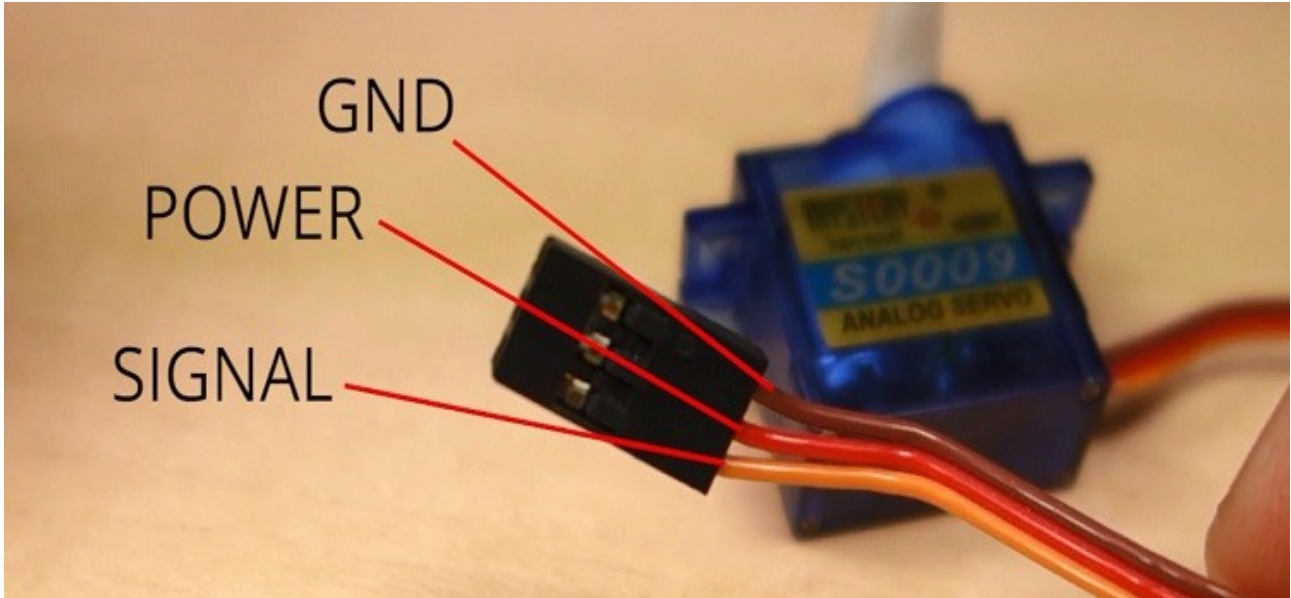# Part 22
-
Servo

Servo Motor

In this tutorial we're going to show you how to control with the ESP32 the shaft's position of a servo motor.

Connecting the Servo Motor to the ESP32
Servo motors have three wires: power, ground, and signal. The power is usually red, the GND is black or brown, and the signal wire is usually yellow, orange, or white.

Wire	Color
Power	Red
GND	Black, or brown
Signal	Yellow, orange, or white

You'll need to power up your servos using an external power supply.

If you're using a small servo like the S0009, you need to connect:
- GND   -> ESP32 GND pin;
- Power   -> ESP32 VIN pin;
- Signal   -> GPIO 13 (or any PWM pin).

Note: in this case, you can use any ESP32 GPIO, because any GPIO is able to produce a PWM signal. However, we don't recommend using GPIOs 9, 10, and 11 that are connected to the integrated SPI flash and are not recommend for other uses.
Also do not use GPIO 12 as, when this pin is high, boot will fail.

How to Control a Servo Motor?
You can position the servo's shaft in various angles from 0 to 180º. Servos are controlled using a pulse width modulation (PWM) signal. This means that the PWM signal sent to the motor will determine the shaft's position.

To control the motor you can simply use the PWM capabilities of the ESP32 by sending a 50Hz signal with the appropriate pulse width. Or you can use a library to make this task much simpler.

Installing the ServoESP32
The ESP32 Arduino Servo Library makes it easier to control a servo motor with your ESP32, using the Arduino IDE. Follow the next steps to install the library in your Arduino IDE:

1. Download from library from https://github.com/RoboticsBrno/ESP32-Arduino-Servo-Library/archive/master.zip. You should have a ServoESP32-master.zip folder in your Downloads folder
2. Unzip the ServoESP32-master.zip folder and you should get ServoESP32-master folder
3. Rename your folder from ServoESP32-master to ServoESP32
4. Move theServoESP32 folder to your Arduino IDE installation libraries folder.
   Note: on Windows, the libraries folder would be "My Documents\Arduino\libraries". For users of versions previous to 17, libraries belong in a subdirectory of the Arduino application directory: Arduino\lib\targets\libraries.
5. Finally, re-open your Arduino IDE

Testing an Example

After installing the library, go to your Arduino IDE. Make sure you have the ESP32 board selected, and then, go to File > Examples > ServoESP32 > Simple Servo.

```cpp
#include <Servo.h>

// create servo object to control a servo
// twelve servo objects can be created on most boards
Servo myservo;

// variable to store the servo position
int pos = 0;

void setup()
{
  // attaches the servo on pin 13 to the servo object
  myservo.attach(13);
}

void loop()
{
  // goes from 0 degrees to 180 degrees in steps of 1 degree
  for (pos = 0; pos <= 180; pos += 1)
  {
    // tell servo to go to position in variable 'pos'
    myservo.write(pos);
    // waits 15ms for the servo to reach the position
    delay(15);
  }

  // goes from 180 degrees to 0 degrees
  for (pos = 180; pos >= 0; pos -= 1)
  {
    // tell servo to go to position in variable 'pos'
    myservo.write(pos);
    // waits 15ms for the servo to reach the position
    delay(15);
  }
}
```