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Appendix 1

```
#include <Servo.h>
#define S0 4
#define S1 5
#define S2 7
#define S3 6
#define sensorOut 8

Servo servo;
Servo servo1;
int color = 0; //setting color function return value to 0
int frequency = 0; //setting frequency to 0

void setup() {

  Serial.begin(9600);
  pinMode(sensorOut, INPUT);
  pinMode(S0, OUTPUT);
  pinMode(S1, OUTPUT);
  pinMode(S2, OUTPUT);
  pinMode(S3, OUTPUT);
```

```
  digitalWrite(S0, HIGH);
  digitalWrite(S1, LOW);
  servo.attach(9);
  servo1.attach(10);
}

void loop() {
    servo.write(150); // set the first servo to the starting position where it catches the candy
    delay(500);// wait half of second

    for (int i = 150; i >= 65; i--) { // Move the first servo to the position of color sensor
    }
    delay(1000); // wait 1 second

    color = readColor(); // Get the return value from the color sensor
    delay(500);//wait half of second
    switch (color) {
      case 1:
      servo1.write(45); // move second servo to an angle of 45 degrees
      break;

      case 2:
      servo1.write(90); // move second servo to an angle of 90 degrees
      break;

      case 3:
      servo1.write(135);// move second servo to an angle of 135 degrees
      break

      case 0:
```

```
    break; // situation where the measurements are not matching any of the color's frequency values
  }
  delay(500);//wait half of a second

   for (int i = 0; i >= 0; i--) { // Move the first servo to the hole to drop th candy
    servo.write(i);
    delay(50);
   }
   delay(200);

   for (int i = 0; i <= 150; i++) { // Return first servo to the initial position
    servo.write(i);
    delay(2);
   }
   color = 0; // set color value back to 0
  }
}

int readColor() { // Color sensor function to read the color

  digitalWrite(S2, LOW);
  digitalWrite(S3, LOW);
  frequency = pulseIn(sensorOut, LOW);
  int R = frequency;
  Serial.print("R= ");
  Serial.print(frequency);
  Serial.print("  ");
  delay(50);

  digitalWrite(S2, HIGH);
```

```
  digitalWrite(S3, HIGH);
  frequency = pulseIn(sensorOut, LOW);
  int G = frequency;
  Serial.print("G= ");
  Serial.print(frequency);
  Serial.print("  ");
  delay(50);

  digitalWrite(S2, LOW);
  digitalWrite(S3, HIGH);
  frequency = pulseIn(sensorOut, LOW);
  int B = frequency;
  Serial.print("B= ");
  Serial.print(frequency);
  Serial.println("  ");
  delay(50);

  if (R < 100 && R > 80 && G > 160 && G < 220 && B > 120 && B < 175) {
    color = 1; // Red - case 1
  }
  if (G < 115 && G > 90 && R < 97 && R > 82 && B < 125 && B > 90) {
    color = 2; // Green - case 2
  }
  if (B < 80 && B > 40 && G > 75 && G < 120 && R > 55 && R < 95) {
    color = 3; // Blue - case 3
  }
  return color; // return the value 1,2 or 3
}
```

Appendix 2

```
#include <Servo.h>
#include <Wire.h>
#include <VL53L1X.h>
#define S0 4
#define S1 5
#define S2 7
#define S3 6
#define sensorOut 8

Servo servo;
Servo servo1;
int color = 0; //setting color function return value to 0
int frequency = 0; //setting frequency to 0
VL53L1X sensor;

void setup() {

  Serial.begin(9600);
  pinMode(sensorOut, INPUT);
  pinMode(S0, OUTPUT);
  pinMode(S1, OUTPUT);
  pinMode(S2, OUTPUT);
  pinMode(S3, OUTPUT);

  digitalWrite(S0, HIGH);
  digitalWrite(S1, LOW);
  servo.attach(9);
  servo1.attach(10);
```

```
  Wire.begin(); // allow communication of Arduino board with VL53L1X  sensor
  Wire.setClock(400000); // use 400 kHz I2C for fast mode of communication

  sensor.setTimeout(500);
  if (!sensor.init()) {
    Serial.println("Failed to detect and initialize sensor!"); // print a message if sensor is not detected
    while (1);
  }

  sensor.setDistanceMode(VL53L1X::Short);// chose short mode for most precise values
  sensor.setMeasurementTimingBudget(20000); //set maximum time allowed for every measurement to 20 miliseconds
  sensor.startContinuous(50);// set time betweeen the measurements to 50 miliseconds
}
}

void loop() {
  if (sensor.read() <= 100) { // Start the sorting process if an object is detected within 10 cm
    servo.write(150); // set the first servo to the starting position where it catches the candy
    delay(500);// wait half of second

    for (int i = 150; i >= 65; i--) { // Move the first servo to the position of color sensor
    }
    delay(1000); // wait 1 second

    color = readColor(); // Get the return value from the color sensor
    delay(500);//wait half of second
    switch (color) {
      case 1:
```

```
    servo1.write(45); // move second servo to an angle of 45 degrees
    break;

    case 2:
    servo1.write(90); // move second servo to an angle of 90 degrees
    break;

    case 3:
    servo1.write(135);// move second servo to an angle of 135 degrees
    break

    case 0:
    break; // situation where the measurements are not matching any of the color's frequency values
  }
  delay(500);//wait half of a second

   for (int i = 0; i >= 0; i--) { // Move the first servo to the hole to drop th candy
    servo.write(i);
    delay(50);
   }
   delay(200);

   for (int i = 0; i <= 150; i++) { // Return first servo to the initial position
    servo.write(i);
    delay(2);
   }
   color = 0; // set color value back to 0
  }
}
```

```
int readColor() { // Color sensor function to read the color

 digitalWrite(S2, LOW);
 digitalWrite(S3, LOW);
 frequency = pulseIn(sensorOut, LOW);
 int R = frequency;
 Serial.print("R= ");
 Serial.print(frequency);
 Serial.print("  ");
 delay(50);

 digitalWrite(S2, HIGH);
 digitalWrite(S3, HIGH);
 frequency = pulseIn(sensorOut, LOW);
 int G = frequency;
 Serial.print("G= ");
 Serial.print(frequency);
 Serial.print("  ");
 delay(50);

 digitalWrite(S2, LOW);
 digitalWrite(S3, HIGH);
 frequency = pulseIn(sensorOut, LOW);
 int B = frequency;
 Serial.print("B= ");
 Serial.print(frequency);
 Serial.println("  ");
 delay(50);

 if (R < 100 && R > 80 && G > 160 && G < 220 && B > 120 && B < 175) {
```

```
  color = 1; // Red - case 1
 }
 if (G < 115 && G > 90 && R < 97 && R > 82 && B < 125 && B > 90) {
  color = 2; // Green - case 2
 }
 if (B < 80 && B > 40 && G > 75 && G < 120 && R > 55 && R < 95) {
  color = 3; // Blue - case 3
 }
 return color; // return the value 1,2 or 3
}
```

Appendix 3

```
#include <Servo.h>
#include <Wire.h>
#include <VL53L1X.h>
#include <FastLED.h>
#define S0 4
#define S1 5
#define S2 7
#define S3 6
#define sensorOut 8
#define LED_PIN 2
#define NUM_LEDS 70
#define LED_TYPE WS2811
#define COLOR_ORDER GRB

Servo servo;
Servo servo1;
```

```
int color = 0; //setting color function return value to 0
int frequency = 0; //setting frequency to 0
VL53L1X sensor;
CRGB leds[NUM_LEDS];

void setup() {

 Serial.begin(9600);
 pinMode(sensorOut, INPUT);
 pinMode(S0, OUTPUT);
 pinMode(S1, OUTPUT);
 pinMode(S2, OUTPUT);
 pinMode(S3, OUTPUT);

 digitalWrite(S0, HIGH);
 digitalWrite(S1, LOW);
 servo.attach(9);
 servo1.attach(10);

 Wire.begin(); // allow communication of Arduino board with VL53L1X  sensor
 Wire.setClock(400000); // use 400 kHz I2C for fast mode of communication

 sensor.setTimeout(500);
 if (!sensor.init()) {
  Serial.println("Failed to detect and initialize sensor!"); // print a message if sensor is not detected
  while (1);
 }

 sensor.setDistanceMode(VL53L1X::Short);// chose short mode for most precise values
```

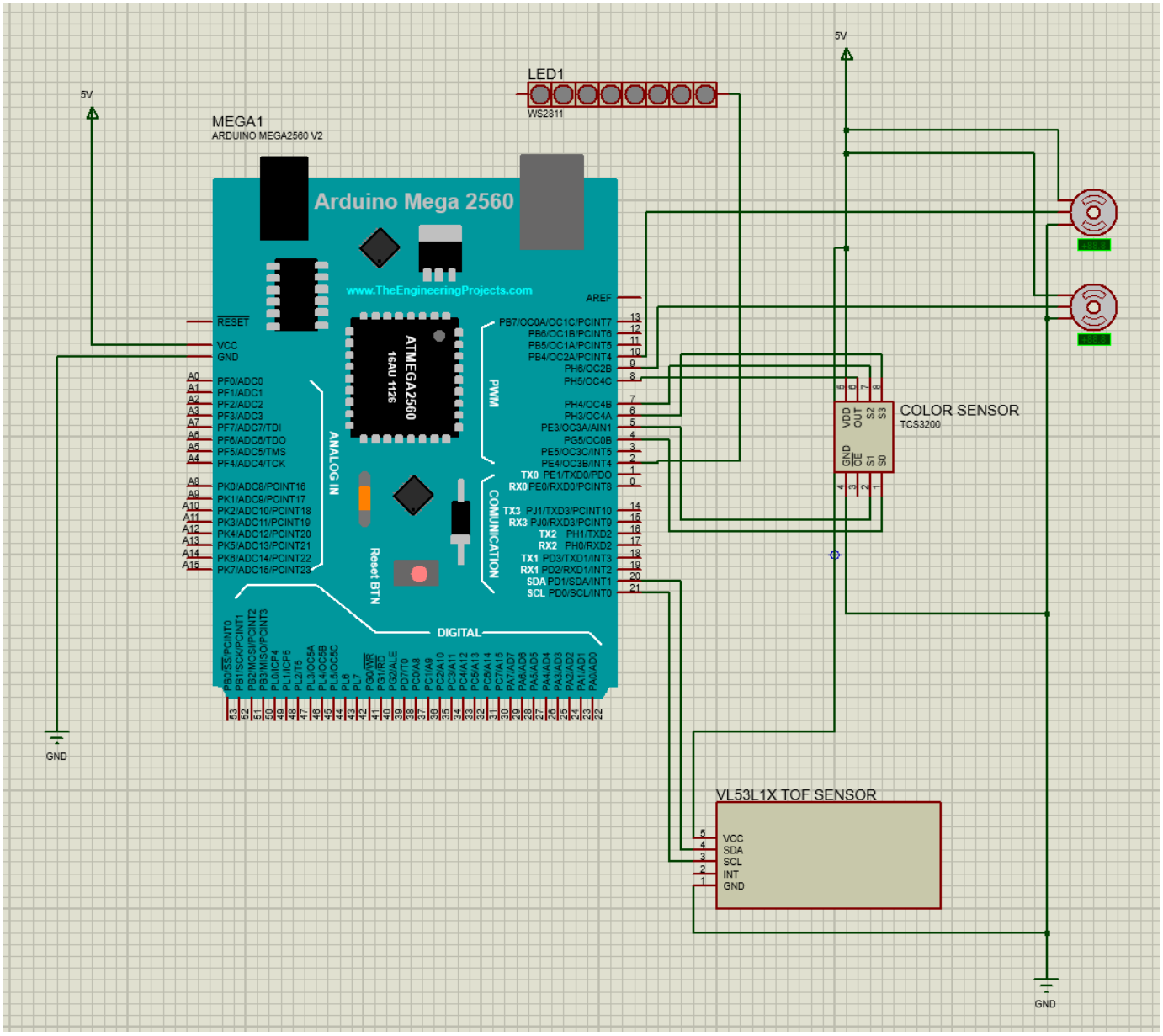
```
  sensor.setMeasurementTimingBudget(20000); //set maximum time allowed for every measurement to 20 miliseconds
  sensor.startContinuous(50);// set time betweeen the measurements to 50 miliseconds

  FastLED.addLeds<LED_TYPE, LED_PIN, COLOR_ORDER>(leds, NUM_LEDS);  // Initialize the LED strip
  FastLED.setBrightness(50);
}
}

void loop() {
  if (sensor.read() <= 100) { // Start the sorting process if an object is detected within 10 cm
    servo.write(150); // set the first servo to the starting position where it catches the candy
    delay(500);// wait half of second

    for (int i = 150; i >= 65; i--) { // Move the first servo to the position of color sensor
    }
    delay(1000); // wait 1 second

    color = readColor(); // Get the return value from the color sensor
    delay(500);//wait half of second
    switch (color) {
      case 1:
      servo1.write(45); // move second servo to an angle of 45 degrees
      for (int i = 0; i < NUM_LEDS; i++) {
         leds[i] = CRGB::Red;   // Set the LED color to red
       }
       FastLED.show();         // Update the LED strip with the new color
       delay(500);
       break;
```

```
    case 2:
    servo1.write(90); // move second servo to an angle of 90 degrees
     for (int i = 0; i < NUM_LEDS; i++) {
        leds[i] = CRGB::Green;  // Set the LED color to green
      }
      FastLED.show();
      delay(500);
      break;

    case 3:
    servo1.write(135);// move second servo to an angle of 135 degrees
     for (int i = 0; i < NUM_LEDS; i++) {
        leds[i] = CRGB::Blue;  // Set the LED color to blue
      }
      FastLED.show();
      delay(500);
      break;

    case 0:
      break; // situation where the measurements are not matching any of the color's frequency values
}
delay(500);//wait half of a second

  for (int i = 0; i >= 0; i--) { // Move the first servo to the hole to drop th candy
    servo.write(i);
    delay(50);
  }
  delay(200);

  for (int i = 0; i <= 150; i++) { // Return first servo to the initial position
```

```
    servo.write(i);
    delay(2);
   }
   color = 0; // set color value back to 0
  }
}

int readColor() { // Color sensor function to read the color

  digitalWrite(S2, LOW);
  digitalWrite(S3, LOW);
  frequency = pulseIn(sensorOut, LOW);
  int R = frequency;
  Serial.print("R= ");
  Serial.print(frequency);
  Serial.print("  ");
  delay(50);

  digitalWrite(S2, HIGH);
  digitalWrite(S3, HIGH);
  frequency = pulseIn(sensorOut, LOW);
  int G = frequency;
  Serial.print("G= ");
  Serial.print(frequency);
  Serial.print("  ");
  delay(50);

  digitalWrite(S2, LOW);
  digitalWrite(S3, HIGH);
  frequency = pulseIn(sensorOut, LOW);
```

```
  int B = frequency;
  Serial.print("B= ");
  Serial.print(frequency);
  Serial.println("  ");
  delay(50);

  if (R < 100 && R > 80 && G > 160 && G < 220 && B > 120 && B < 175) {
    color = 1; // Red - case 1
  }
  if (G < 115 && G > 90 && R < 97 && R > 82 && B < 125 && B > 90) {
    color = 2; // Green - case 2
  }
  if (B < 80 && B > 40 && G > 75 && G < 120 && R > 55 && R < 95) {
    color = 3; // Blue - case 3
  }
  return color; // return the value 1,2 or 3
}
```

Appendix 4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LED1
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VL53L1X TOF SENSOR
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INT
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