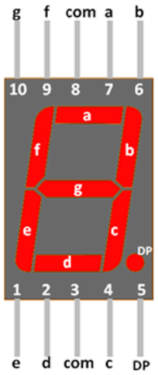
W9B: DE [TinkerCAD] Arduino & Seven Segment Display

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.
Use the following application:

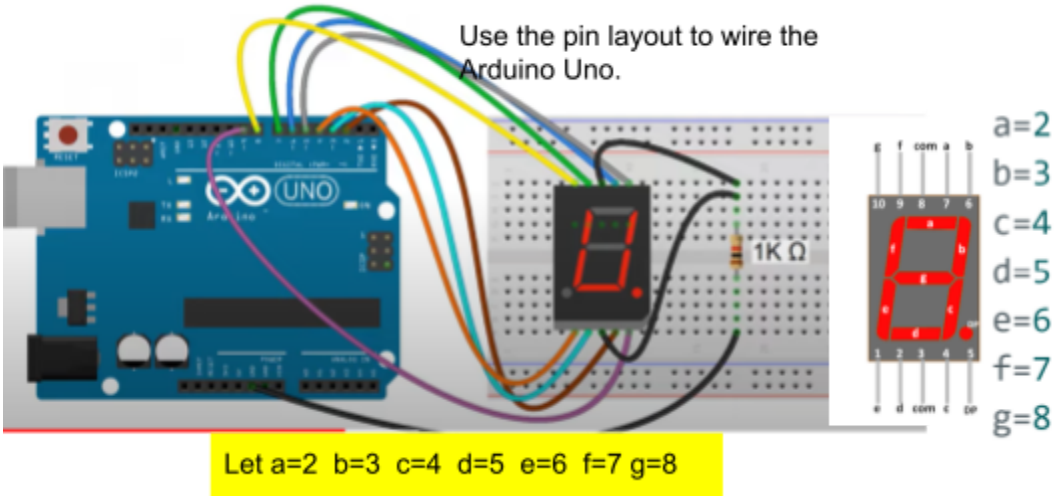


Equipment

Computer with Arduino Software
Recall the Common Cathode Seven Segment Display:
TinkerCAD:
https://www.tinkercad.com/things/3bOuXrpipMe-bodacious-juttuli/editel?tenant=circuits

Procedure

Code the TinkerCAD with your Birthday 00-00-00



STEP 1: Attach the code for DOB assignment in text code using C++.

Attach your C++ text code below. To earn full credit make sure your **code has comments.**

```
// Seven Segment Display Control with Button Increment
// Pins 2-8 connected to segments A-G respectively
// Pin 10 connected to a button
// Common cathode seven segment display

// Segment patterns for digits 0-9
const byte digitPatterns[10] = {
  // Patterns for digits 0-9 (A,B,C,D,E,F,G)
  0b1111110, // 0
  0b0110000, // 1
  0b1101101, // 2
  0b1111001, // 3
  0b0110011, // 4
  0b1011011, // 5
  0b1011111, // 6
  0b1110000, // 7
  0b1111111, // 8
  0b1111011  // 9
};

const byte hypenPattern = 0b0000001;

int numbers[] = {1, 2, 1, 2, 0, 7}; // Your list of integers for your date of birth
int hypens[] = {1, 3};

// Current digit to display

void setup() {
  // Set pins 2-8 as outputs for segments A-G
  Serial.begin(9600);
  for (int pin = 2; pin <= 8; pin++) {
    pinMode(pin, OUTPUT);
  }

  // Initially display 0
  displayDigit(0);
}
```

```
void displayPattern(byte digitPattern) {
  for (int seg = 0; seg < 7; seg++) {
    // Segments are on pins 2-8
    // Check each bit in the pattern
    digitalWrite(seg + 2, (digitPattern & (1 << (6 - seg))) ? HIGH : LOW);
  }
}


void displayDigit(int digit) {
  // Validate digit is between 0-9
  if (digit < 0 || digit > 9) return;

  // Get the bit pattern for the digit
  byte pattern = digitPatterns[digit];

  // Display the digit by setting each segment
  displayPattern(pattern);
}

bool isElementInArray(int element, int arr[], int size) {
  for (int i = 0; i < size; i++) {
    if (arr[i] == element) {
      return true; // Element found
    }
  }
  return false; // Element not found
}


void loop() {
  // Read the button state
  int numElements = sizeof(numbers) / sizeof(numbers[0]); // Calculate array size
  for (int i = 0; i < numElements; i++) {
    displayDigit(numbers[i]);
    delay(1000); // Pause for one second (1000 milliseconds)
    if (isElementInArray(i, hypens, 2)) {
      displayPattern(hypenPattern);
      delay(1000);
```

```
  }
 }
}
```

E-Portfolio **video** with updated code.

E-Portfolio Published link with video file. Upload the file to your Google Drive to upload on your Portfolio. YouTube Videos preferred
https://sites.google.com/riversideunified.org/matthewjeide/notes/w9b-de-tinkercad-arduino-seven-segment-display

Conclusion

Answer in complete sentences each of the questions below.

1. How does this program compare to building the circuit using chips?

It is much quicker to do through code rather than spending entire class periods wiring basic logic gates.