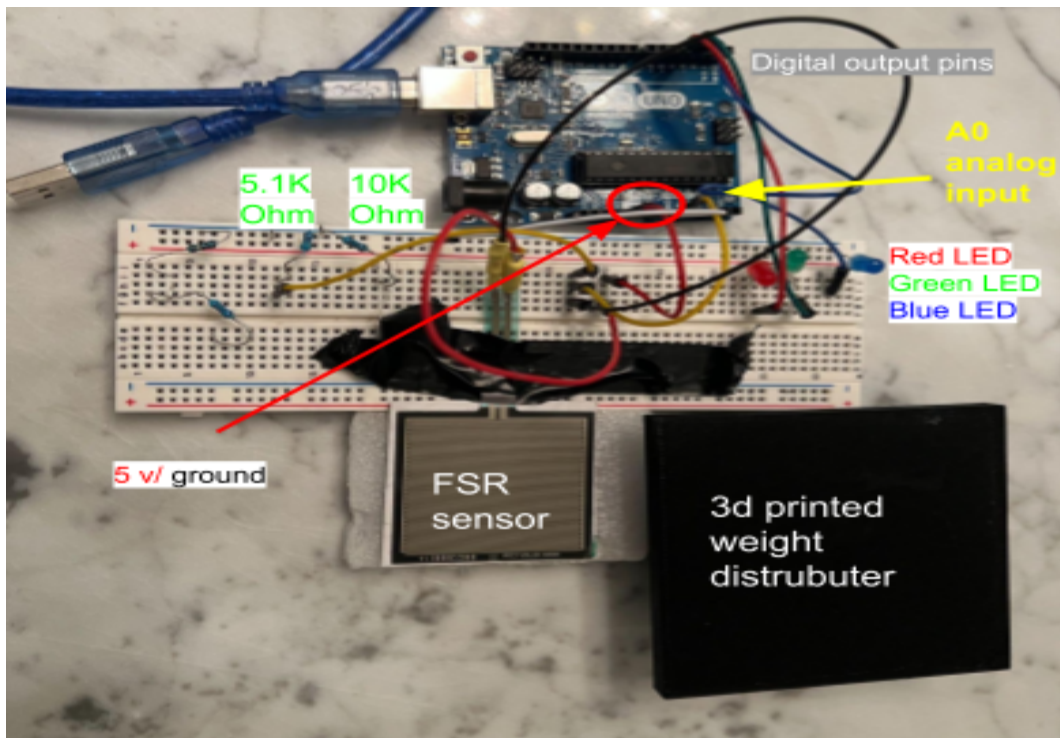# Design Log:

Build Description: this build uses a force sensing resistor and sends the data to the A0 terminal in the arduino. There is also a voltage divider between the FSR and resistor to ground. There is a red, green, and blue LED which are connected pins 5, 4, and 3 respectively. Each negative terminal of the leds is attached to ground. Styrofoam is placed under the sensor to act as a platform, and a 3d printed object was used on top of the sensor to distribute the weight. The 3d print was made on tinkercad and is a .obj file.

Voltage Divider

$$I = \frac{V}{R} = \frac{V_{in}}{R_1 + R_2}$$

$$V_{out} = \frac{R_2}{R_1 + R_2} \cdot V_{in}$$
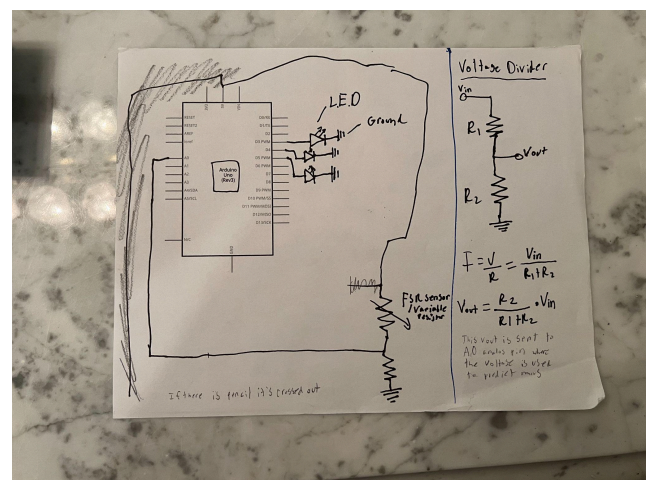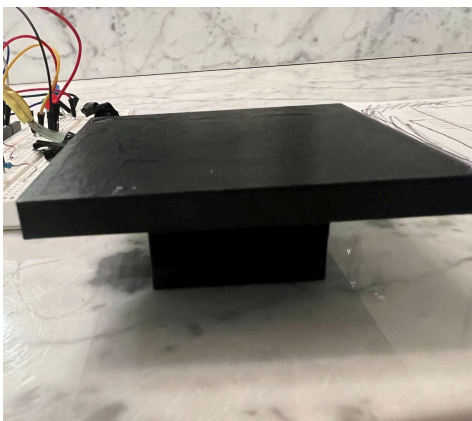
3D print note: This 3d print was made using tinker cad and ultimaker software. It was 3d printed on an Ender 3 3d printer with a 30% infill. Two separate parts were printed and glued together to make a device to evenly distribute the weight.

Voltage vs. Mass for Force Sensing Resistor

● ━ 13.8e^0.918x R² = 0.977
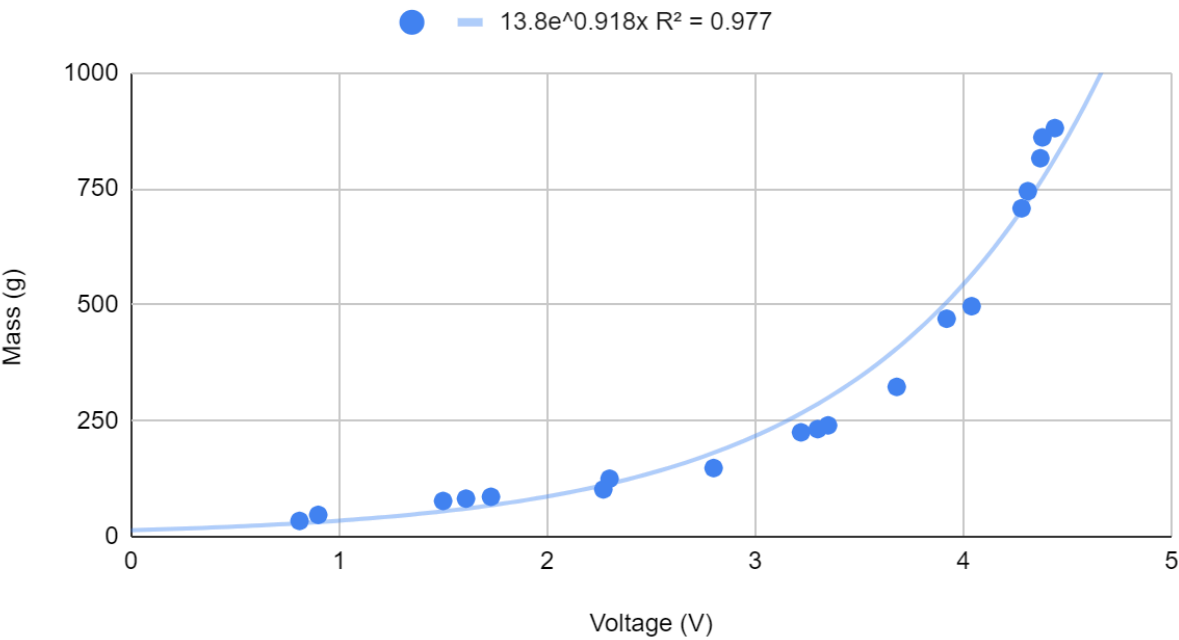
FSR Device using
Ean 0814358019467 1.5 in Square
Force Sensing Resistor.

Voltage (V)	Mass (g)
1.5	77
4.38	861
3.35	240
2.3	125
3.22	225
4.04	497
1.61	82
4.37	816
1.73	86
0.81	34
4.44	881
4.31	745
3.3	232
0.9	47
3.68	323
3.92	470
4.28	708
2.8	148
2.27	102

Code:

```
1.    int FSR = 0;
2.    int redLed = 5;
3.    int greenLed = 4;
4.    int blueLed= 3;
5.    int fsrRead;
6.    float voltage;
7.    float t2;
8.    float t1;
9.    float T;
10.   float sum=0.0f;
11.   void setup() {
12.
13.     Serial.begin(9600);
14.     t1=millis();
15.
16.     pinMode(redLed, OUTPUT);
17.     pinMode(greenLed, OUTPUT);
18.     pinMode(blueLed, OUTPUT);
19.     // initialize the led pins as an output
20.
21.   }
22.
23.   float predict(float v){
24.     return 13.8 * exp(.918*v);
25.   }
26.
27.   void loop() {
28.
29.   // The commented code below was to find
30.     t2=millis();//the aveage voltage detected in one minute
31.     if(t2-t1>=10000-50 && t2-t1<=10000+50 ){
32.
33.       Serial.print("Analog reading = ");
34.   Serial.print(sum/100.0);
35.   //prints analog value from sensor
36.
37.   Serial.print(" Voltage = ");
38.   Serial.print(T/100.0);
39.   //prints voltage from sensor
40.
41.   Serial.print(" Mass = ");
42.   Serial.println(predict(T/100.0));
43.   //prints predicted mass of object
44.     }
45.   fsrRead = analogRead(FSR);
46.   //reads analog value of sensor
47.   sum+=fsrRead;
48.   voltage = (fsrRead/1023.0)*5.0;
49.   //converts analog data to voltage
50.
51.
52.
53.     if (predict(voltage)>=500 && predict(voltage)<=1000){
54.       digitalWrite(redLed,HIGH);
55.        digitalWrite(greenLed,LOW);
56.       digitalWrite(blueLed,LOW);
57.     }
58.     else if (predict(voltage)>100 && predict(voltage)<500){
59.       digitalWrite(greenLed,HIGH);
60.       digitalWrite(redLed,LOW);
61.       digitalWrite(blueLed,LOW);
62.     }
63.     else if (predict(voltage)<=100 && predict(voltage)>=30){
64.     digitalWrite(blueLed,HIGH);
65.      digitalWrite(redLed,LOW);
66.       digitalWrite(greenLed,LOW);
67.     }
68.     else{
69.       digitalWrite(redLed,LOW);
70.       digitalWrite(greenLed,LOW);
71.       digitalWrite(blueLed,LOW);
72.     }
```

```
73.  // Detirmines Which LED
74.    delay(100);
75.    //LEDBright = map(fsrRead,0,1023,0,255);
76.    T+=voltage;
77.
78.  }
```