PROGRAMMING WITH ARDUINO

Lesson 27/04/2017

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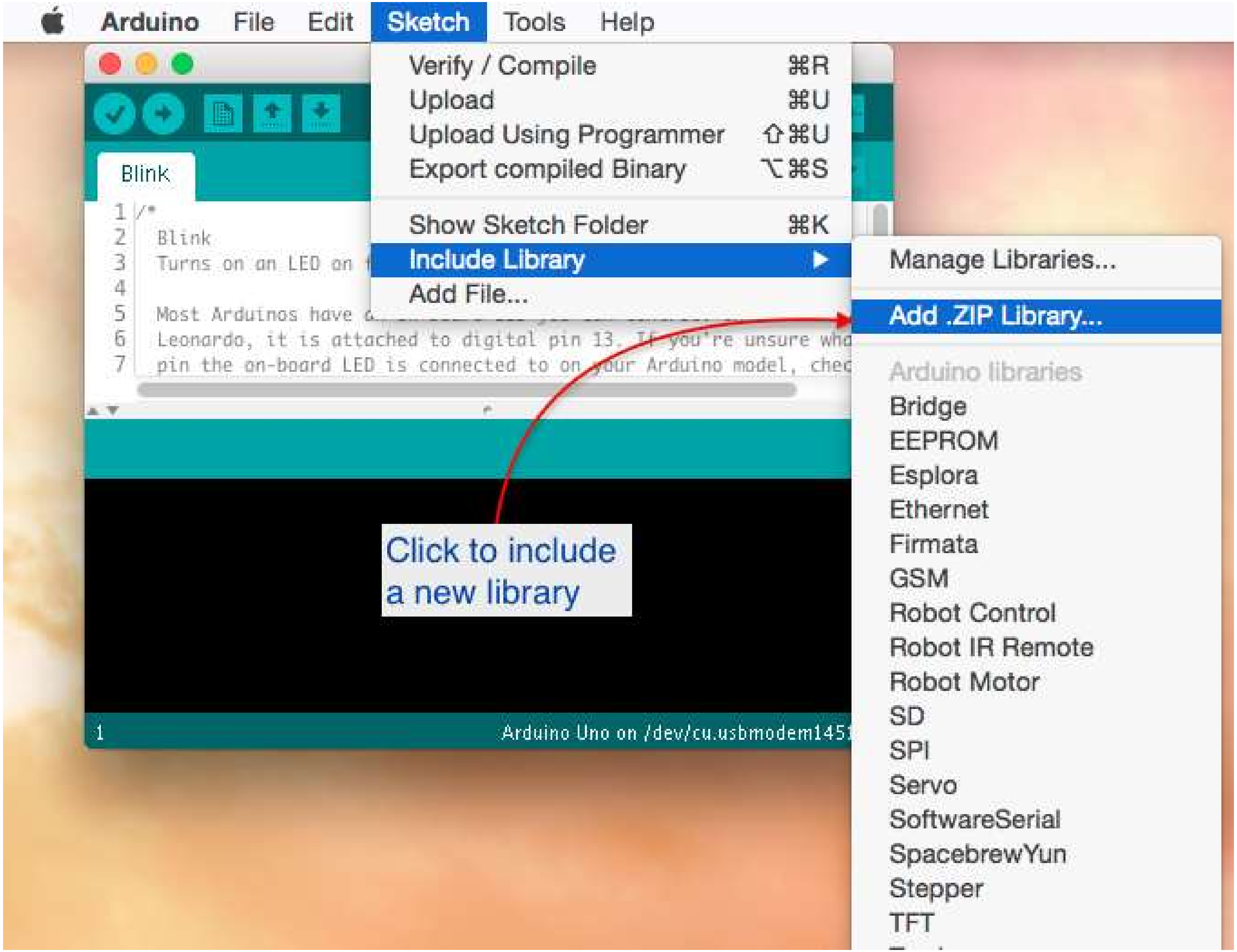
Libraries

Arduino Libraries

- If there is a library that you need but is not included with the IDE, you can install it. Let’s look at an example.
- Download the ZIP file on your computer. It doesn’t matter what platform you are on; the libraries work the same regardless of whether you are on Windows, Mac or Linux.
- Also, don’t worry about extracting the files from the ZIP archive. The newer versions of the Arduino IDE have an easy library installer that takes care of extracting the library from the ZIP file and copying the files to the right location.
- Assuming the library ZIP file is in your Downloads folder, start the Arduino IDE. Then click on “Sketch → Include Library → Add .ZIP Library…”, like this:



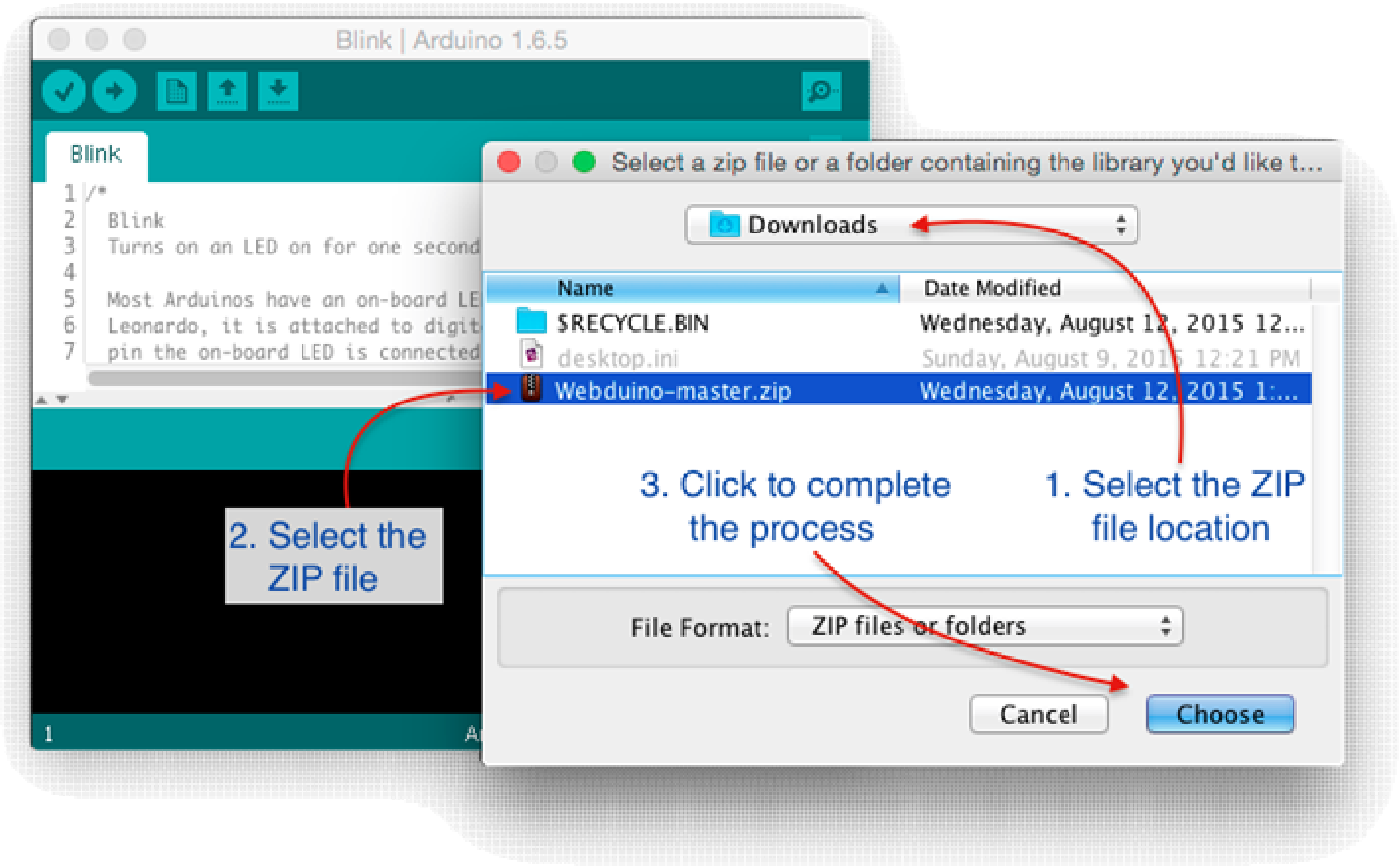
```
/*
  Blink
  Turns on an LED on f

  Most Arduinos have a
  Leonardo, it is attached to digital pin 13. If you're unsure wha
  pin the on-board LED is connected to on your Arduino model, chec
```

Arduino Uno on /dev/cu.usbmodem145

Click to include
a new library

A new dialogue box will pop up. Browse to the location of the ZIP file, select it, and click on Choose to complete the process:



```
/*
  Blink
  Turns on an LED on for one second

  Most Arduinos have an on-board LE
  Leonardo, it is attached to digit
  pin the on-board LED is connected
```

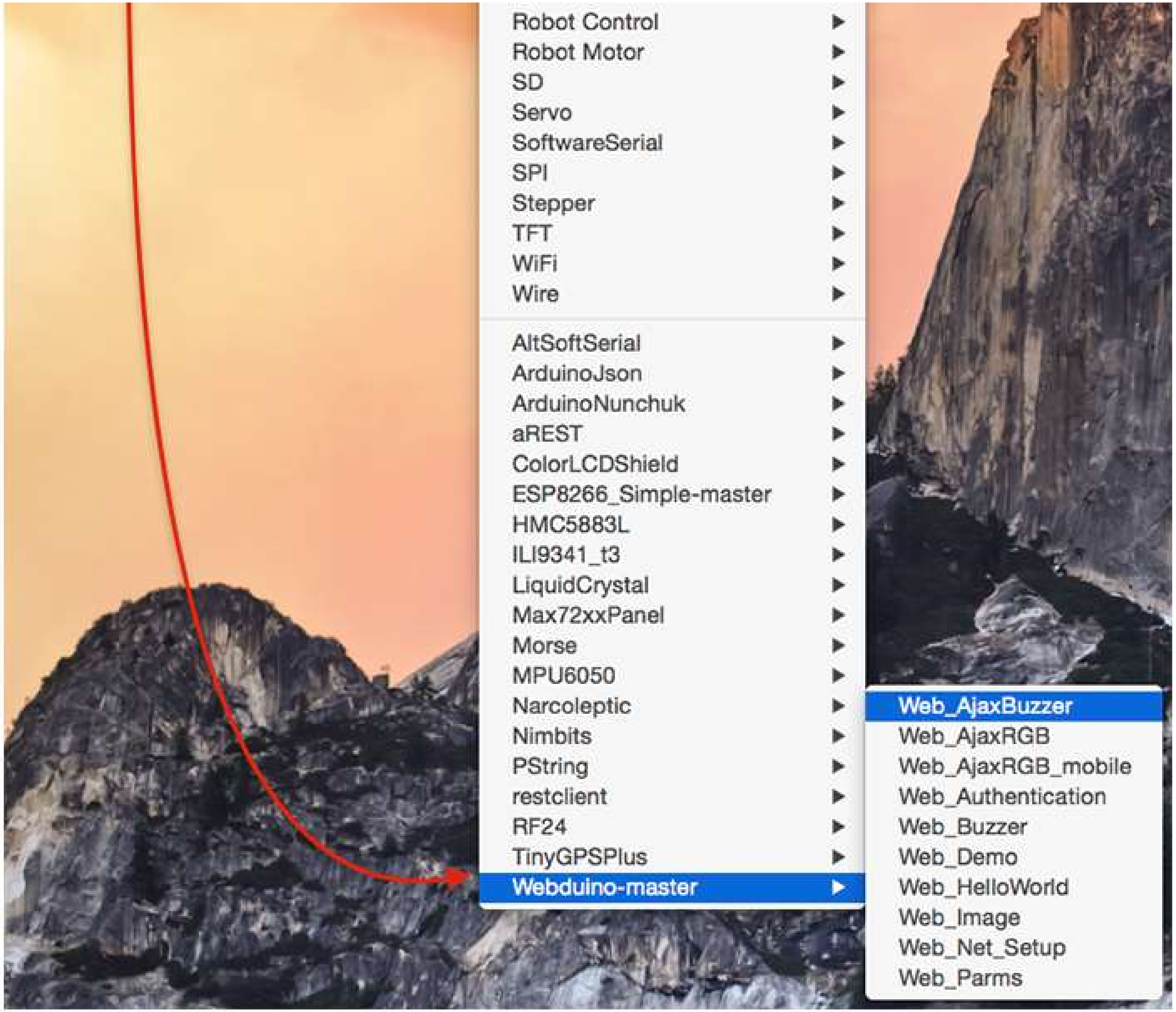
Name	Date Modified
$RECYCLE.BIN	Wednesday, August 12, 2015 12...
desktop.ini	Sunday, August 9, 2015 12:21 PM
Webduino-master.zip	Wednesday, August 12, 2015 1:...

1. Select the ZIP file location

2. Select the ZIP file

3. Click to complete the process

- When you click on “Choose”, the dialogue box will disappear, but nothing else is going to happen. No confirmation, no sound… To make sure that the Webuino library was actually installed, you can look for the example sketches that most libraries include.
- Go to File → Examples, and look at the bottom of the list for your new library:


Robot Control
Robot Motor
SD
Servo
SoftwareSerial
SPI
Stepper
TFT
WiFi
Wire
AltSoftSerial
ArduinoJson
ArduinoNunchuk
aREST
ColorLCDShield
ESP8266_Simple-master
HMC5883L
ILI9341_t3
LiquidCrystal
Max72xxPanel
Morse
MPU6050
Narcoleptic
Nimbits
PString
restclient
RF24
TinyGPSPlus
Webduino-master
Web_AjaxBuzzer
Web_AjaxRGB
Web_AjaxRGB_mobile
Web_Authentication
Web_Buzzer
Web_Demo
Web_HelloWorld
Web_Image
Web_Net_Setup
Web_Parms

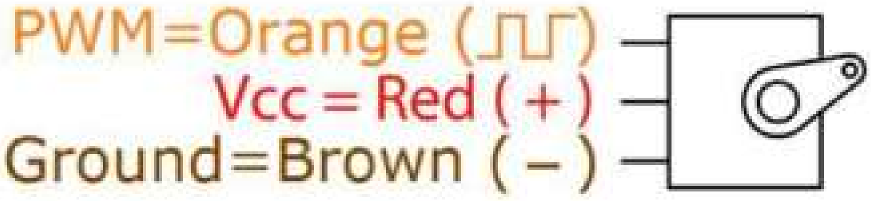
How to include a new library

```
#include <Name_of_library.h>
```

Third Program

Micro Servo 9g

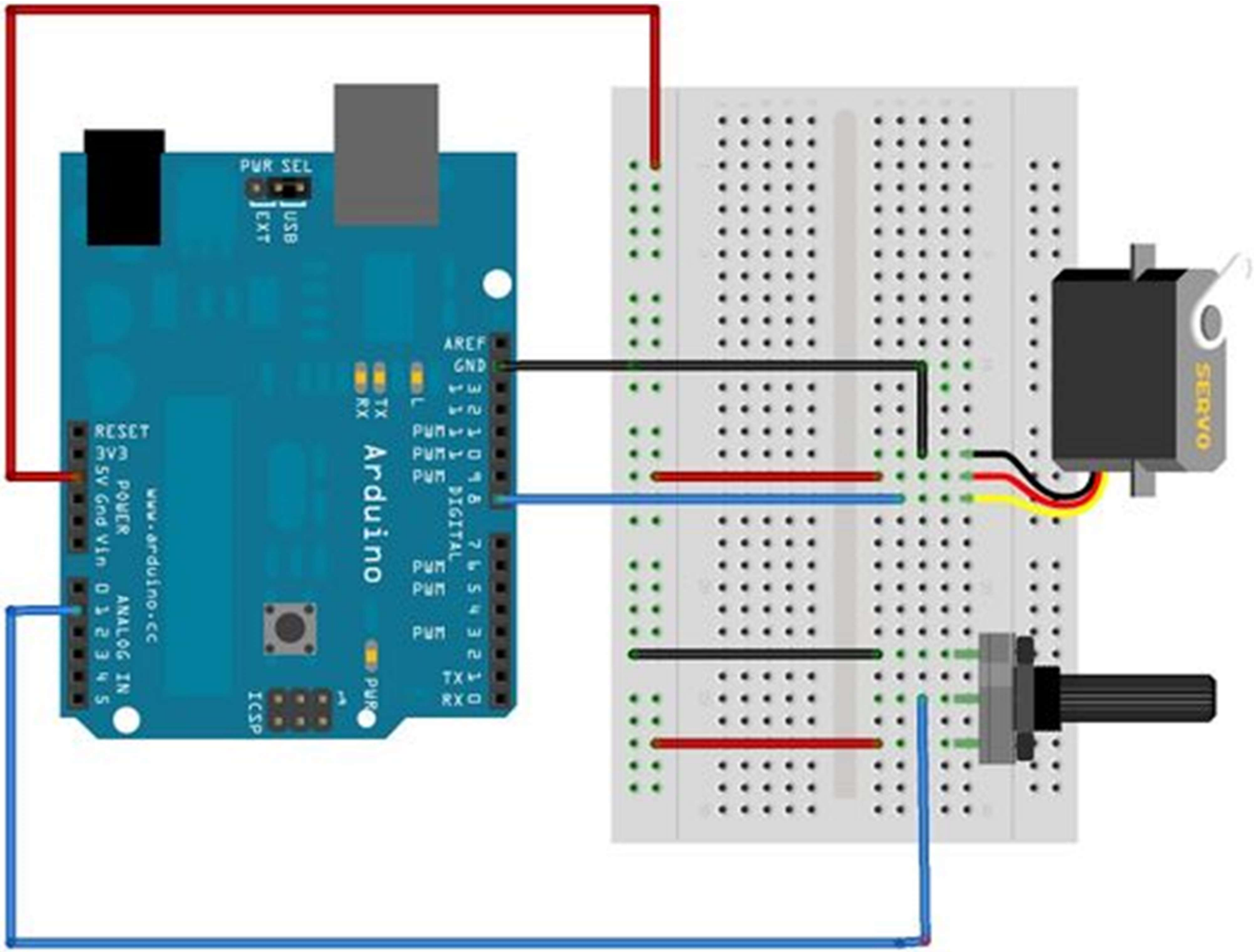
Micro Servo 9g SG90



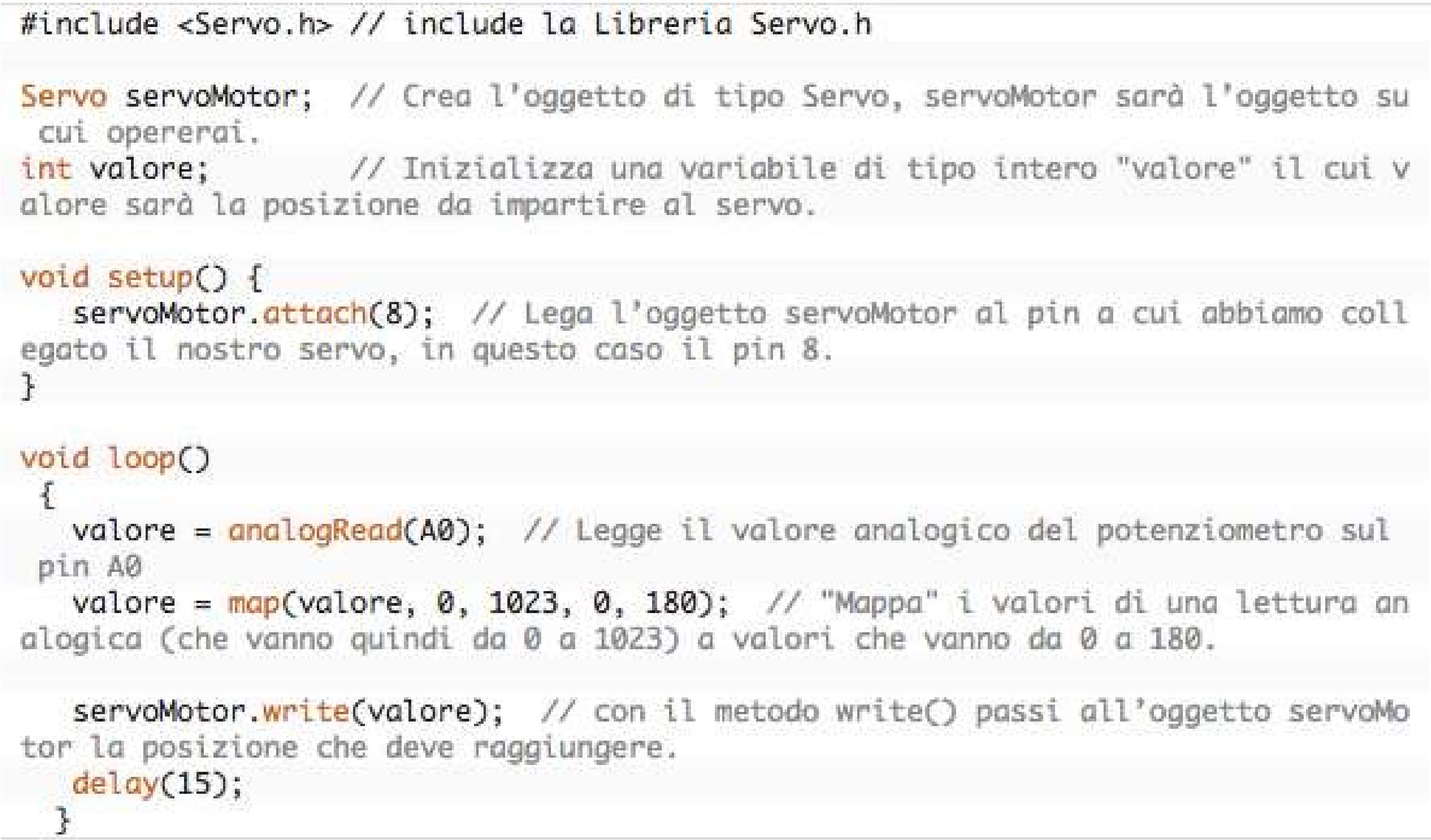
Library: http://playground.arduino.cc/ComponentLib/Servo

Datasheet: http://www.ee.ic.ac.uk/pcheung/teaching/DE1_EE/stores/sg90_datasheet.pdf

Servo Motor Circuit (example)



Servo Motor Sketch



```
#include <Servo.h> // include la Libreria Servo.h

Servo servoMotor;  // Crea l'oggetto di tipo Servo, servoMotor sarà l'oggetto su
 cui opererai.
int valore;        // Inizializza una variabile di tipo intero "valore" il cui v
alore sarà la posizione da impartire al servo.

void setup() {
   servoMotor.attach(8);  // Lega l'oggetto servoMotor al pin a cui abbiamo coll
egato il nostro servo, in questo caso il pin 8.
}

void loop()
 {
   valore = analogRead(A0);  // Legge il valore analogico del potenziometro sul
 pin A0
   valore = map(valore, 0, 1023, 0, 180);  // "Mappa" i valori di una lettura an
alogica (che vanno quindi da 0 a 1023) a valori che vanno da 0 a 180.

   servoMotor.write(valore);  // con il metodo write() passi all'oggetto servoMo
tor la posizione che deve raggiungere.
   delay(15);
  }
```

Fourth Program

Step Motor 5V DC

Stepper motor 28YBJ-48 and related driver

In figure the stepper motor 28YBJ 48, with reducer. Features:

- 4-phase motor
- 5-12 volt power supply, from a source that can be external to Arduino
- consumption: 320 mA
- reduction ratio 1/64

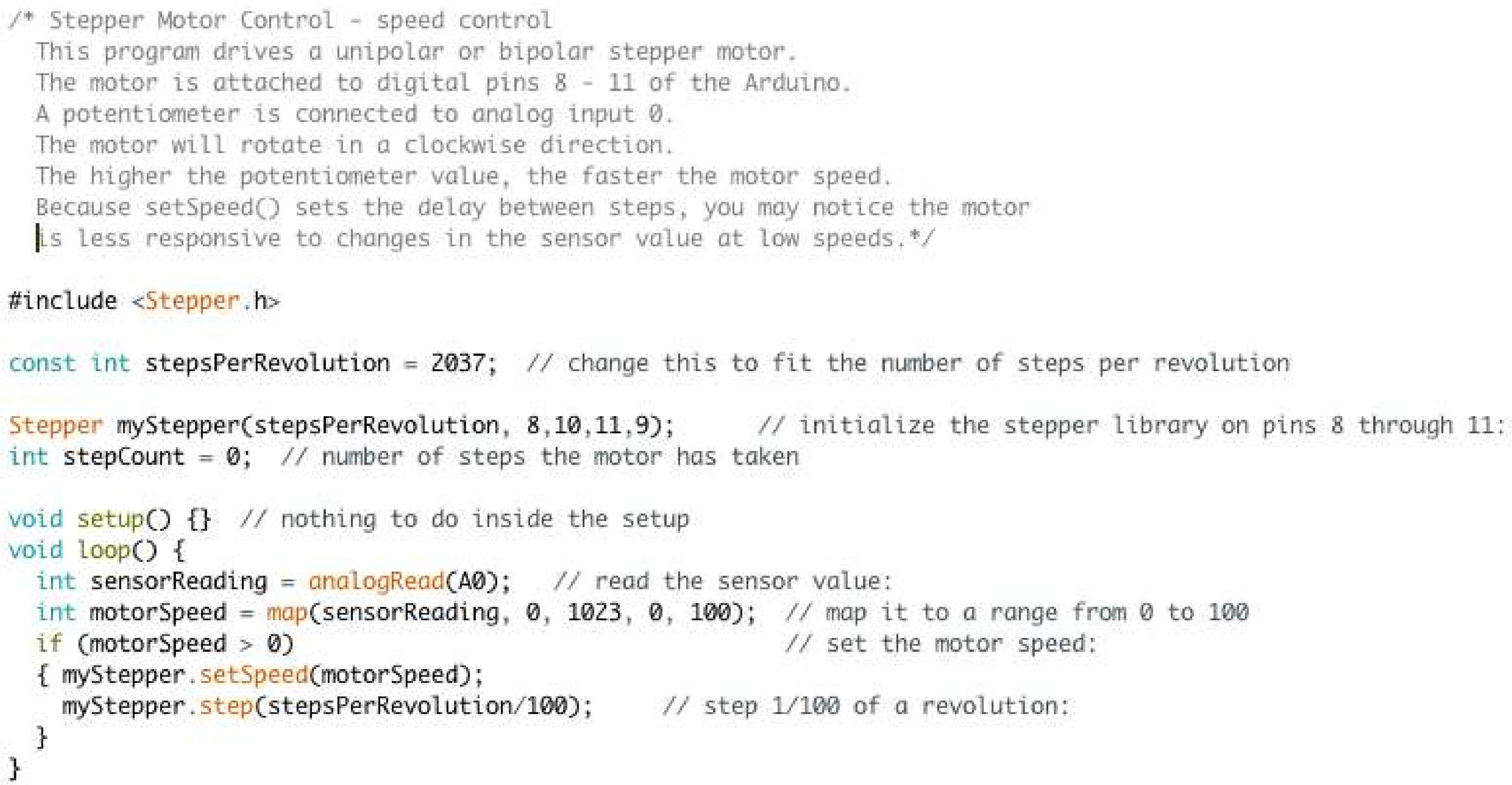
Library: https://www.arduino.cc/en/reference/stepper

Datasheet: http://robocraft.ru/files/datasheet/28BYJ-48.pdf

How the Stepper works?

- The motor can operate in two ways:
  - 64 or 32 pulses for a motor shaft rotation.
- The Arduino libraries manages the 32 pulses mode, so for each pulse the motor shaft rotates 11.25 degrees
- The motor is managed by a driver which, operating under Arduino control, launches the needed impulses. The engine is equipped with a 1/64 ratio reducer, for which, a complete rotation of the output pin, needs 64 crankshaft rotations, thats means 32 * 64 = 2048 pulses.
- The connection between driver and engine is assured by a 4-wire cable that terminates in a plug to be inserted into the driver white slot.

Step Motor Sketch



```
/* Stepper Motor Control - speed control
  This program drives a unipolar or bipolar stepper motor.
  The motor is attached to digital pins 8 - 11 of the Arduino.
  A potentiometer is connected to analog input 0.
  The motor will rotate in a clockwise direction.
  The higher the potentiometer value, the faster the motor speed.
  Because setSpeed() sets the delay between steps, you may notice the motor
  is less responsive to changes in the sensor value at low speeds.*/

#include <Stepper.h>

const int stepsPerRevolution = 2037;  // change this to fit the number of steps per revolution

Stepper myStepper(stepsPerRevolution, 8,10,11,9);      // initialize the stepper library on pins 8 through 11:
int stepCount = 0;  // number of steps the motor has taken

void setup() {}  // nothing to do inside the setup
void loop() {
  int sensorReading = analogRead(A0);   // read the sensor value:
  int motorSpeed = map(sensorReading, 0, 1023, 0, 100);  // map it to a range from 0 to 100
  if (motorSpeed > 0)                                     // set the motor speed:
  { myStepper.setSpeed(motorSpeed);
    myStepper.step(stepsPerRevolution/100);     // step 1/100 of a revolution:
  }
}
```