables. Light in weight hence can be easily carried.

Fig.1

2. Jumper pins: They are used for connection of wires which have connector pins each end without any soldering provided.

Fig.2

3. Side shaft motor:

Fig.3

4. L-clamps: It is a component which is L-shaped. It is a fastening device used to hold objects tightly and to prevent further movement.

Fig.4

5. Worm gear: It is a gear arrangement in which a worm meshes with a worm gear. These worm gear drive units are used to transfer motion in 90 degree.

Fig.5

6. Spur gear: spur gears are a type of cylindrical gear, with shafts that are parallel and coplanar, and the teeth are straight and oriented parallel to the shaft.

Fig.6

7. Joystick: It is used for the motion and movement. It consists of a stick that pivots on a base.

Fig.7

8. Push Buttons:

Fig.8

9. Wheels: These are generally used for the translatory motion.

Fig.9

10. Nuts and bolts: Nut is basically a tool in which the middle portion contains a threaded hole, bolt is a form of threaded fastener with an external male thread which is pointing outward.

Fig.10

11. Wood: It is an organic material consists of natural composite of cellulose fibers, which are strong in tension and embedded in a matrix.

2.2.2 Software

1. L298N-motor driver: It is a dual H-Bridge motor driver which allows speed and direction of two DC motors at the same time.

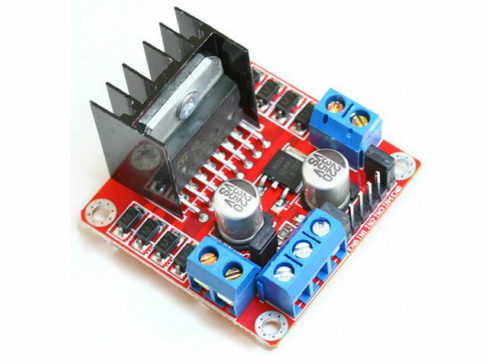


Fig.11

2. Servo motor: It is a rotatory or linear actuator that allows for precise control of angular or linear position, velocity and acceleration.

Fig.12

3. Ardunio Leonardo: It is a microcontroller board based on the ATmega32u4. It has 20 digital input/output pins.

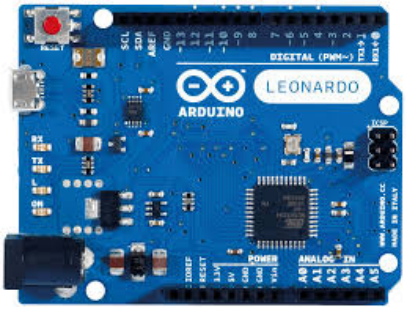


Fig.13

4. Ardunio nano: It is a small-device friendly board based on ATmega328p. it consists of 14 digital pins.

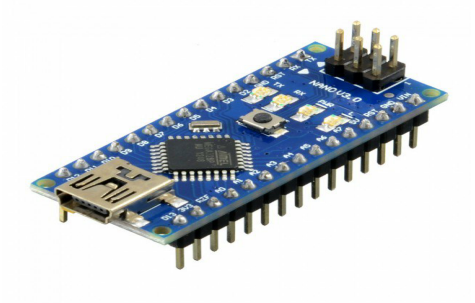
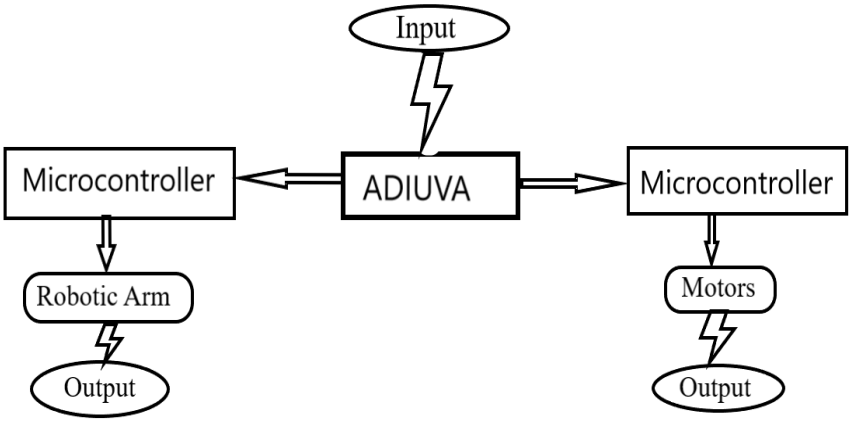
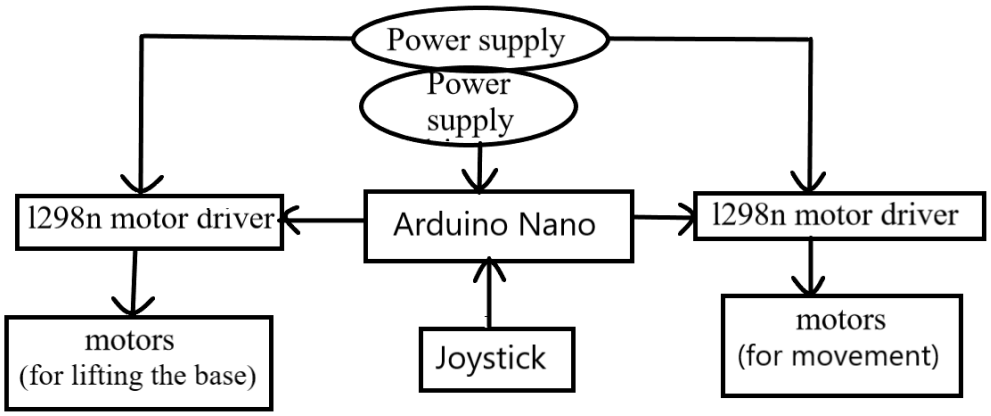


Fig.14

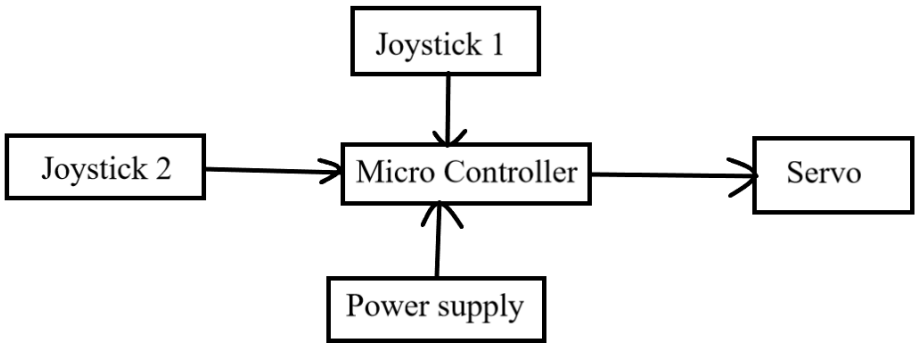
Chapter 3
Implementation and working



Block diagram

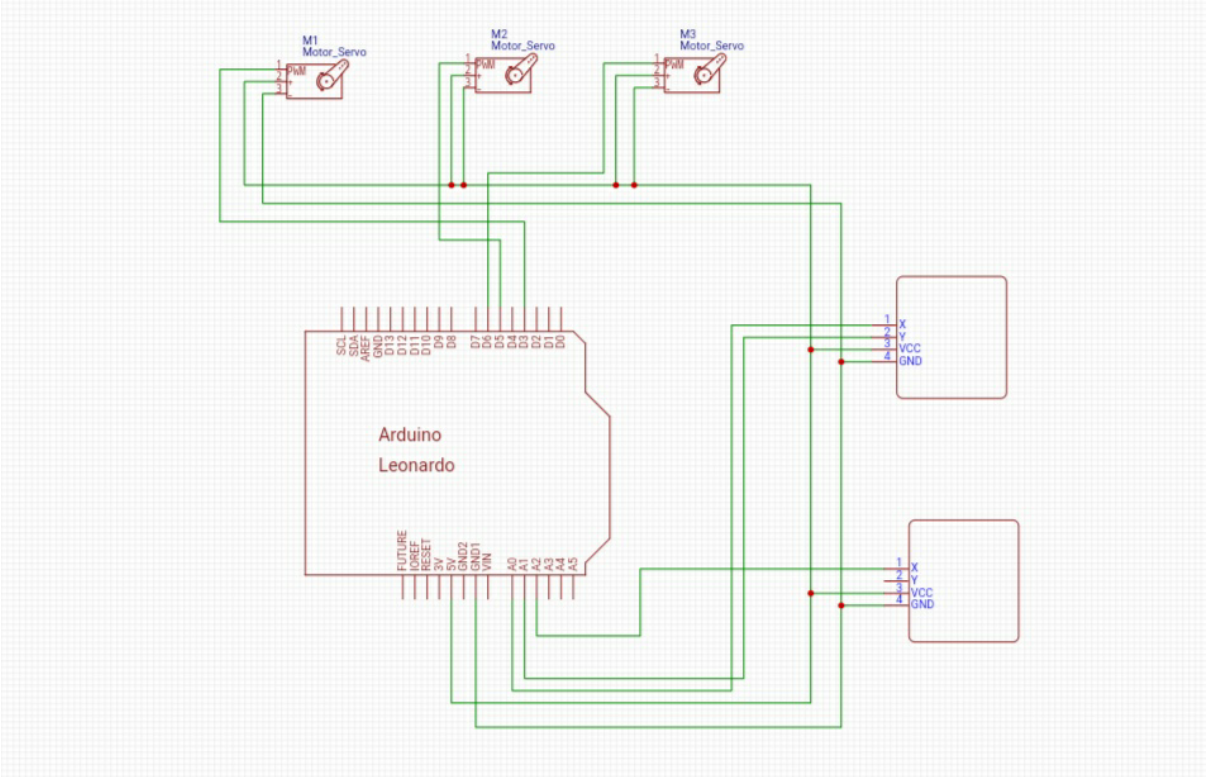


Block diagram of Walker

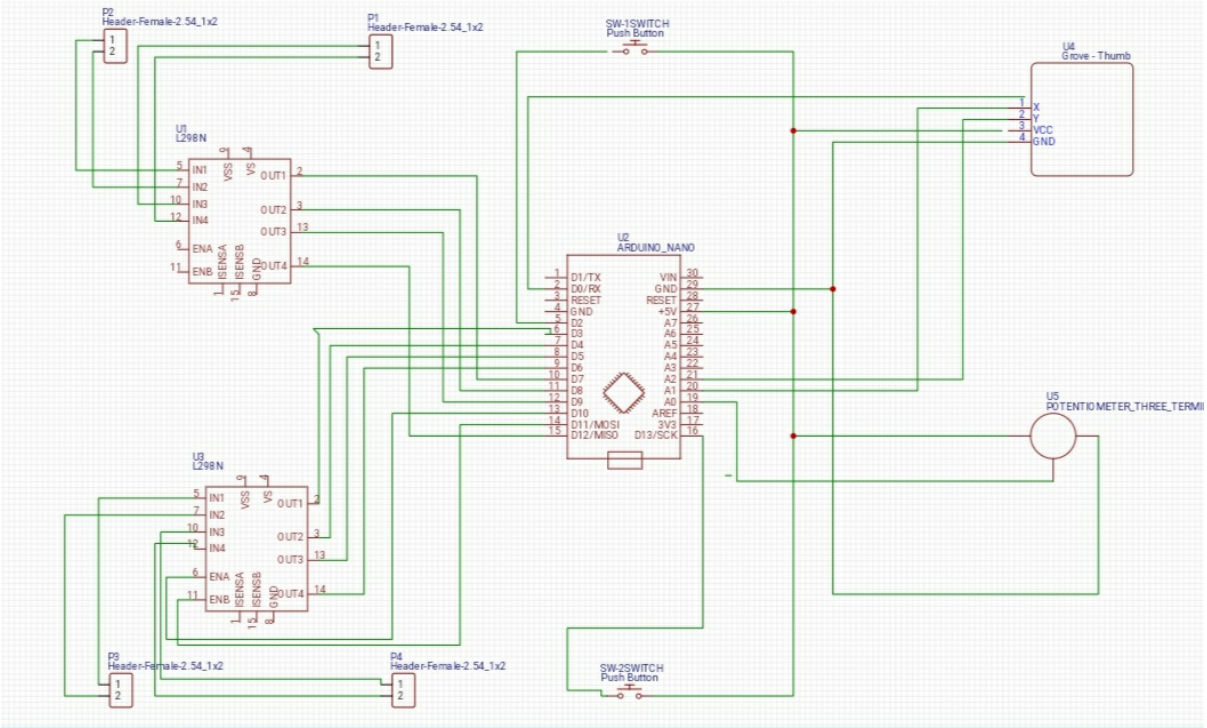


Block diagram of arm

Circuitry:



Circuit-1



Circuit-2

Working:

Old people or semi-disabled people generally use walker while walking. To make their moving more easy and comfort we have done this project.

We had placed two buttons on either sides of the walker for the easy movement of wheels while walking with manual effort. When he is exhausted, he can stand on the base. Joysticks are used for the movement of wheels placed at the bottom.

To pick the objects, which are on the ground etc, we introduced a robotic arm. It consists of three servo motors, depending on the required angel we can the movement of the arm by joysticks.

Algorithm:

Step-1 : Begin
Step-2 : give power to Arduino Nano
Step-3 : connect motor drivers ,push buttons and joystick to the Arduino.
Step-4 : control the Walker with push buttons while standing on ground
Step-5 : control the Walker with joystick while standing on the platform
Step-6 : give power to Arduino leonardo
Step-7 : connect servos and joysticks to the leonardo
Step-8 : control the arm with the joysticks.
Step-9 : End.

Chapter 4:

Experimental Results and Conclusion

4.1 RESULTS:

We made the movement easy and more comfort for old and semi-disabled people.

It is also easy for the people who cannot bend and pick the objects by using the robotic arm.

4.2 FUTURE ENHANCEMENTS:

In our project we used joysticks for the movement of wheels and arm, which is impossible or difficult for the people, who does not have hands. It can be solved by giving signals by voice i.e, voice command.

4.3 CONCLUSION:

The overall conclusion of the project is that we have successfully constructed a walker that really help the semi-disabled and old people

SOURCE CODE

1.CODE FOR WALKER:

```
 int g=1;
int yo=0;
int xpos =0;
int ypos =0;
int pot =A0;
int xaxis =A1;
int yaxis =A2;
int switch1; //int enA =D10; //pwm      //int enB =D11; //pwm
void setup()
{ Serial.begin(9600);
pinMode(pot,INPUT);
pinMode(xaxis,INPUT);
pinMode(yaxis,INPUT);
pinMode(3,OUTPUT);
pinMode(4,OUTPUT);
pinMode(5,OUTPUT);
pinMode(6,OUTPUT);
pinMode(7,OUTPUT);
pinMode(8,OUTPUT);
pinMode(9,OUTPUT);
pinMode(12,OUTPUT);
pinMode(0,INPUT);
pinMode(2,OUTPUT);//button1
pinMode(1,OUTPUT);//button2
pinMode(10,OUTPUT);//pwm
pinMode(11,OUTPUT);//pwm
pinMode(13,INPUT);//switch
int t;
for(t=0;t<14;t++)
```

```
digitalWrite(t,LOW);}


void loop()
{  int xpos = analogRead(xaxis);
  int ypos = analogRead(yaxis);
  int speed1 = analogRead(pot);
  analogWrite(10,speed1);
  analogWrite(11,speed1);
switch1 =digitalRead(13);
Serial.println(switch1);
if(switch1==0 && yo==0)
  {  g=g+1;
     yo=1;}//Serial.println(g);
if(switch1==1 && yo!=0)
 {if(g%2==0)
   { Serial.println("even");
   switch1=digitalRead(13);
   open1();
    while(true)
    {//run1();
   Serial.println("run1()");
   int button1=digitalRead(1);
   int button2=digitalRead(2);
   Serial.println(button1);
   Serial.println(button2);
   switch1=digitalRead(13);
   if(switch1==0)
   { yo=0;
    break;
```

```
 }
else if (button1==0 && button2==0)
{ digitalWrite(3,LOW);
 digitalWrite(4,LOW);
 digitalWrite(5,LOW);
 digitalWrite(6,LOW);
 Serial.println("stop");
 int button1=digitalRead(1);
int button2=digitalRead(2);
}
else if (button1==1 && button2==0) //button1 on right and 3,4 pins for right motor
{ digitalWrite(3,HIGH);
 digitalWrite(4,LOW);
 digitalWrite(5,LOW);
 digitalWrite(6,LOW);
 Serial.println("left");
 int button1=digitalRead(1);
int button2=digitalRead(2);
}
else if (button1==0 && button2==1)
{ digitalWrite(3,LOW);
 digitalWrite(4,LOW);
 digitalWrite(5,HIGH);
 digitalWrite(6,LOW);
 Serial.println("right");
 int button1=digitalRead(1);
int button2=digitalRead(2);
}
else if (button1==1 && button2==1)
```

```
  { digitalWrite(3,HIGH);
   digitalWrite(4,LOW);
   digitalWrite(5,HIGH);
   digitalWrite(6,LOW);
   Serial.println("front");
   int button1=digitalRead(1);
  int button2=digitalRead(2);
  }
 }
}
yo=0;
  //Serial.println(g);
  if(g%2!=0)
  { Serial.println("odd");
  switch1 =digitalRead(13);
  close1();
  while(true)
{      //run2();
 Serial.println("run2()");
 int xpos = analogRead(xaxis);
 int ypos = analogRead(yaxis);
 //Serial.println(xpos);
 //Serial.println(ypos);
 switch1 =digitalRead(13);
  if(switch1==0)
   {yo=0;
   break;
  }
  else if (350<xpos && xpos<600 && 450<ypos && ypos<600) //stop
```

```
 { digitalWrite(3,LOW);
  digitalWrite(4,LOW);
  digitalWrite(5,LOW);
  digitalWrite(6,LOW);
  Serial.println("stop");
  switch1 =digitalRead(0);
  int xpos = analogRead(xaxis);
 int ypos = analogRead(yaxis);
 }
 else if (0<=xpos && xpos<350) //forward
 { digitalWrite(3,HIGH);
  digitalWrite(4,LOW);
  digitalWrite(5,HIGH);
  digitalWrite(6,LOW);
  Serial.println("front");
  switch1 =digitalRead(13);
   int xpos = analogRead(xaxis);
int ypos = analogRead(yaxis);
}
else if (600<xpos && xpos<=1023) //backward
{ digitalWrite(3,LOW);
  digitalWrite(4,HIGH);
  digitalWrite(5,LOW);
  digitalWrite(6,HIGH);
  Serial.println("back");
  switch1 =digitalRead(0);
    int xpos = analogRead(xaxis);
int ypos = analogRead(yaxis);
}
```

```
 else if (0<=ypos && ypos<450) //left (3,4 pins for right motor)
 { digitalWrite(3,HIGH);
  digitalWrite(4,LOW);
  digitalWrite(5,LOW);
  digitalWrite(6,LOW);
  Serial.println("left");
  switch1 =digitalRead(0);
    int xpos = analogRead(xaxis);
 int ypos = analogRead(yaxis);
 }
 else if (600<ypos && ypos<=1023) //right (5,6 pins for left motor)
 { digitalWrite(3,LOW);
  digitalWrite(4,LOW);
  digitalWrite(5,HIGH);
  digitalWrite(6,LOW);
  Serial.println("right");
  switch1 =digitalRead(0);
    int xpos = analogRead(xaxis);
 int ypos = analogRead(yaxis);
 }
 }
  }
  }
  yo=0;
}
}
void open1()
{ digitalWrite(7,HIGH);
 digitalWrite(8,LOW);
```

```
  digitalWrite(9,HIGH);
  digitalWrite(12,LOW);
   delay(5000);
  digitalWrite(7,LOW);
  digitalWrite(8,LOW);
  digitalWrite(9,LOW);
  digitalWrite(12,LOW);
     Serial.println("open1");
}
void close1()
{ digitalWrite(7,LOW);
  digitalWrite(8,HIGH);
  digitalWrite(9,LOW);
  digitalWrite(12,HIGH);
   delay(5000);
  digitalWrite(7,LOW);
  digitalWrite(8,LOW);
  digitalWrite(9,LOW);
  digitalWrite(12,LOW);
  Serial.println("close1");
}
```

2.Code for Robotic Arm:

```
#include <Servo.h>
Servo myservo1;  // create servo object to control a servo
Servo myservo2;
Servo myservo3;
```

```
int val1;//variable for moment of elbow
int val2;//variable for wrist roll
int val3;//variable for gripper
int ang1=0;
int ang2=0;
int ang3=0;
void setup()
{  Serial.begin(9600);
 myservo1.attach(3);
 myservo2.attach(5);
 myservo3.attach(6);
 myservo4.attach(11);
 myservo1.write(ang1);
 myservo2.write(ang2);
 myservo3.write(ang3);
 myservo4.write(ang4);
 delay(15);
}
void loop()
 {  val1 = analogRead(A0);           // reads the value of the potentiometer (value between 0 and 1023)
  val1 = map(val1, 0, 1023, 0, 180);     // scale it to use it with the servo (value between 0 and 180)
  if(val1>105)
{    for(;ang1<180;ang1++){
      myservo1.write(ang1);
      delay(15);
      val1 = analogRead(A0);
      val1 = map(val1, 0, 1023, 0, 180);
      if(val1<105)
      break;
```

```
   }
 }
 if(val1<75)
{    for(;ang1>0;ang1--){
     myservo1.write(ang1);
     delay(15);
     val1 = analogRead(A0);
     val1 = map(val1, 0, 1023, 0, 180);
     if(val1>75)
     break;
   }
 }
Serial.println(val1);
Serial.println(ang1);
val2 = analogRead(A1);          // reads the value of the potentiometer (value between 0 and 1023)  val2 =
map(val2, 0, 1023, 0, 180);     // scale it to use it with the servo (value between 0 and 180)
if(val2>105)
{    for(;ang2<180;ang2++){
     myservo2.write(ang2);
     delay(15);
     val2 = analogRead(A1);
     val2 = map(val2, 0, 1023, 0, 180);
     if(val2<105)
     break;
   }
 }
 if(val2<75)
 {    for(;ang2>0;ang2--)
   {  myservo2.write(ang2);
```

```
    delay(15);
    val2 = analogRead(A1);
    val2 = map(val2, 0, 1023, 0, 180);
    if(val2>75)
    break;
   }
 }
Serial.println(val2);
Serial.println(ang2);
val3 = analogRead(A2);          // reads the value of the potentiometer (value between 0 and 1023)  val3 =
map(val3, 0, 1023, 0, 180);     // scale it to use it with the servo (value between 0 and 180)
if(val3>105)
{   for(;ang3<180;ang3++){
    myservo3.write(ang3);
    delay(15);
    val3 = analogRead(A2);
    val3 = map(val3, 0, 1023, 0, 180);
    if(val3<105)
    break;
   }
 }
 if(val3<75)
 {  for(;ang3>0;ang3--)
   {  myservo3.write(ang3);
    delay(15);
    val3 = analogRead(A2);
    val3 = map(val3, 0, 1023, 0, 180);
    if(val3>75)
    break;
```

```
   }
 }
Serial.println(val3);
Serial.println(ang3);
val4 = analogRead(A3);          // reads the value of the potentiometer (value between 0 and 1023)  val4 =
map(val4, 0, 1023, 0, 180);     // scale it to use it with the servo (value between 0 and 180)
if(val4>105)
 {  for(;ang4<180;ang4++)
   {  myservo4.write(ang4);
     delay(15);
     val4 = analogRead(A3);
     val4 = map(val1, 0, 1023, 0, 180);
     if(val4<105)
     break;
   }
 }
 if(val4<75)
{  for(;ang4>0;ang4--){
     myservo4.write(ang4);
     delay(15);
     val4 = analogRead(A3);
     val4 = map(val4, 0, 1023, 0, 180);
     if(val4>75)
     break;
   }
 }
Serial.println(val4);
Serial.println(ang4);
}
```