Manu Patil
ISIM Fall 2018
19 September 2018

Strain Gauge Lab

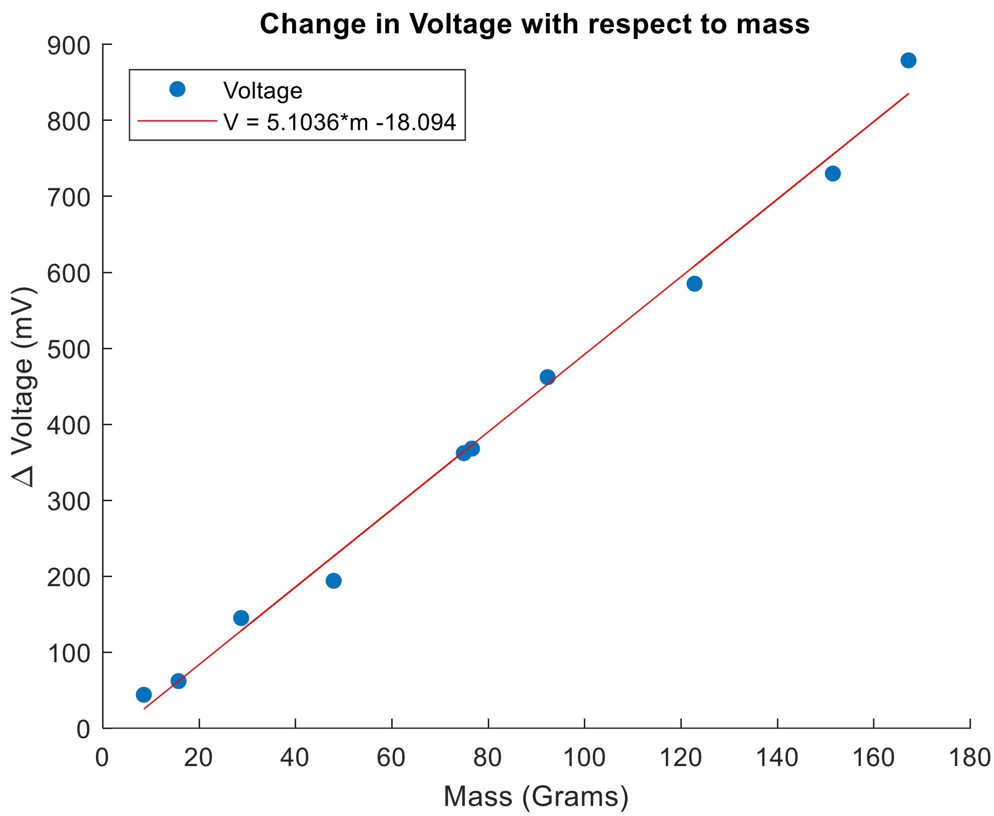

Figure 1: The above figure shows the change in voltage with respect to the amount of mass added to the "fishing hook"

The data was gathered by recording the average voltage of the unloaded and loaded system.

Mass (grams)	Unloaded Voltage (mV)	Loaded Voltage (mV)
8.5	20	64
15.7	21	83
74.9	20	382
47.9	26	220
28.7	27	172
76.6	50	418
92.3	47	509
167.2	47	926
122.8	81	666
151.5	71	801

The associated change in electrical resistance is that would cause a change in voltage of 20mV is .003717Ω.

To approximate the mass that would cause a 20mV change we can use equation of the line of best fit: $V = 5.1036m - 18.094$. Using this equation, it was calculated that a 7.46 gram mass would cause a 20mV change.

$$V_{out} = V_{ref} + G(V_+ - V_-)$$

$$\frac{V_{out} - V_{ref}}{G} = V_+ - V_-$$

$$V_- = V_+ - \frac{V_{out} - V_{ref}}{G}$$

$$\frac{600}{S_g + 120} = 2.5 - \frac{.02 - 2.5}{501}$$

$$600 \Big/ \left(2.5 - \frac{.02-2.5}{501}\right) - 120 = S_g$$

$V_{out} = .02V$, $V_{out} = 0$

$V_{ref} = 2.5$

$V_+ = 2.5$

$G = 501$

$V_- = \frac{5(120)}{S_g + 120}$

Strained Value of Resistance = 119.5257Ω ($V_{out} = 2.5$)

Unstrained Value of Resistance = 119.5219 ($V_{out} = 0$)

$\Delta\Omega = .003817\Omega$