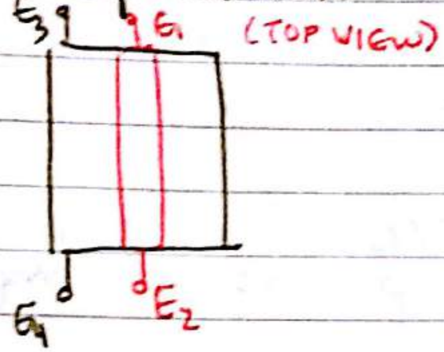
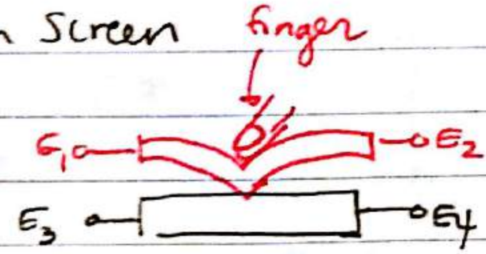
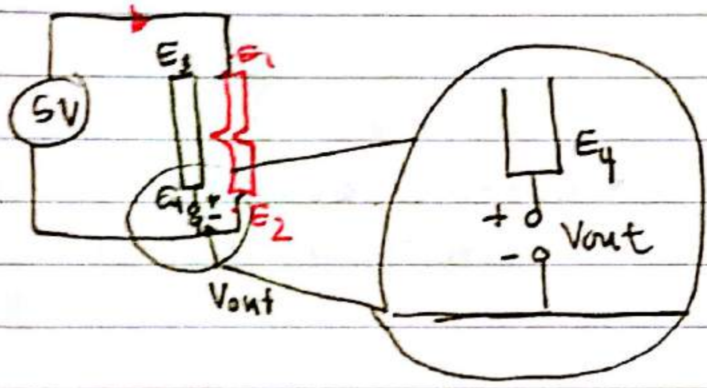
Recap: Resistive Touch Screen



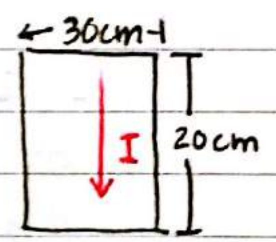


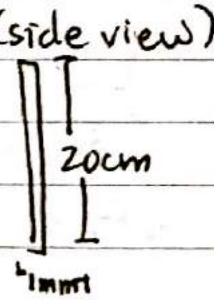


resistors: $R = \rho \cdot L/A$

Our touch screen:

(top view)



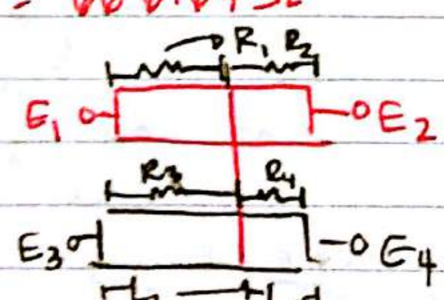


L: 20cm

A: 30cm · 1mm

$R_{TOT} = \rho \cdot \frac{L}{A} = 666.67\,\Omega$

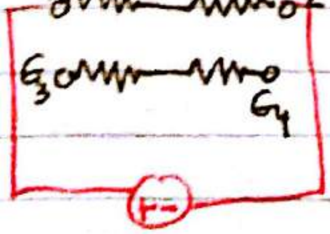
Side View:



$R_1 = \rho \frac{L_1}{A}$

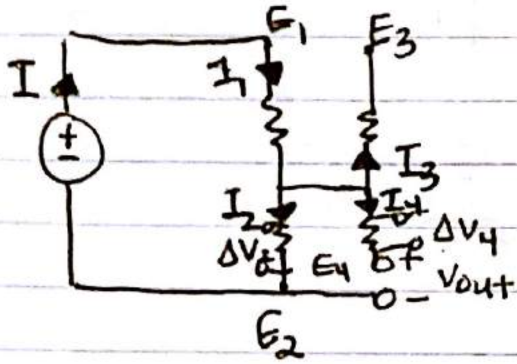
$= \frac{L_1}{L_1 + L_2} \cdot 666.67\,\Omega$

$R_2 = \frac{L_2}{L_1 + L_2} 666.67\,\Omega$



$R_3 = R_1$

$R_4 = R_2$



* Passive Sign Convention:

$+ \rightarrow -$

$V \equiv \Delta E / Q$

$V \cdot I = P$. positive-dissipating

$I_4 = 0$ (open circuit)

$I_3 = 0$ (open circuit)

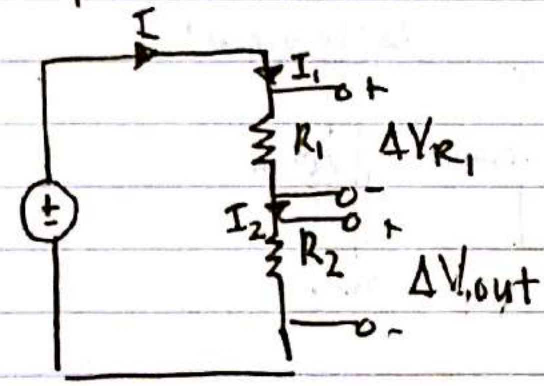
$\Delta V_{R4} = 0$

$\Delta V_{R2} - \Delta V_{R4} - \Delta V_{out} = 0$

$\rightarrow \Delta V_{R2} = \Delta V_{out}$

* $\Delta V_{R2} / \Delta V_{ROUT}$ not dependent on R_3 or R_4

Simplified:



$I = I_1 = I_2$

$5V - \Delta V_{R_1} - \Delta V_{out} = 0$

$\Delta V_{R1} = I R_1$

$\Delta V_{R2} = I R_2$

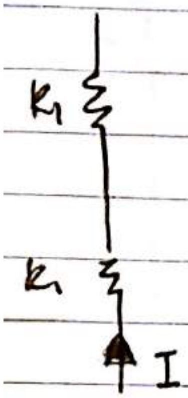
$5V - IR_1 - IR_2 = 0$

$\Rightarrow I = \frac{5V}{R_1 + R_2}$

$V_{out} = \frac{R_2}{R_1+R_2} \cdot 5V$

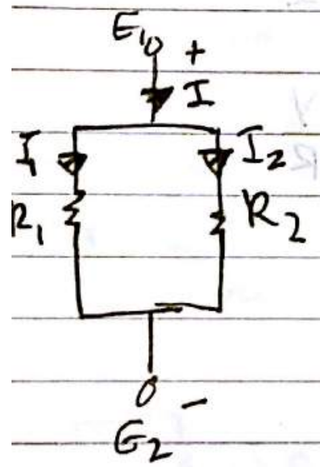
$\rightarrow V_{out} = \frac{L_2/(L_1+L_2)\ 667.67}{667.67} \cdot 5V$

$= \frac{L_2}{L_1+L_2} \cdot 5V$ ∵



→ series connection

R_{eff} $\quad R_{eff} = R_1 + R_2$



V across R_1 and R_2 → same

$$R_{eff} = \left(\frac{1}{R_1} + \frac{1}{R_2}\right)^{-1}$$

$$I = I_1 + I_2$$

$$\uparrow \qquad \uparrow$$

$$\frac{V}{R_1} \qquad \frac{V}{R_2}$$

$$I = \frac{V}{R_{eff}}$$

$$\frac{V}{R_{eff}} = \frac{V}{R_1} + \frac{V}{R_2}$$

$$\frac{1}{R_{eff}} = \frac{1}{R_1} + \frac{1}{R_2}$$