Mohlapo TK **220044065** **PHY003A**

PRACTICAL REPORT 2: Sensor Calibration

Section A: Data Collection

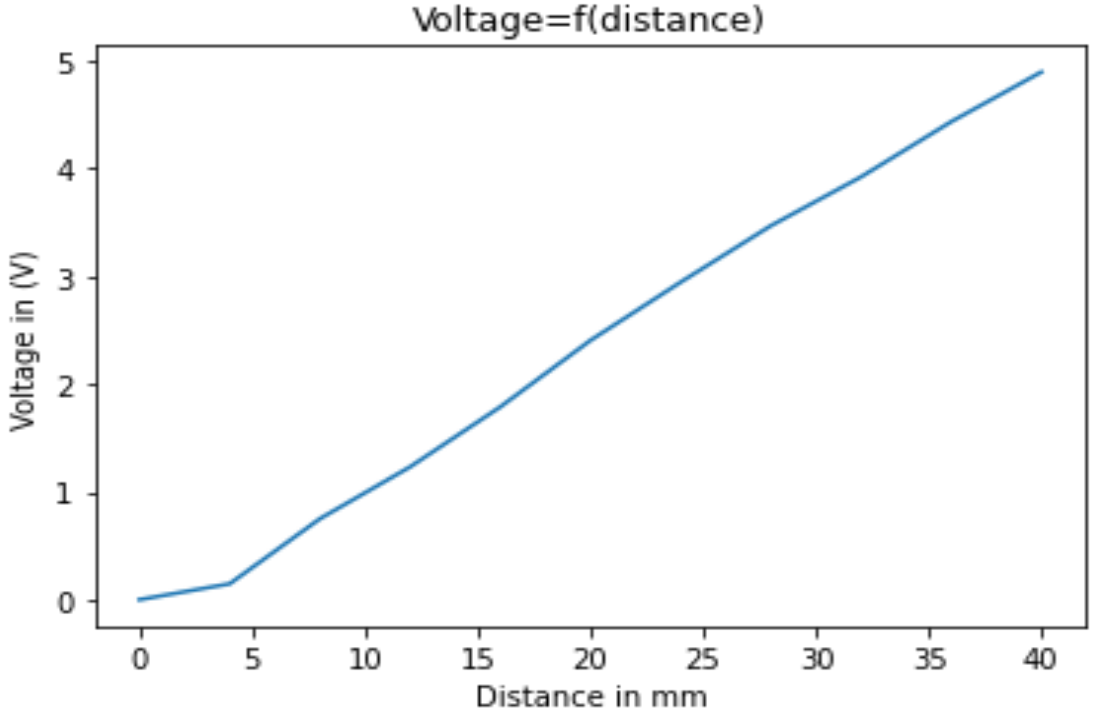
This is the table of the recording that were taken on the Multimeter reading and on the Serial Monitor while varying the of the slide cursor

Distance(mm)	Analog Voltage(V)	Digital Output(V)
0	0	0
4	0.147	28
8	0.75	155
12	1.231	256
16	1.787	373
20	2.404	502
24	2.944	616
28	3.467	725
32	3.92	820
36	4.432	927
40	4.893	1023

Section B: Data Vizualization

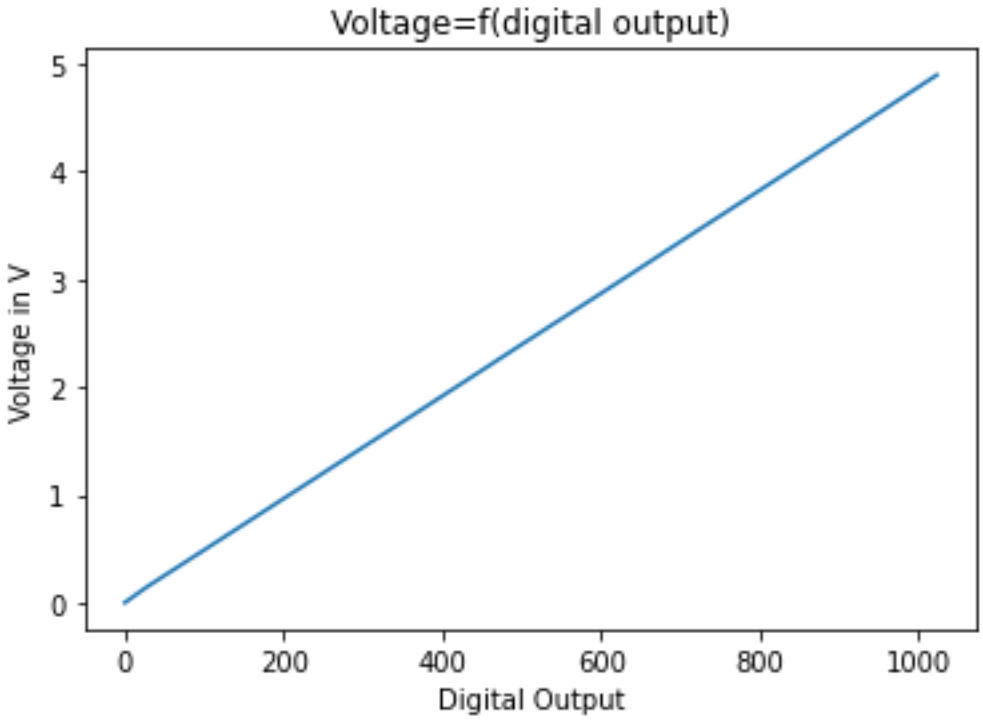
First Graph of Voltage = f(distance)

V = 0.111x – 0.359



Second Graph of Voltage = f(digital output)

V = 0.00477d+0.013



Section C: Data Analysis

Taking the two linear equations obtained in Section B we see that they are equal so we can write them as :

V(distance) = V(digital output)

$0.111x – 0.359 = 0.00477d + 0.013$

$0.00477d = 0.111x - 0.359 + 0.013$

$0.00477d = 0.111x – 0.346$

$d = (0.111x – 0.346)/ 0.00477$

$d = 23.27x – 72.54$

This gives us the digital output as the function of distance

Questions

1. What is the resolution of the analog to digital converter (ADC) built-in the Arduino?
-5V/1024=0.004V

2. Assuming that the full range input of the Arduino ADC is 5V, determine the number of bits of the Arduino ADC?
-It ranges from 0 to 1023 bits

Code:

```
int Potentiometer = 0;
int pin_A0 = 0;

void setup()
{
  pinMode(A0, INPUT);
  Serial.begin(9600);

  pinMode(2, OUTPUT);
  pinMode(3, OUTPUT);
  pinMode(4, OUTPUT);
}
void loop()
{
  pin_A0 = analogRead(A0);
  Serial.println(pin_A0);

  Potentiometer = map(((pin_A0)), 0, 1023.0, 0, 100);


  if(Potentiometer < 25)
  {
    digitalWrite(2, HIGH);
    digitalWrite(3, LOW);
    digitalWrite(4, LOW);
  }
  else if(Potentiometer >= 25 && Potentiometer <=50)
  {
    digitalWrite(2, LOW);
    digitalWrite(3, HIGH);
    digitalWrite(4, LOW);
  }
  else if(Potentiometer > 50)
  {
    digitalWrite(2, LOW);
    digitalWrite(3, LOW);
    digitalWrite(4, HIGH);
  } delay(10); // Delay a little bit to improve simulation performance
}
```