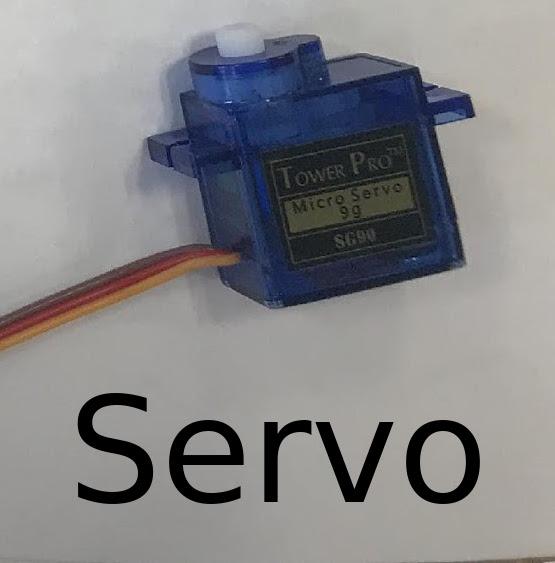
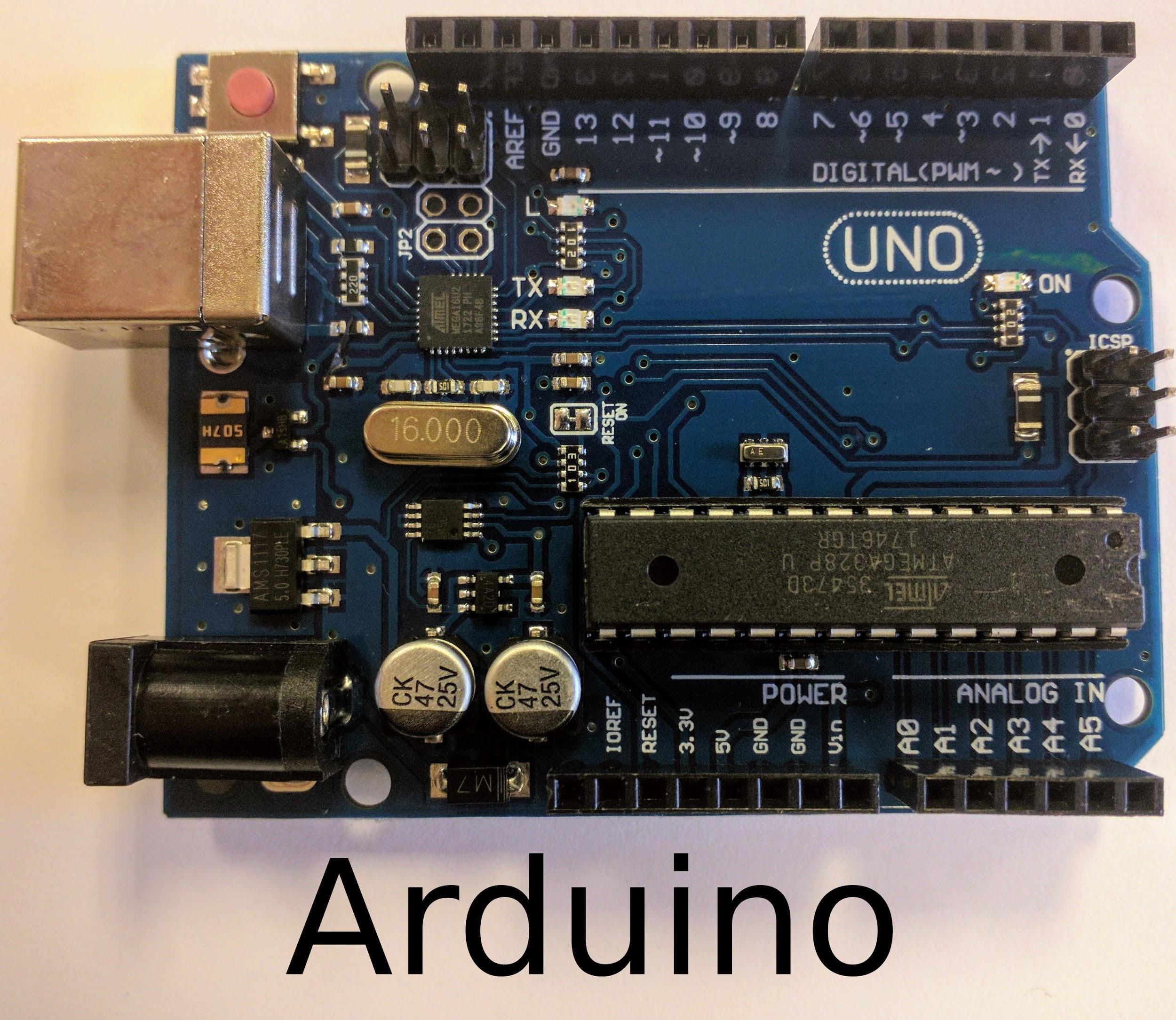
**iCREAT I: Module 6 - LAB 1- Arduino Servo Motors**



horizontal line

# Objectives

* Learn how to control the position of a [servo motor](http://en.wikipedia.org/wiki/Servo_motor#RC_servos) with your Arduino and a potentiometer.
* Learn how to change direction (sweep) back and forth using a servo
* Learn how to generate random numbers

# 

# Background / Scenario

[Servo motors](https://en.wikipedia.org/wiki/Servomotor) have been around for a long time and are utilized in many applications. They can be used to operate remote-controlled or radio-controlled toy cars, robots and airplanes. Servo motors are also used in industrial applications, robotics, in-line manufacturing, pharmaceutics and food services.

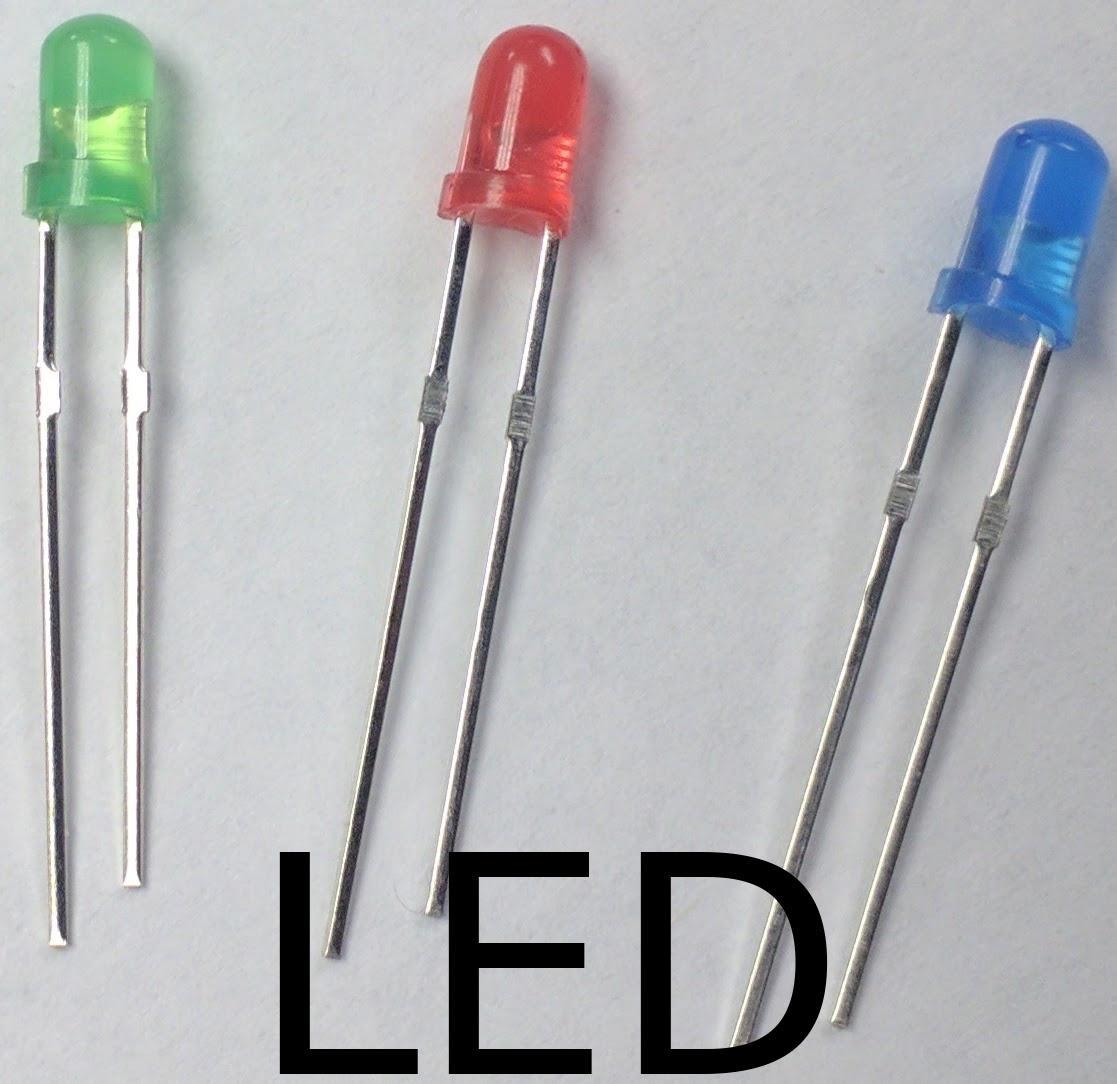
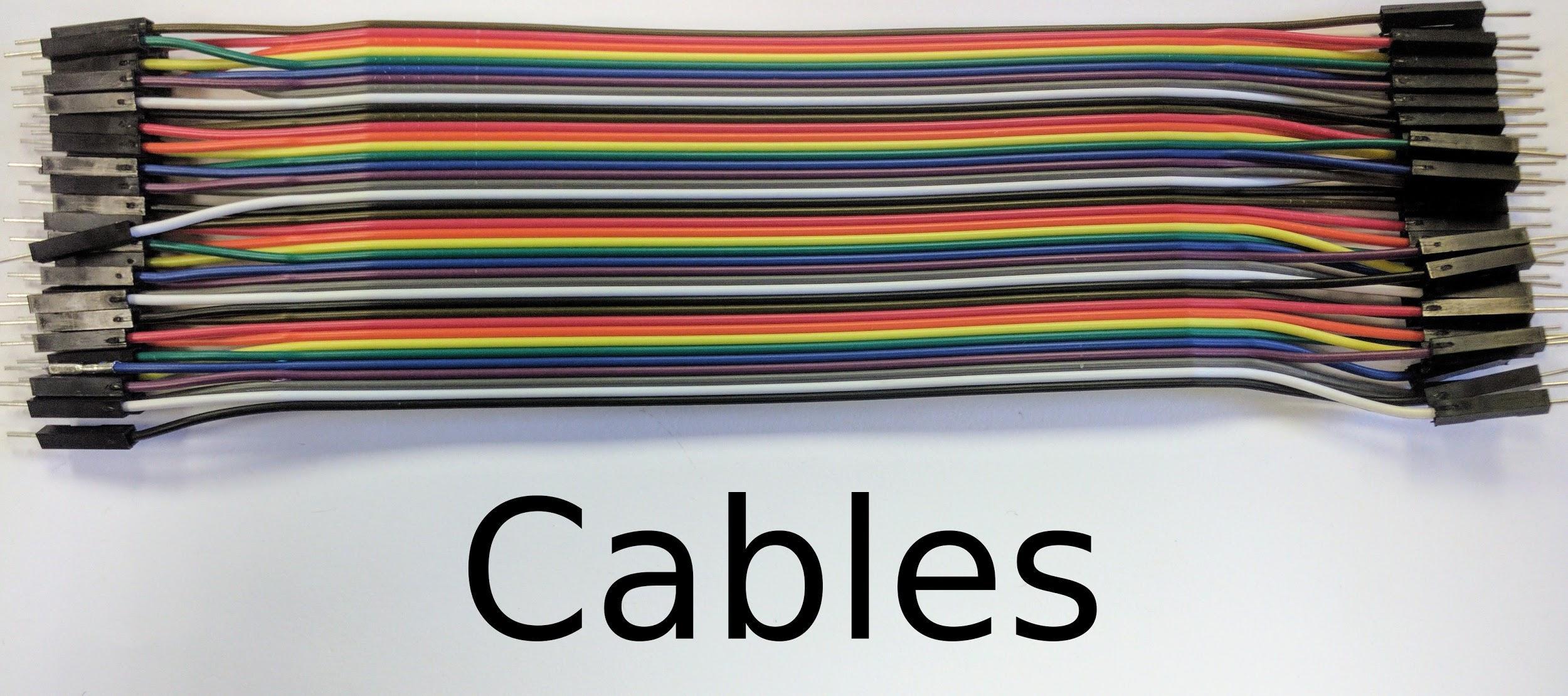
A [Servo](https://en.wikipedia.org/wiki/Servomechanism) is a small device that incorporates a two wire DC motor, a gear train, a potentiometer, an integrated circuit, and an output shaft. Of the three wires that stick out from the motor casing, one is for power, one is for ground, and one is a control input line

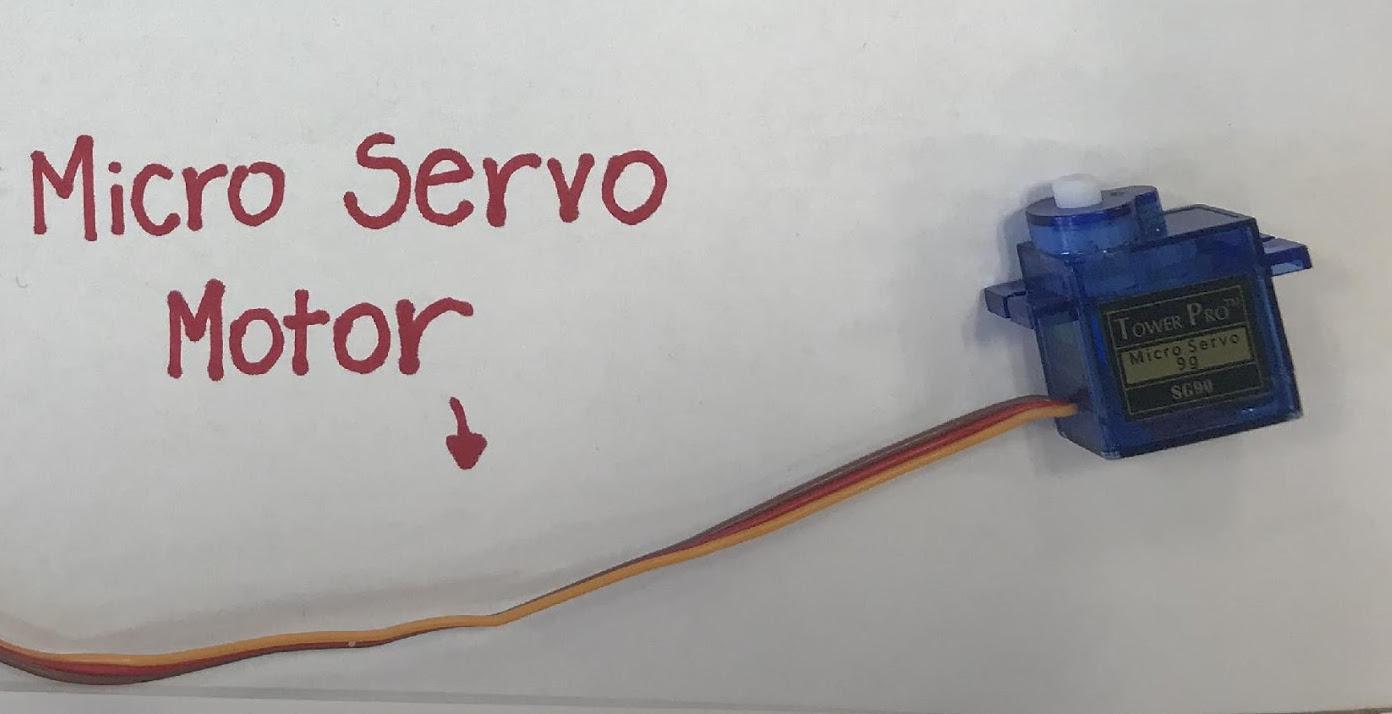
The Servo Library allows [Arduino boards](https://www.arduino.cc/en/Main/Boards) to control a variety of servo motors, more information can be found at the Reference [for the Servo Library](https://www.arduino.cc/en/Reference/Servo) page. This library allows an Arduino board to control RC (hobby) servo motors. Standard servos allow the shaft to be positioned at various angles, usually between 0 and 180 degrees.

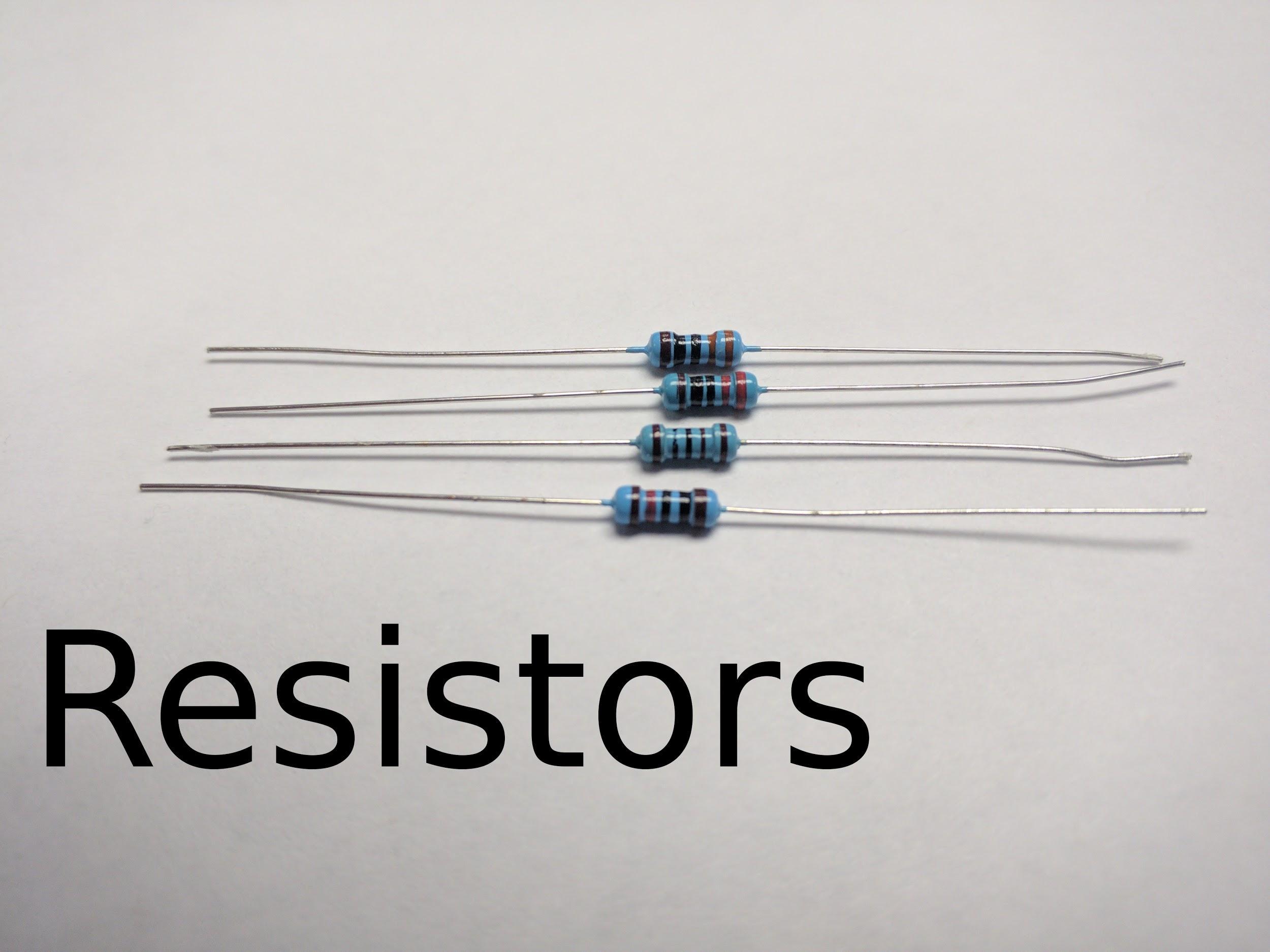
In this lab you will learn and experiment with servo motors and the [Arduino](https://en.wikipedia.org/wiki/Arduino) [microcontroller](https://en.wikipedia.org/wiki/Microcontroller).

# 

# Required Resources:

* Arduino UNO board connected to a computer
* Appropriate USB [ca](http://www.robotshop.com/cables-wires-connectors-en.html)b[le](http://www.robotshop.com/cables-wires-connectors-en.html)
* Access to the Arduino IDE
* Breadboard
* Servo Motor
* 2 LEDs (**RED**, **GREEN**)
* 10KΩ potentiometer
* Resistors (220Ω, or 330Ω, or 100Ω)
* Jumper wires
* Access to the iCREAT course

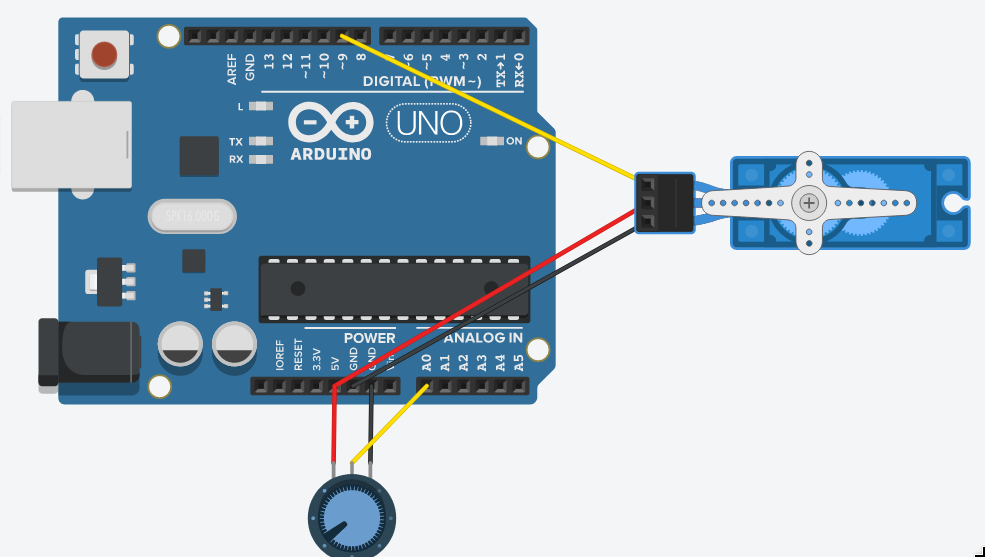




**Part 1. “Knob” Tutorial (OPTIONAL)**

We will control the position of an RC (hobby) [servo motor](http://en.wikipedia.org/wiki/Servo_motor#RC_servos) with your Arduino and a potentiometer. In this section you will follow the instructions for the [**Arduino “Knob” Tutorial**](https://www.arduino.cc/en/Tutorial/Knob). You could use 3 or more servos and potentiometers to [build your own robotic arm using cardboard pieces](http://bocabearingsworkshop.blogspot.co.id/2015/08/simple-robotic-arm-made-out-of.html), or design and 3D print the necessary parts..

1. **Follow the diagram** to create the circuit:



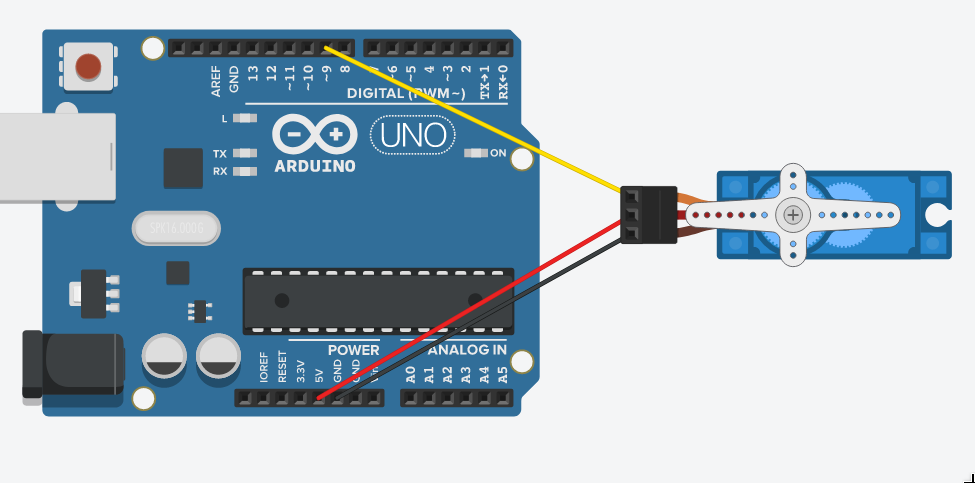
1. **Download the code** by clicking on the [**[G**](https://www.arduino.cc/en/Tutorial/Knob?action=sourceblock&num=1)**e**[**t Code]**](https://www.arduino.cc/en/Tutorial/Knob) link, and read and understand the code. Feel free to experiment!
2. **Have fun and experiment** by adding an LED (with a resistor of course!) to your circuit so that when the value of the potentiometer changes and the servo moves, the intensity of the LED also changes.

**Show your** completed diagrams and working programs before you move to the next section.

**Part 2. “Sweep” Tutorial**

We will Sweep the shaft of a RC [servo motor](http://en.wikipedia.org/wiki/Servo_motor#RC_servos) back and forth across 180 degrees. In this section you will follow the instructions for the [**Arduino “Sweep” Tutorial**](https://www.arduino.cc/en/Tutorial/Sweep).

1. **Follow the diagram** to create the circuit:

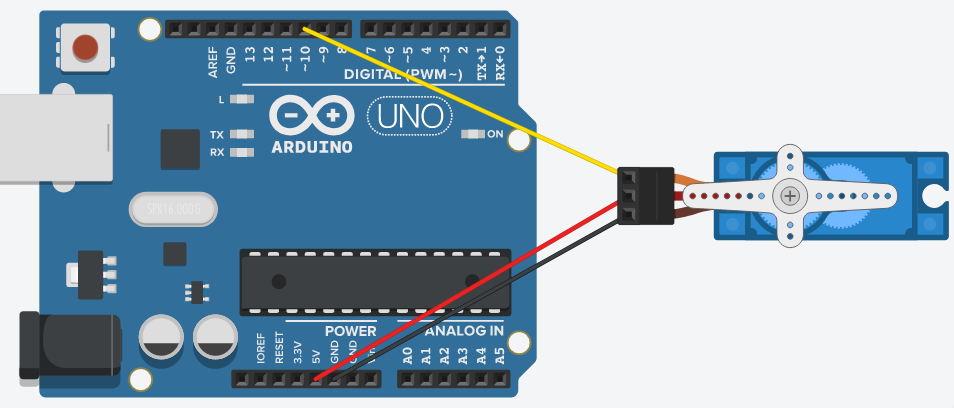


1. **Download the code** by clicking on the [**[Get Code]**](https://www.arduino.cc/en/Tutorial/Sweep) link, and read and understand the code.
2. **Have fun and experiment** by adding an LED to your circuit, add another servo that moves to the opposite direction, and use the **map()** function.
3. **Show us your** completed diagrams and working programs before you move to the next section.

**Part 3. Random Servo**

For this exercise you will make a servo to randomly turn left and right. You will use the functions ***randomSeed(x)*** and ***random(x,y)*** to accomplish this task.

1. **Follow** this diagram to create the circuit:



1. **Follow the code** provided and modify it to print the output generated on the serial monitor. Run and test it.

*#include <Servo.h>  
Servo servoM;  
long randomNumber;  
  
void setup() {  
 servoM.attach(10);  
 randomSeed( analogRead(A0) );  
}  
void loop() {  
 randomNumber = random(0,181);  
 servoM.write(randomNumber);  
 delay(500);  
}*

1. **Change your circuit** to add two LEDs to show if the random number generated is odd (**RED**) or even (**GREEN**).
2. **Show us your** completed diagrams and programs.

Tutorials, Examples and help at <https://www.arduino.cc/en/Tutorial/BuiltInExamples>