CLUB ELECTRO

ACTUATORS

Electro

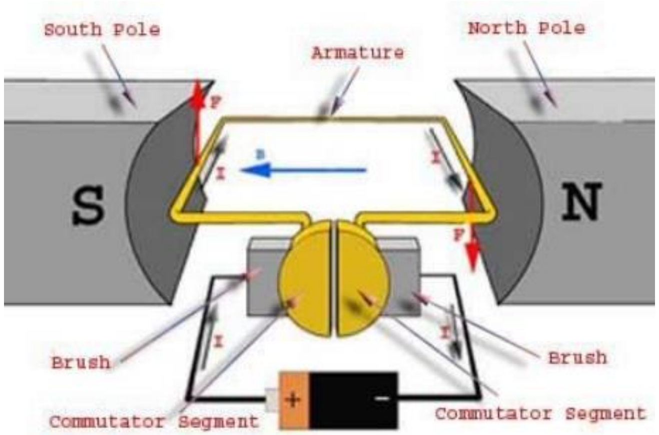
2022/2023

What You Will Learn

- **DC Motor**
- **Servo Motors**
- **Buzzer**

DC Motor

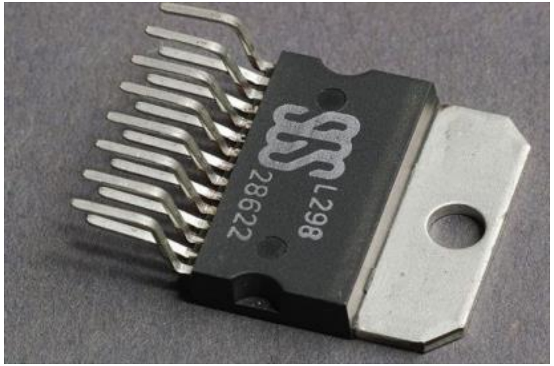
A DC motor (Direct Current motor) is the most common type of motors. DC motors normally have just two leads, one positive and one negative. If you connect these two leads directly to a battery, the motor will rotate. If you switch the leads, the motor will rotate in the opposite direction.



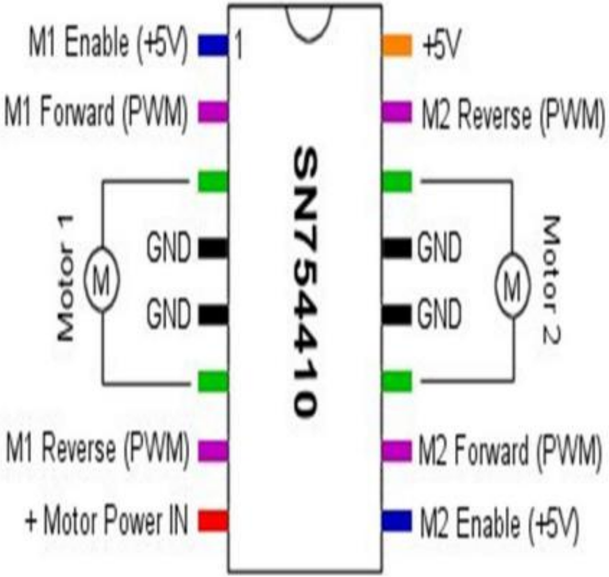
Motor Driver H-Bridge

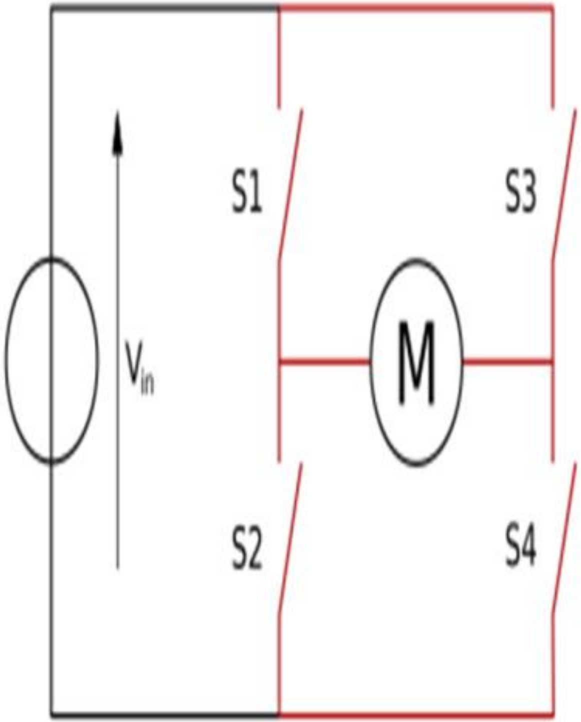
An H bridge is an electronic circuit that enables a voltage to be applied across a load in opposite direction.

These circuits are often used in robotics and other applications to allow DC/stepper motors to run forwards or backwards.

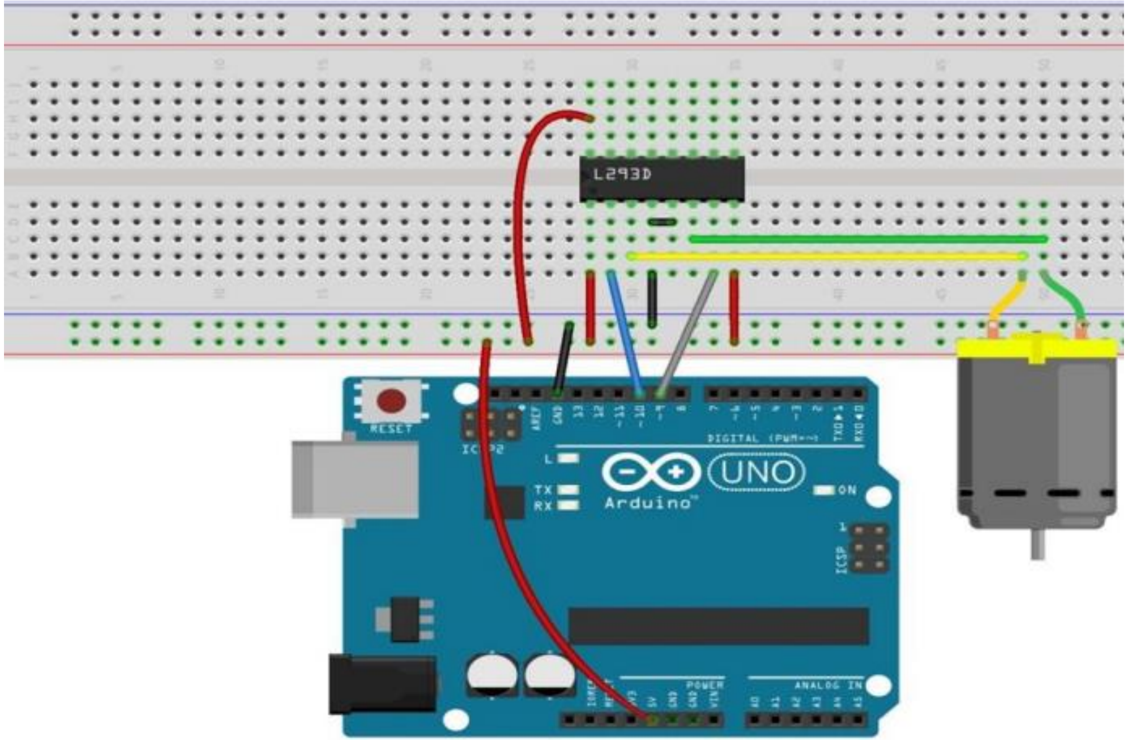


H-Bridge Datasheet

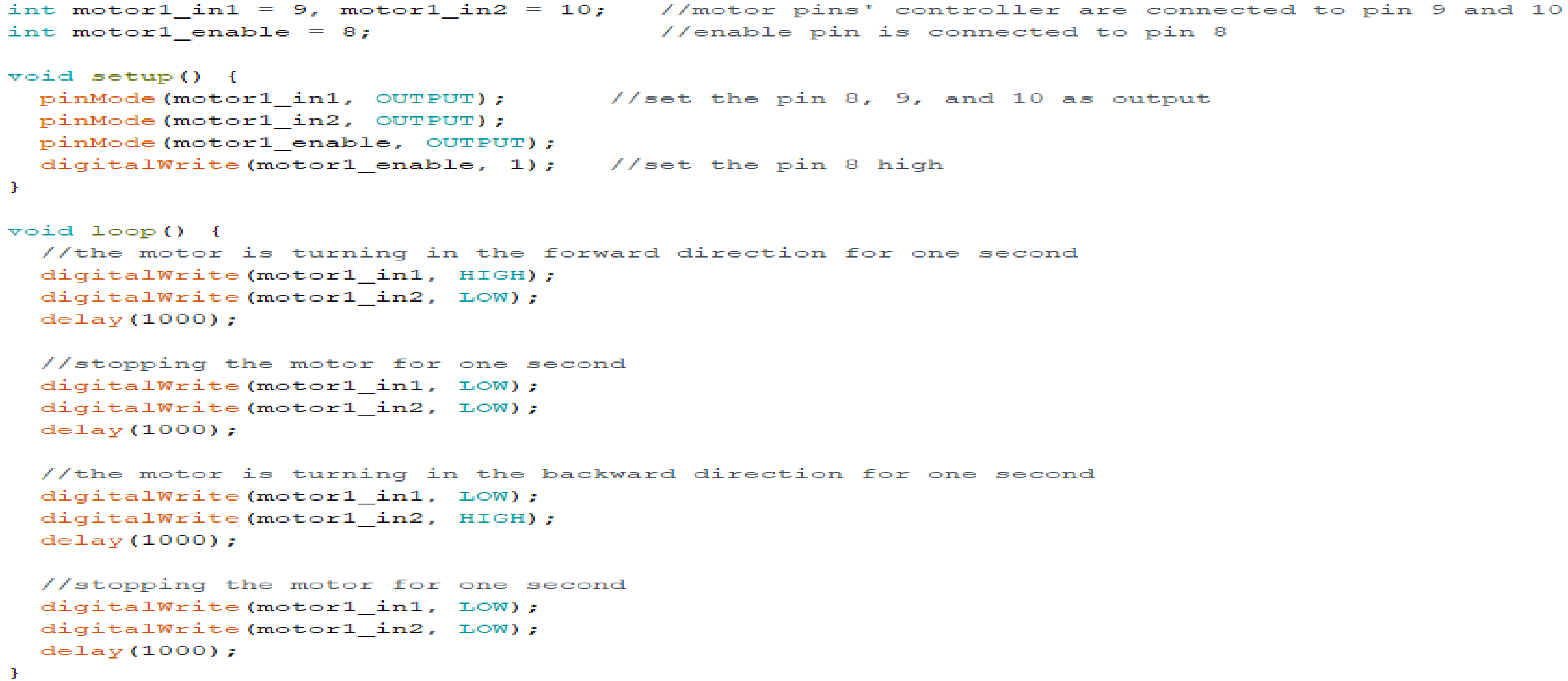




Circuit Building



Let’s Code!

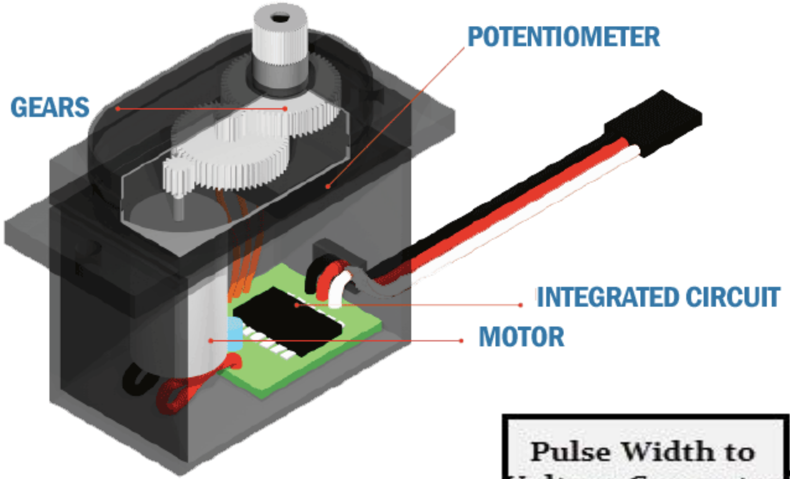


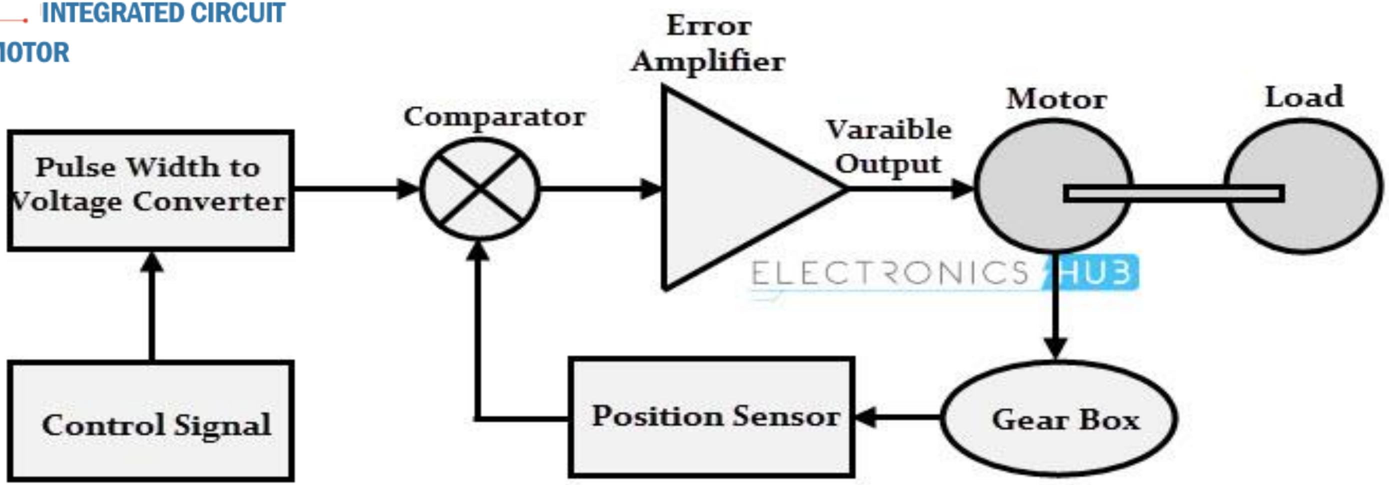
```
int motor1_in1 = 9, motor1_in2 = 10;    //motor pins' controller are connected to pin 9 and 10
int motor1_enable = 8;                  //enable pin is connected to pin 8

void setup() {
  pinMode(motor1_in1, OUTPUT);        //set the pin 8, 9, and 10 as output
  pinMode(motor1_in2, OUTPUT);
  pinMode(motor1_enable, OUTPUT);
  digitalWrite(motor1_enable, 1);     //set the pin 8 high
}

void loop() {
  //the motor is turning in the forward direction for one second
  digitalWrite(motor1_in1, HIGH);
  digitalWrite(motor1_in2, LOW);
  delay(1000);

  //stopping the motor for one second
  digitalWrite(motor1_in1, LOW);
  digitalWrite(motor1_in2, LOW);
  delay(1000);

  //the motor is turning in the backward direction for one second
  digitalWrite(motor1_in1, LOW);
  digitalWrite(motor1_in2, HIGH);
  delay(1000);

  //stopping the motor for one second
  digitalWrite(motor1_in1, LOW);
  digitalWrite(motor1_in2, LOW);
  delay(1000);
}
```

Servo Motor

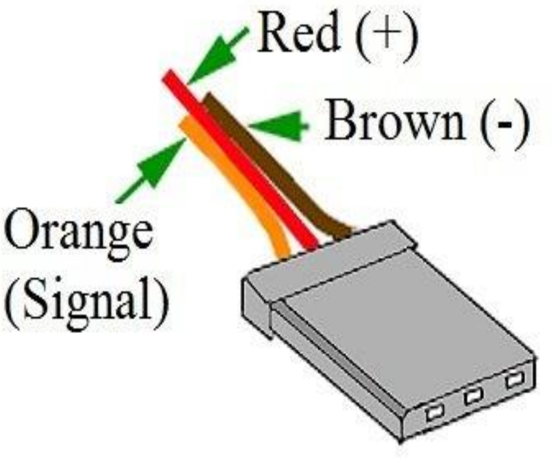
A servo-motor is an actuator with a built-in feedback mechanism that responds to a control signal by moving at a continuous speed and special angle.

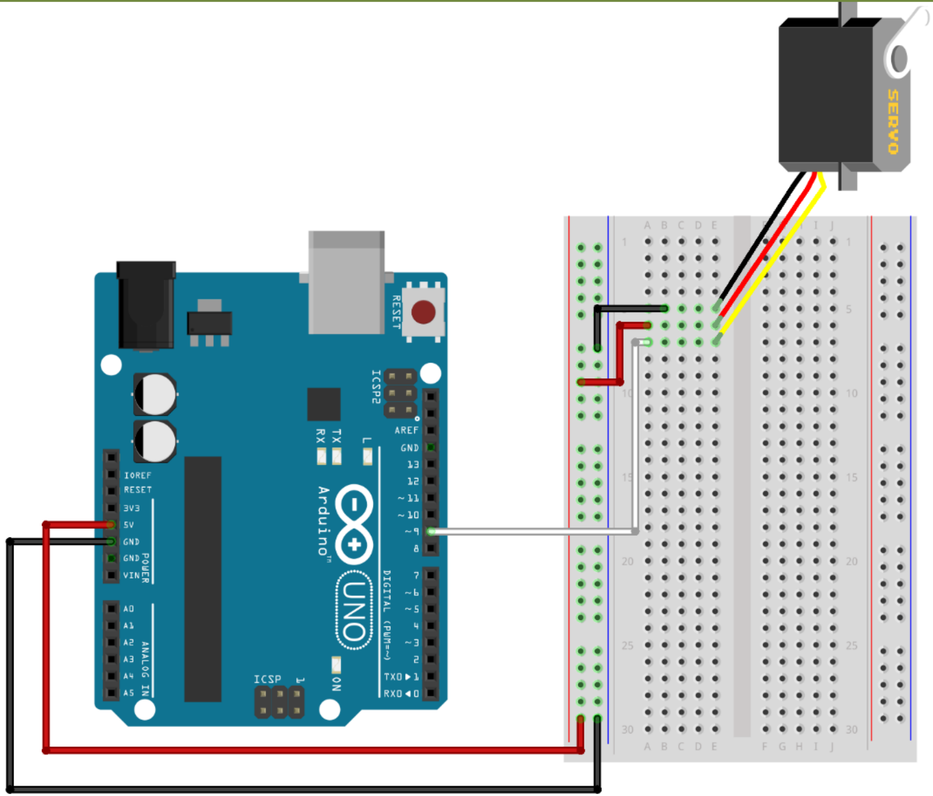
How Does it work?



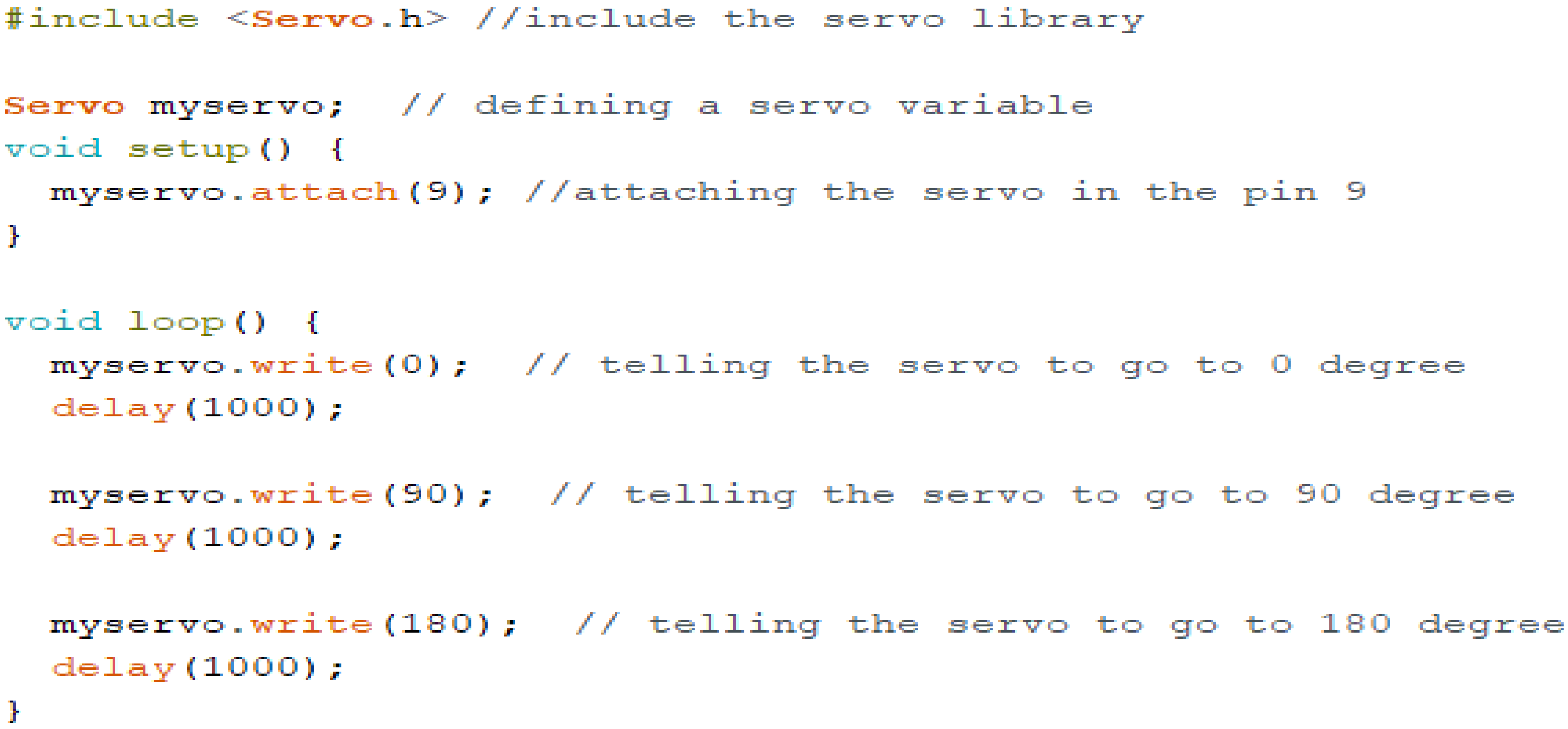


Circuit


Red (+)
Brown (-)
Orange
(Signal)

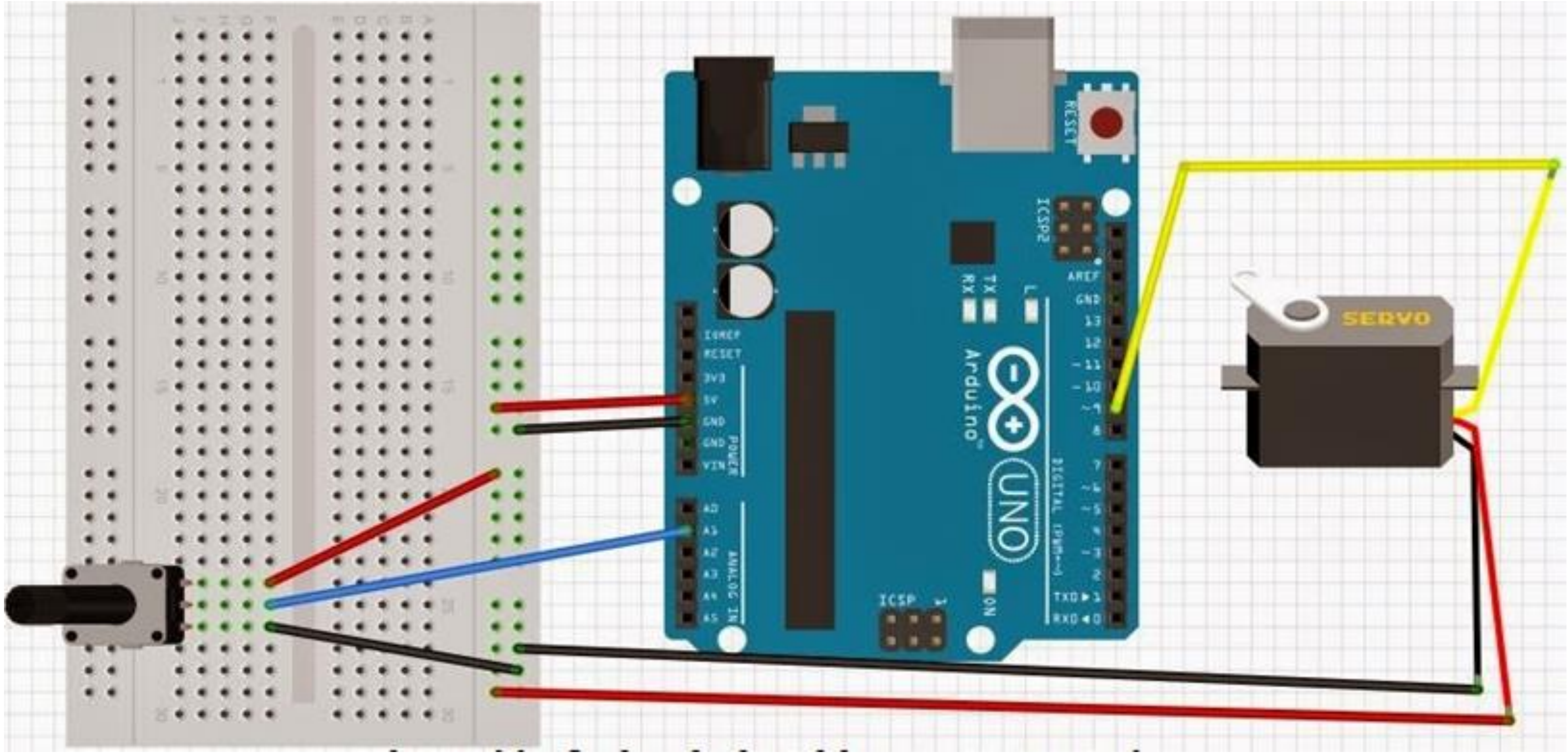

SERVO
Arduino
UNO
RESET
ICSP2
ICSP
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX▶1
RX◀0
DIGITAL (PWM=~)
IOREF
RESET
3V3
5V
GND
GND
VIN
POWER
A0
A1
A2
A3
A4
A5
ANALOG IN
TX
RX
L
ON

Code

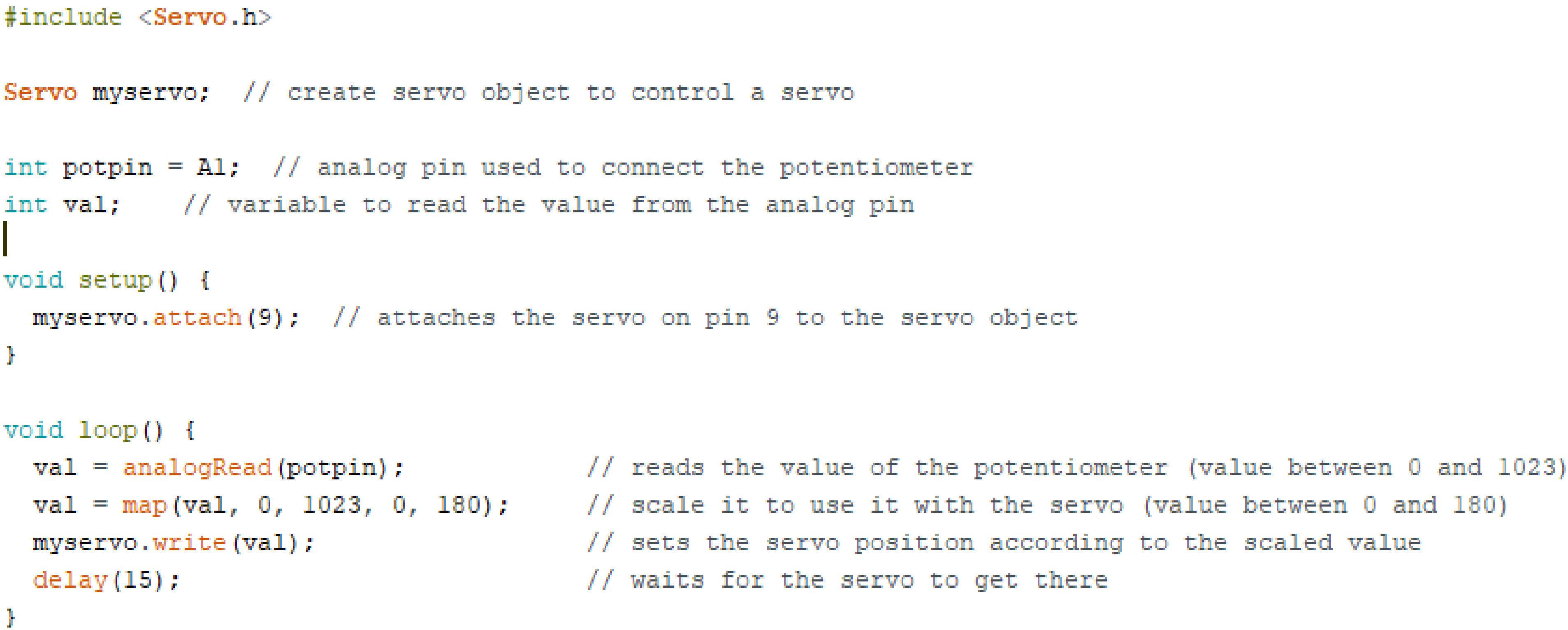


```
#include <Servo.h> //include the servo library

Servo myservo;  // defining a servo variable
void setup() {
  myservo.attach(9); //attaching the servo in the pin 9
}

void loop() {
  myservo.write(0);  // telling the servo to go to 0 degree
  delay(1000);

  myservo.write(90);  // telling the servo to go to 90 degree
  delay(1000);

  myservo.write(180);  // telling the servo to go to 180 degree
  delay(1000);
}
```

Control a Servo using a pot



Let’s Code!

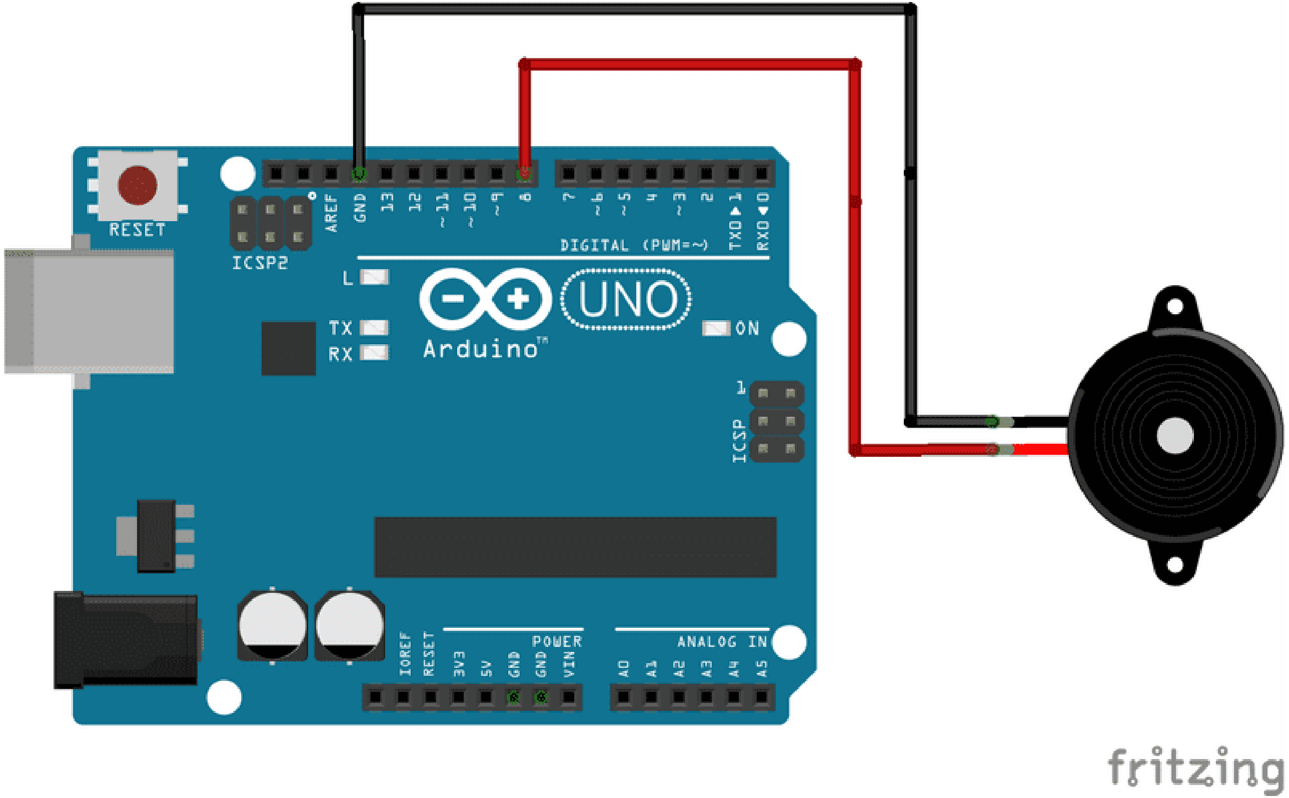


```
#include <Servo.h>

Servo myservo;  // create servo object to control a servo

int potpin = A1;  // analog pin used to connect the potentiometer
int val;    // variable to read the value from the analog pin

void setup() {
  myservo.attach(9);  // attaches the servo on pin 9 to the servo object
}

void loop() {
  val = analogRead(potpin);            // reads the value of the potentiometer (value between 0 and 1023)
  val = map(val, 0, 1023, 0, 180);     // scale it to use it with the servo (value between 0 and 180)
  myservo.write(val);                  // sets the servo position according to the scaled value
  delay(15);                           // waits for the servo to get there
}
```

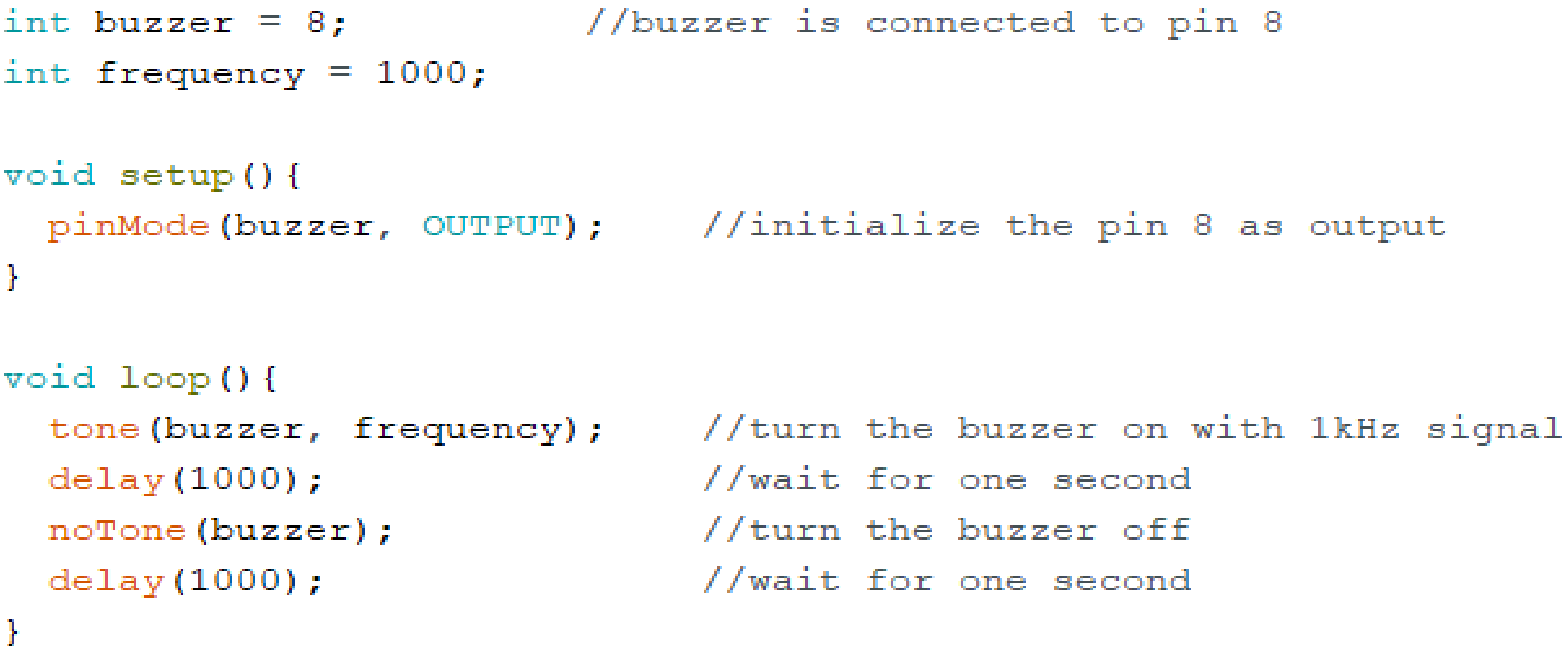
Buzzer

Buzzers can be found in alarm devices, computers, timers and confirmation of user input such as a mouse click or keystroke.

Circuit Building



Let’s Code!



```
int buzzer = 8;          //buzzer is connected to pin 8
int frequency = 1000;

void setup(){
  pinMode(buzzer, OUTPUT);    //initialize the pin 8 as output
}

void loop(){
  tone(buzzer, frequency);    //turn the buzzer on with 1kHz signal
  delay(1000);                //wait for one second
  noTone(buzzer);             //turn the buzzer off
  delay(1000);                //wait for one second
}
```

That’s it!

CLUB ELECTRO

@electro.sc

https://github.com/electro-sc/Arduino-Bootcamp-2023

Thanks!