

ARDUINO (INPUT BOARD)

BOARD CONNECTIONS DONE

A0	POT0	D2	K1	COL 2
A1	POT1	D3	K2	ROW 1
A2	POT2	D4	K3	COL 1
A3	ROTARY	D5	K4	ROW 4
A5	LINO	D6	K5	COL 3
A4	LIN1	D7	K6	ROW 3
A7	LIN2	D8	K7	ROW 2
A6	TOGGLES	D9		
		D10	PB R	
		D11	PB G	
		D12	PB B	
		D13	PB Y	

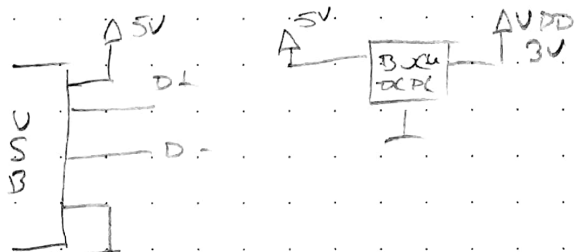
PILO / HRF52 (LOGIC BOARD)

GROUND

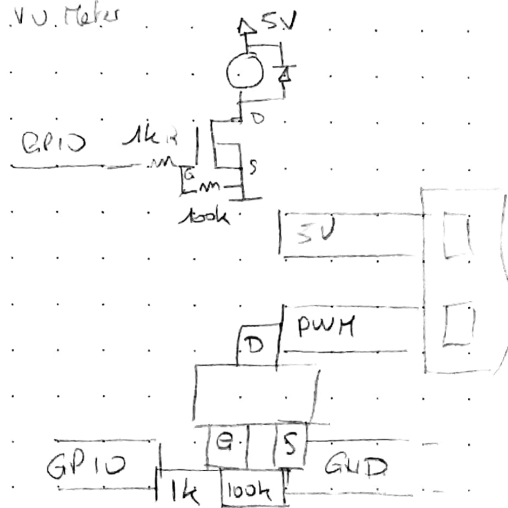
VDD

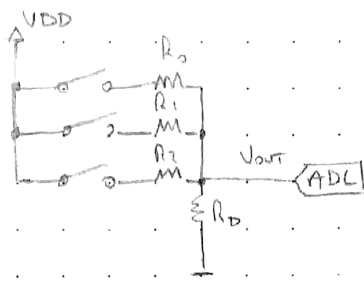
P0.20	NUM (PWM)	POTS	TOGGLES
P0.29	UART TX → ARDUINO RX	SLIDERS	POTS
P0.31	UART RX ← ARDUINO TX	PB's	SLIDERS
X	UART DTR → ARDUINO DTR	PWM	LED 1
X	ARDUINO X → external	LED 1	LED 2
P0.09	I2C SDA	LED 2	INPUT
P0.10	I2C SCL	HRF52	

POWER



VU Meter



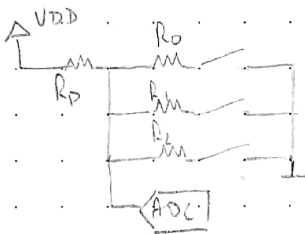
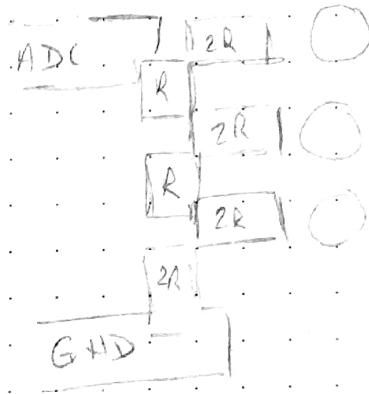


$$V_{out} = \frac{R_D}{R_D + R_0 + R_1 + R_2} \times V_{in}$$

$$R_D = 10k$$

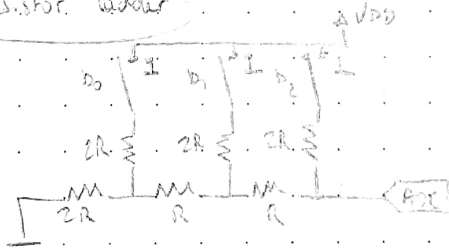
$$R_0 = 1k$$

$$R_1 = 5k \quad R_2 = 10k$$



$$V_{out} = \frac{R_0 + R_1 + R_2}{R_D + R_0 + R_1 + R_2} \times V_{DD}$$

Resistor ladder

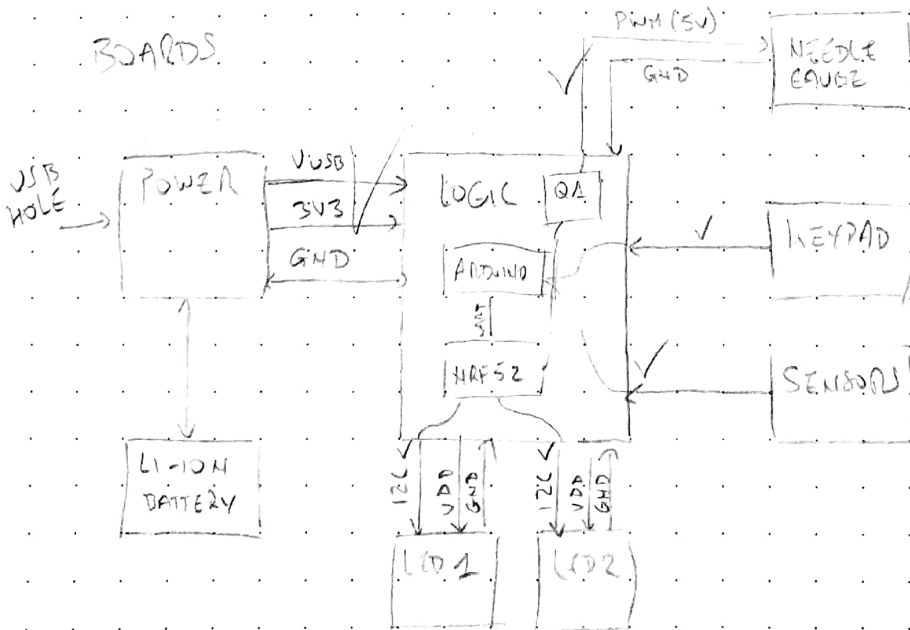


$$V_{out} = V_{DD} \times \frac{n}{2^N}$$

e.g.  $b_0 + b_1 = 3 \rightarrow V_{out} = V_{DD} \times \frac{3}{2^3} = 1.23$

$$Z_0 = R = 6k$$

BOARDS



Cables:

- ✓ keyboard
- ✓ power in
- ✓ pots
- ✓ sliders
- ✓ buttons
- ✓ toggles

# LED DRIVERS

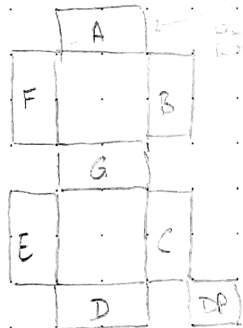
## BARGRAPH

graph:  $A1-A10 + C0, C1, C2 \rightarrow led = [(L/M/R) \times 16 + (bit + 1)]$

orange leds:  $A12, A13, A14, A15, A15, A14, A13 + C3 \rightarrow led = ((L/M/R) + 12) + 3 \times 16$

## SEGMENTS

B <sub>x</sub>	3 <sub>x</sub>	2 <sub>x</sub>	F <sub>x</sub>	A <sub>x</sub>	1 <sub>x</sub>
x	x	x	x	x	x
4	G	C	DP	D	E



## COM

C0	A
C1	F
C2	B
C3	G
C4	C
C5	E
C6	D
C7	DP

## Row

A3	1
A4	2
A5	3
A6	4
A7	1
A8	2
A9	3
A10	4

TOP (rows 1-4)  
BOTTOM (rows 5-8)

Representation in app:  
 00 b1 01 03 b4 b5 b6 b7  
 A B C D E + G DP

Driver representation

- Have to put everything in a linear array
- Have to convert COM indexes

Driver addressing:

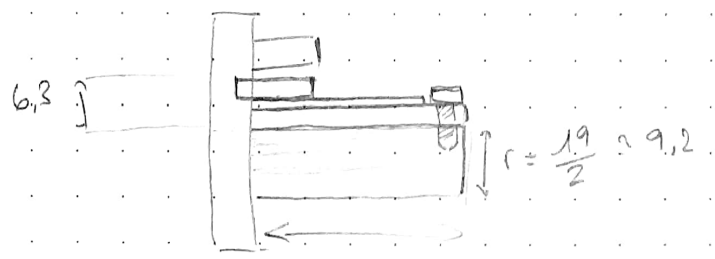
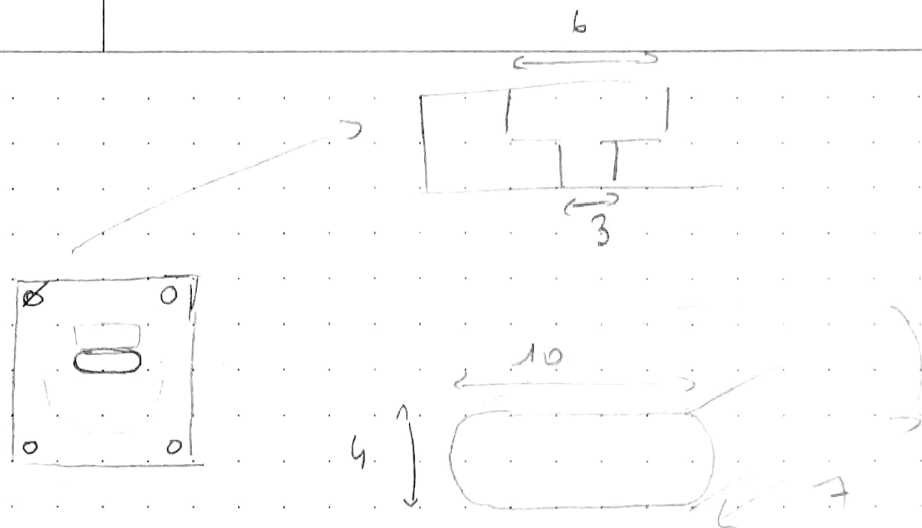
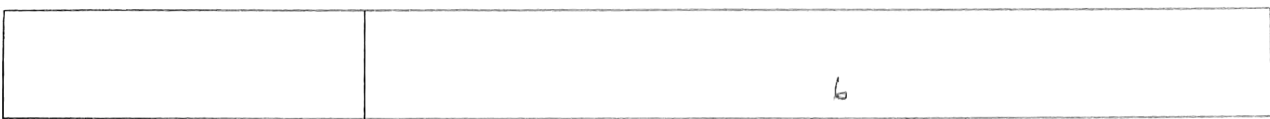
col  $\rightarrow addr = idx / \text{COLUMNS} (w)$   
 $bit = idx \% \text{COLUMNS} (w)$

Row  $\rightarrow$  Row (bit) always stays the same  
 $\rightarrow$  col (addr) selects the segment

$$map[Seg.ID] \times 8 + digitID$$



276 x 205

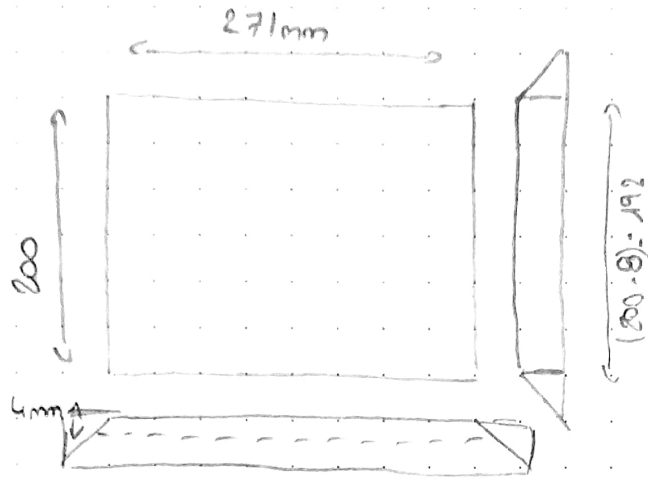


$$I = \frac{U}{R} = \frac{3,3}{12 \cdot 10^{-3}} = 275 \text{ R}$$

$$RC = 275 \cdot 100 \cdot 10^{-9}$$

TOGGLES

$$\left. \begin{array}{l} b_3 = 512 \\ b_2 = 256 \\ b_1 = 125 \end{array} \right\} N = \frac{1 \cdot 10 \cdot 2^3}{10 \cdot 24}$$



total =  $192 + 375 = 567 * 2 = 1134$

