

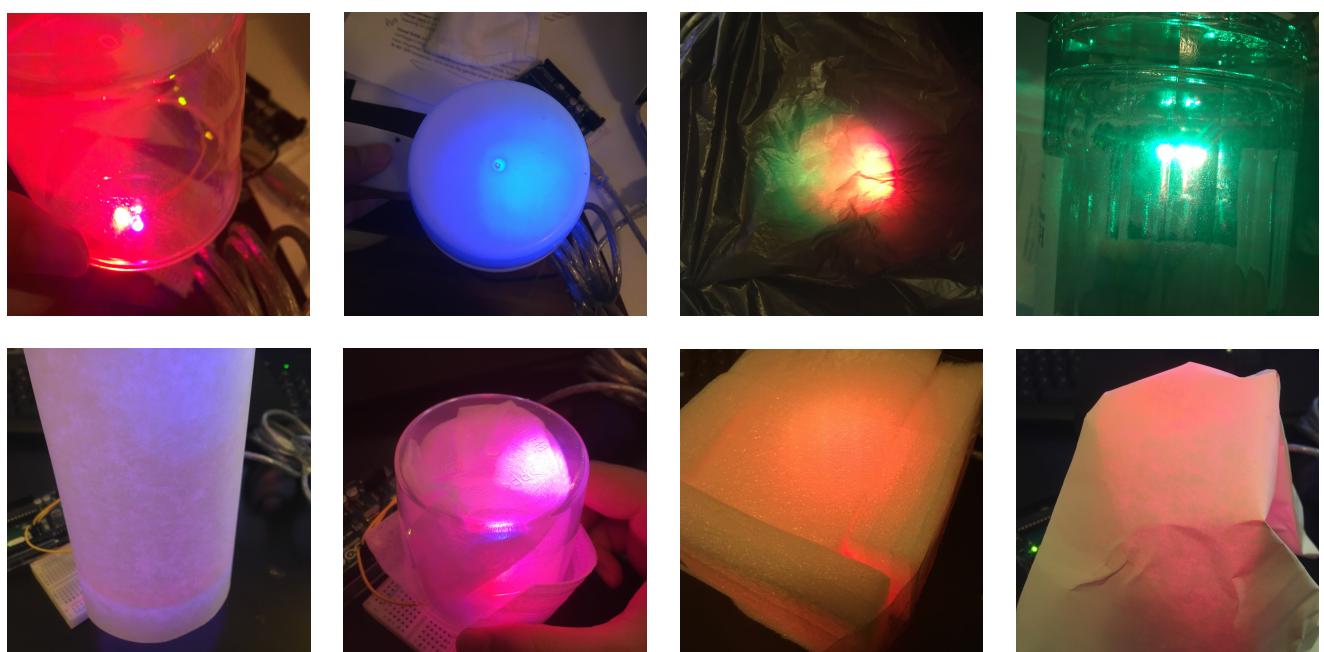
Lab 2: Digital I/O with Arduino

Description

Part 1:

For creating a diffuser for RGB LEDs, I experimented with as many materials possible. I first visited Daiso in order to check whether there were any interesting materials. However, I was only able to find wrapping papers which did not seem any special. I then looked around my house for materials, and experimented with the following materials: glass cup, plastic measuring cup, rice cup, black plastic bag, semi-transparent plastic bag, facial tissue, thin towel, thin and thick Styrofoam, and glass prism. I also overlapped these materials and played around with them.

As I tried out various materials, I realized that the distance of the material from the LED and the brightness of LED mattered as well. Also, while I believed that glass prism and plastic bag would become a good diffuser that blends the color gradient well, they were too transparent. The two best materials I found was a layered-combination of tissue, thin Styrofoam, and rice cup; and thick Styrofoam. Thick Styrofoam was an effective diffuser just by itself, while the prior method required to deliberately combine the layers in order to make the lights diffuse better.

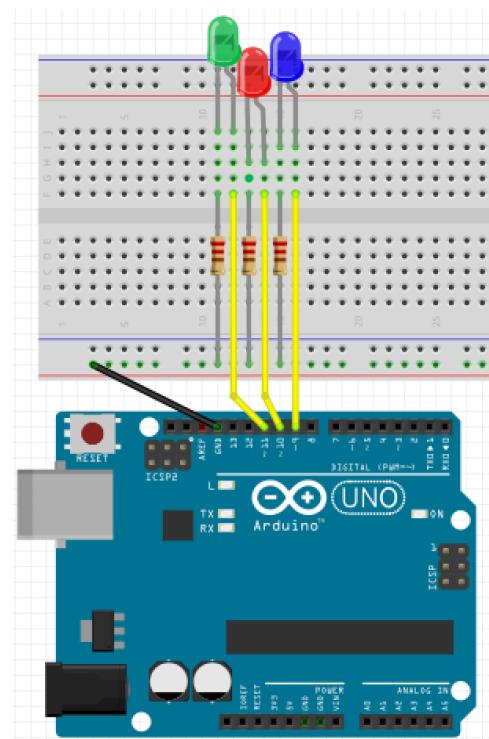
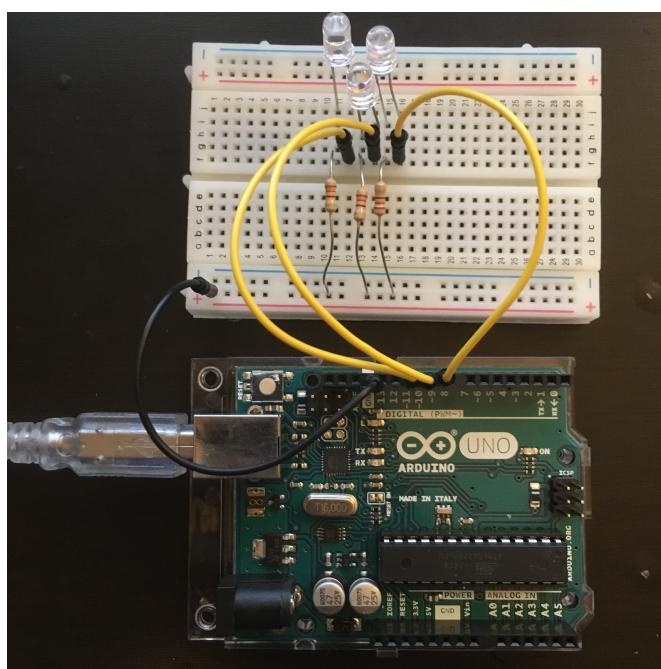


Part 2 & 3:

I made changes to the codes so that LED brightness can be readjusted by the number of either r's, b's, or g's as input. The more letters, the brighter that certain color would be. Moreover, I added additional color combinations so that typing 'o,' 'y,' or 'p' would respectively yield the color of orange, yellow, and purple.

Components

- 1 Arduino
- 3 LED (red, green, and blue)
- 3 Resistor ($220\ \Omega$)
- 1 Breadboard
- 4 Jumper wires



Code

```
char serInString[100]; // array that will hold the different bytes of the string. 100=100characters;
                      // -> you must state how long the array will be else it won't work properly
char colorCode;
char color;
int colorVal;

int redPin = 9; // Red LED, connected to digital pin 9
int greenPin = 10; // Green LED, connected to digital pin 10
int bluePin = 11; // Blue LED, connected to digital pin 11
int percentage = 0;

void setup() {
    pinMode(redPin, OUTPUT); // sets the pins as output
    pinMode(greenPin, OUTPUT);
    pinMode(bluePin, OUTPUT);
    Serial.begin(9600);
    analogWrite(redPin, 127); // set them all to mid brightness
    analogWrite(greenPin, 127); // set them all to mid brightness
    analogWrite(bluePin, 127); // set them all to mid brightness
    // Serial.println("enter color command (e.g. 'r43') :");
    Serial.println("enter color command (e.g. 'rr, ggg, or bbbb'). Optional: 'o' for orange and 'y' for yellow and 'p' for purple:");
}

void loop () {
    // clear the string
    memset(serInString, 0, 100);
    //read the serial port and create a string out of what you read
    readSerialString(serInString);
    percentage = strlen(serInString);

    colorCode = serInString[0];
    if( colorCode == 'r' || colorCode == 'g' || colorCode == 'b' ) {
        colorVal = int(10 * 2.55 * percentage);
        Serial.print("setting color ");
        Serial.print(colorCode);
        Serial.print(" to ");
        Serial.print(colorVal);
        Serial.println();
        serInString[0] = 0;           // indicates we've used this string
        if(colorCode == 'r')
            analogWrite(redPin, colorVal);
        else if(colorCode == 'g')
            analogWrite(greenPin, colorVal);
        else if(colorCode == 'b')
            analogWrite(bluePin, colorVal);
    }

    if(colorCode == 'o' ) {
        Serial.print("setting color to orange");
        Serial.println();
        analogWrite(redPin, 70);
        analogWrite(greenPin, 30);
        analogWrite(bluePin, 0);
    }
    if(colorCode == 'y' ) {
        Serial.print("setting color to yellow");
        Serial.println();
    }
}
```

```
analogWrite(redPin, 30);
analogWrite(greenPin, 80);
analogWrite(bluePin, 0);
}
if(colorCode == 'p' ) {
    Serial.print("setting color to purple");
    Serial.println();
    analogWrite(redPin, 100);
    analogWrite(greenPin, 0);
    analogWrite(bluePin, 100);
}

delay(100); // wait a bit, for serial data
}

//read a string from the serial and store it in an array
//you must supply the array variable
void readSerialString (char *strArray) {
    int i = 0;
    if(!Serial.available()) {
        return;
    }
    while (Serial.available()) {
        strArray[i] = Serial.read();
        i++;
    }
}
```