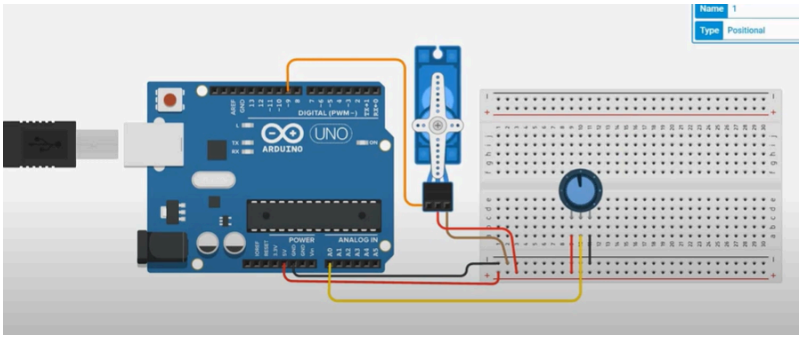
PLTW Engineering **Digital Electronics Manufacturing**
Jeide, Matthew 3/31/25 Period 2

W11B: DE [Tollgate: Servo & Potentiometer] Arduino Variables Tutorial

Introduction

Programming languages have their own grammar called "syntax". Programs written with the Ardiuno software are called Sketches. A **Sketch** (program written with **Arduino**) will contain: a title, **constants**,



variables, setup() functions, and loop() functions.If the syntax of a language is not followed, the program will not compile correctly. This means that no executable code will be produced. Fortunately, the **Arduino** integrated development environment (IDE) will provide error messages that will help you fix your "bad grammar"… called "syntax errors". One of the most common syntax errors that students make is forgetting that lines of code need to end with a semicolon.

Equipment

- https://my.pltw.org
- Computer with Arduino Software & **Pulse Width Modulation (PWM)**
-
- Use the **Arduino** Examples→Servo
- Parallax® student DE bundle with **Arduino**
  - **Arduino**™ UNO Microcontroller Board
- **Arduino**™ IDE Software
- Breadboard
- VEX® potentiometer
- VEX® 393 Motor with Motor Controller 29 [SERVO]

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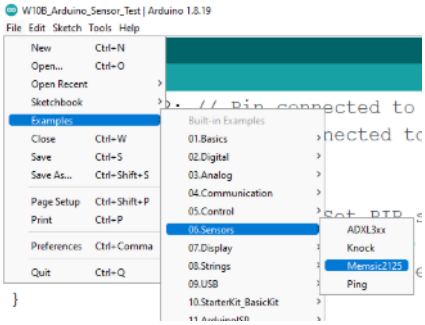
- Use the **Arduino** Examples→ 06 Sensors→Memsic2125

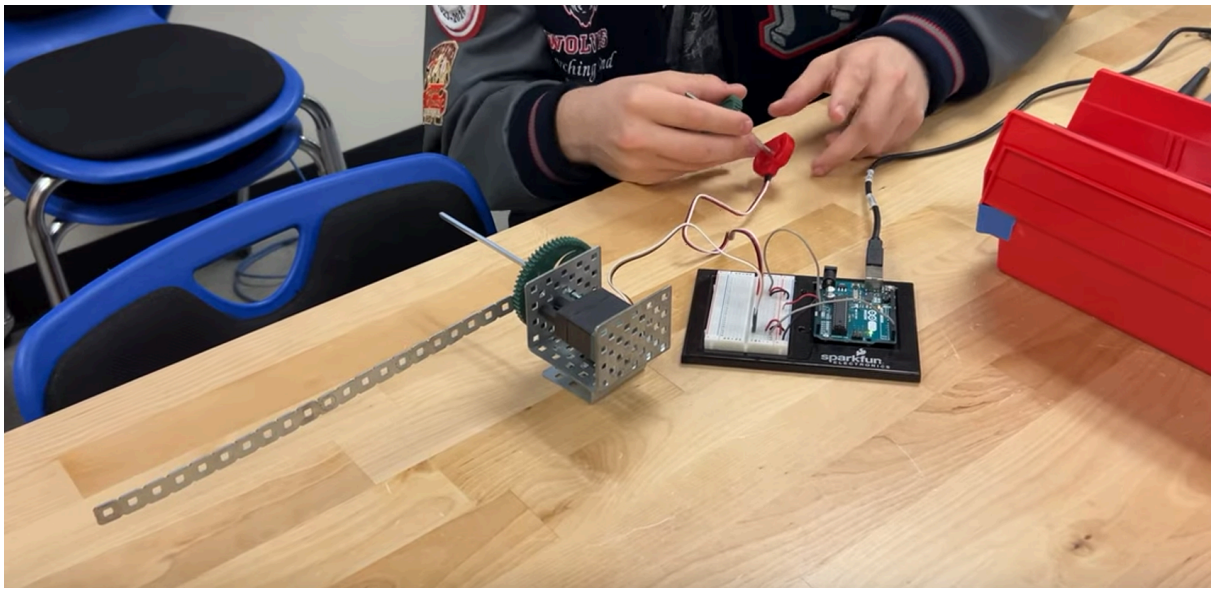


Procedure

Introduction: Create a "New Sketch" and enter the code from the **Sensor Examples: SERVO with Knob.**

1. Use the space below to provide pictures and a short video of your toll gate in action.

Provide a picture of your toll gate and a short YouTube video.



https://youtu.be/K0HQzKX6EaU

2. In the table below provide the Arduino code for the Servo with a knob (potentiometer).

Arduino Code

```
#include <Servo.h>

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

```
int potpin = A0;  // analog pin used to connect the potentiometer
int val;    // variable to read the value from the analog pin

void setup() {
  myservo.attach(2);  // 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 for use with the servo
(value between 0 and 180)
  myservo.write(val);                  // sets the servo position according to
the scaled value
```

3. Make sure to design a new toll gate with two gates opening in opposite directions. Must use two motors and one potentiometer. You and your partner are writing the code to control a second motor.

Arduino Code

```
#include <Servo.h>

Servo myservo;  // create Servo object to control a servo
Servo myservo1;

int potpin = A0;  // analog pin used to connect the potentiometer
int val;    // variable to read the value from the analog pin

void setup() {
  myservo.attach(2);  // attaches the servo on pin 9 to the Servo object
  myservo1.attach(3);
}
```

```
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 for use with the servo
(value between 0 and 180)
  myservo.write(val);                  // sets the servo position according to
the scaled value

  val = analogRead(potpin);            // reads the value of the potentiometer
(value between 0 and 1023)
  val = map(val, 0, 1023, 180, 0);     // scale it for use with the servo
(value between 0 and 180)
  myservo1.write(val);
  delay(15);                           // waits for the servo to get there
}
```

4. Modify the code to create two toll gates opening in opposite directions. You may use two servo motors. Make to attach the code and a short video.

Video of the Tollgate with two motors opening in opposite directions.
https://youtu.be/V6w8jI2u9cI?si=FQuBbMBWEcLNUa4M