



Arm Robot

Project 6

ARM ROBOT CONTROL WITH 2 JOYSTICKS

PROJECT N° 6: Control the Arm Robot with 2 joysticks

Once you have built the Arm Robot and done the exercises 1 to 5, do this final project to control its movements using 2 joysticks. With the J1 you will move the forearm (S3) and the gripper (S4), and with the J2 you will move the arm (S2) and the base (S1).

DIFFICULTY LEVEL: Advanced.

DURATION OF THE EXERCISE: 60 min.

MATERIALS:

- Arm Robot

- 1 USB - USB type B cable
- Computer

CONNECTIONS:

To do this project, the Arm Robot must be assembled according to the instructions manual (link to the manual). Follow the steps and do the corresponding connections.

PROGRAMMING CODE

You can do this project using the Arduino program or a visual programming software by blocks compatible. Below you will find the necessary code.

Arduino Code

1. Download and install the Arduino IDE program. It is available for Windows, Mac OS and Linux.
2. Open the Arduino program and copy the following code in it:

```
#include <Servo.h>

int valueX = 0; // J2 X-AXIS READING
int valueY = 0; // J2 Y-AXIS READING
int valueX2 = 0; // J1 X-AXIS READING
int valueY2 = 0; // J1 Y-AXIS READING
/*-----*/
-----*/
int pinJX = A1; // A1 X-AXIS ANALOG PIN
int pinJY = A0; // A0 Y-AXIS ANALOG PIN
int pinJX2 = A2; // A2 X2-AXIS ANALOG PIN
int pinJY2 = A3; // A3 Y2-AXIS ANALOG PIN
/*-----*/
-----*/
Servo motor1; // DECLARE S1 // SERVO MOTOR 1
Servo motor2; // DECLARE S2 // SERVO MOTOR 2
Servo motor3; // DECLARE S3 // SERVO MOTOR 3
Servo motor4; // DECLARE S4 // SERVO MOTOR 4
/*-----*/
-----*/
int degree1 = 0; // S1 DEGREES
int degree2 = 0; // S2 DEGREES
int degree3 = 0; // S3 DEGREES
int degree4 = 0; // S4 DEGREES
```

```

/*-----*/
-----*/
float tiempo;

void setup() {
  // put your setup code here, to run once:
  motor1.attach (6); // DIGITAL PIN PWM 6 WHERE S1 IS
  CONNECTED
  motor2.attach (9); // DIGITAL PIN PWM 9 WHERE S2 IS
  CONNECTED
  motor3.attach (10); // DIGITAL PIN PWM 10 WHERE S3 IS
  CONNECTED
  motor4.attach (11); // DIGITAL PIN PWM 11 WHERE S4 IS
  CONNECTED
  /*-----*/
  -----*/
  // ARM ROBOT INITIAL POSITION
  degree1 = 20; //S1
  degree2 = 70; //S2
  degree3 = 80; //S3
  degree4 = 90; //S4
  /*-----*/
  -----*/
}

void loop() {
  // put your main code here, to run repeatedly:
  Motor1();
  Motor2();
  Motor3();
  Motor4();

  for (tiempo = 0; tiempo < 2500; tiempo++)
  {
    if (tiempo >= 2500)
    {
      tiempo == 0;
    }
  }
}

void Motor1 ()
{
  valueX = analogRead ( pinJX); // STORES THE

```

```

READINGS OF THE Y-AXIS OF THE ANALOG PORT A1
  // INCREASE MOTOR 1 DEGREES
  if ( (valueX > 520) && (valueX <= 1023) && (degree1
< 170) ) // INCREASE THE DEGREES WHEN THE X-AXIS
READING IS HIGHER THAN THE CALIBRATION OR LOWER/EQUAL
TO 1023
  {
    degree1 = degree1 + 5; // +5 degree
  }
  // DECREASE MOTOR 1 DEGREES
  else if ( (valueX >= 0 ) && (valueX < 480)&&
(degree1 > 20) ) // DECREASE DEGREES WHEN THE X-AXIS
READING IS LOWER THAN THE CALIBRATION OR HIGHER /
EQUAL TO 0
  {
    degree1 = degree1 - 5; // -5 degree
  }
  motor1.write (degree1); // SEND DEGREES TO SERVO 1
}

void Motor2 ()
{
  valueY = analogRead ( pinJY); // STORES THE
READINGS OF THE Y-AXIS OF THE ANALOG PORT A0
  // INCREASE MOTOR2 DEGREES
  if ( (valueY > 530 ) && (valueY <= 1023) &&
(degree2 < 140) )// INCREASE THE DEGREES WHEN THE Y-
AXIS READING IS HIGHER THAN THE CALIBRATION 0 LOWER /
EQUAL TO 1023
  {
    degree2 = degree2 + 5; // +5 degree
  }
  // MOTRO2 DECREASE DEGREES
  else if ( (valueY >= 0 ) && (valueY < 480) &&
(degree2 > 70) ) // DECREASE DEGREES WHEN THE Y-AXIS
LECTURE IS LOWER THAN THE CALIBRATION OR HIGHER/EQUAL
TO 0
  {
    degree2 = degree2 - 5; // -5 degree
  }
  motor2.write (degree2); // SEND DEGREES TO SERVO 2
}

void Motor3 ()

```

```

{
  valueX2 = analogRead ( pinJX2); // STORES THE
  READINGS OF THE X2-AXIS OF THE ANALOG PORT A2
  // MOTOR3 DEGREES INCREASE
  if ( (valueX2 >= 0 ) && (valueX2 < 480) && (degree3
  < 155) ) // INCREASE DEGREES WHEN THE X2-AXIS
  READING IS HIGHER THAN THE CALIBRATION OR LOWER/EQUAL
  TO 1023
  {
    degree3 = degree3 + 5; // +5 degree
  }
  // MOTOR3 DEGREE DECREASE
  if ( (valueX2 > 530 ) && (valueX2 <= 1023) &&
  (degree3 > 80) ) // DECREASE DEGREES WHEN THE X2-
  AXIS READING IS LOWER THAN THE CALIBRATION OR
  HIGHER/EQUAL TO 0
  {
    degree3 = degree3 - 5; // -5 degree
  }
  motor3.write (degree3); // SEND DEGREES TO SERVO 3
}

void Motor4 ()
{
  valueY2 = analogRead ( pinJY2); // STORES THE
  READINGS OF THE Y-AXIS OF THE ANALOG PORT A3
  // MOTOR4 INCREASE DEGREES
  if ( (valueY2 >= 0 ) && (valueY2 < 480) && (degree4
  < 125) ) // INCREASE DEGREES WHEN Y2-AXIS READING IS
  HIGHER THAN THE CALIBRATION OR LOWER/EQUAL TO 1023
  {
    degree4 = degree4 + 5; // +5 degree
  }
  // MOTOR4 DEGREE DECREASE
  else if ( (valueY2 > 530 ) && (valueY2 <= 1023) &&
  (degree4 > 90) ) // DECREASE DEGREES WHEN THE Y2-AXIS
  READING IS LOWER THAN THE CALIBRATION OR HIGHER/EQUAL
  TO 0
  {
    degree4 = degree4 - 5; // -5 degree
  }
  motor4.write (degree4); // SEND DEGREES TO SERVO 4
}

```

3. Configure and upload the code, following the instructions indicated in the

Arm Robot First Steps guide

Code for the visual programming software by blocks compatible

1. Download and install the program.
2. Open the program and copy the following code:

```

Arduino Program
set DEGREE1 to 90
set DEGREE2 to 90
forever
  if read analog pin (A) 1 > 550 then MOTOR 1
    set DEGREE1 to DEGREE1 + 5
    set servo pin 6 angle as DEGREE1
    if DEGREE1 > 180 then
      set DEGREE1 to 180
  if read analog pin (A) 1 < 480 then
    set DEGREE1 to DEGREE1 - 5
    set servo pin 6 angle as DEGREE1
    if DEGREE1 < 0 then
      set DEGREE1 to 0
  if read analog pin (A) 0 > 550 then MOTOR 2
    set DEGREE2 to DEGREE2 + 5
    set servo pin 9 angle as DEGREE2
    if DEGREE2 > 140 then
      set DEGREE2 to 140
  if read analog pin (A) 0 < 480 then
    set DEGREE2 to DEGREE2 - 5
    set servo pin 9 angle as DEGREE2
    if DEGREE2 < 70 then
      set DEGREE2 to 70
  wait 0.05 secs

```

3. Configure the program and upload it to the Arm Robot. You will find the instructions in the Arm Robot First Steps guide.

RESULT OF THE EXERCISE

Once you have created the program, you will be able to control the Arm Robot with two joysticks. With the J1 you will move the forearm (S3) and the gripper (S4), and with the J2 you will move the arm (S2) and the base (S1).