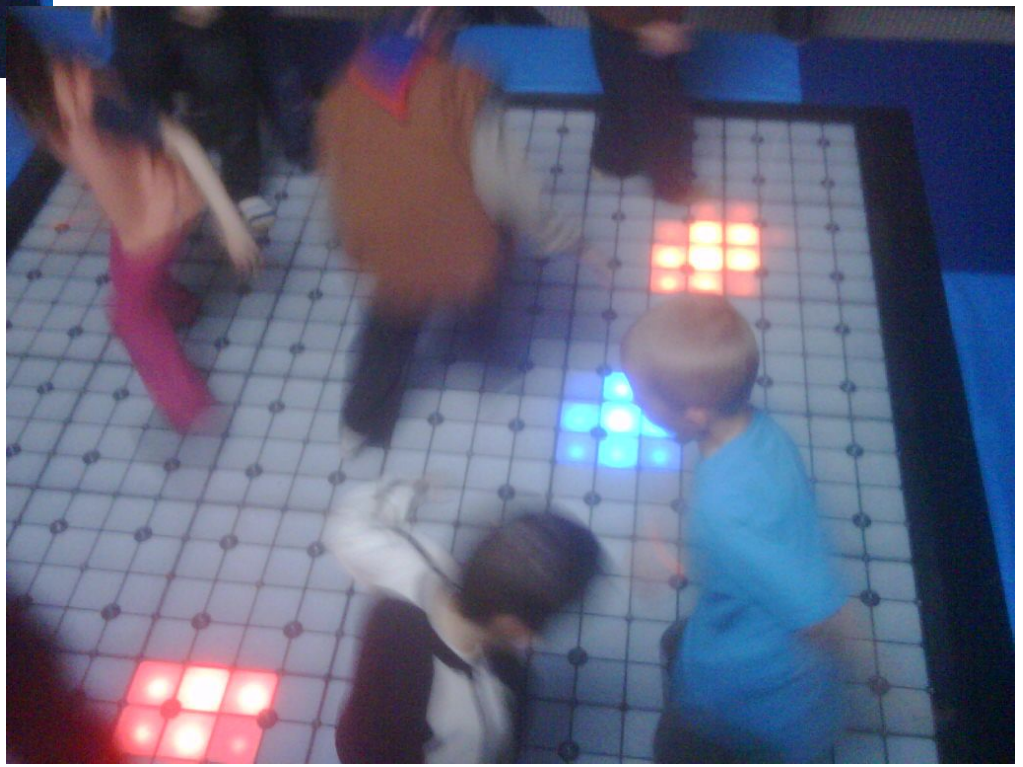
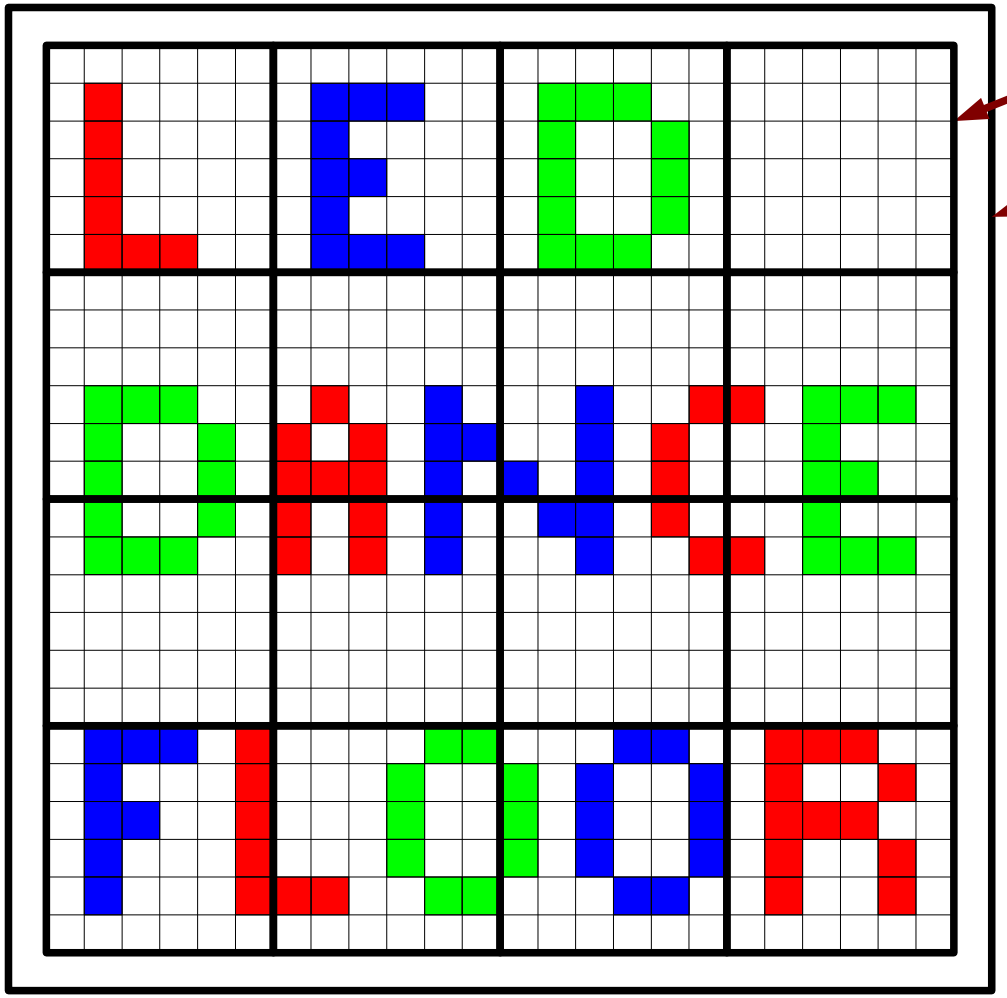
LED dance floor, by Nick, Kathryn, Mark, and Aiden

$23,000

OUCH!
I think we can beat that!

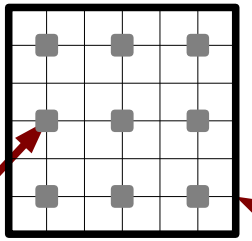


The inspiration – a game floor at Kidzone



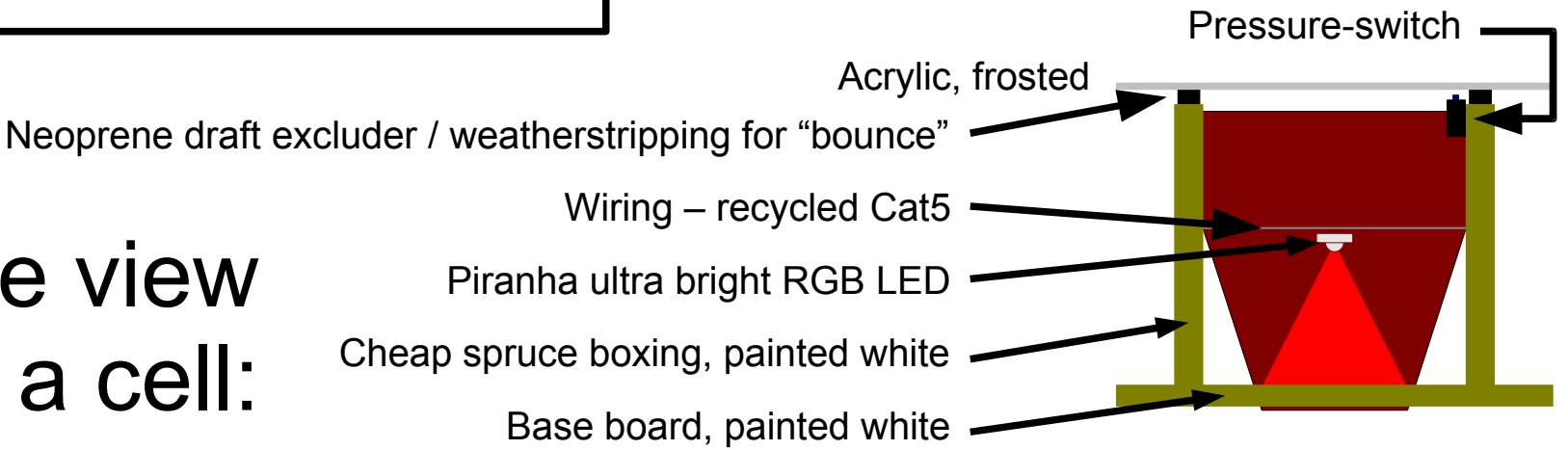
Dance floor is made of 4x4 modules...

... and a 4-inch border for control electronics and cabling



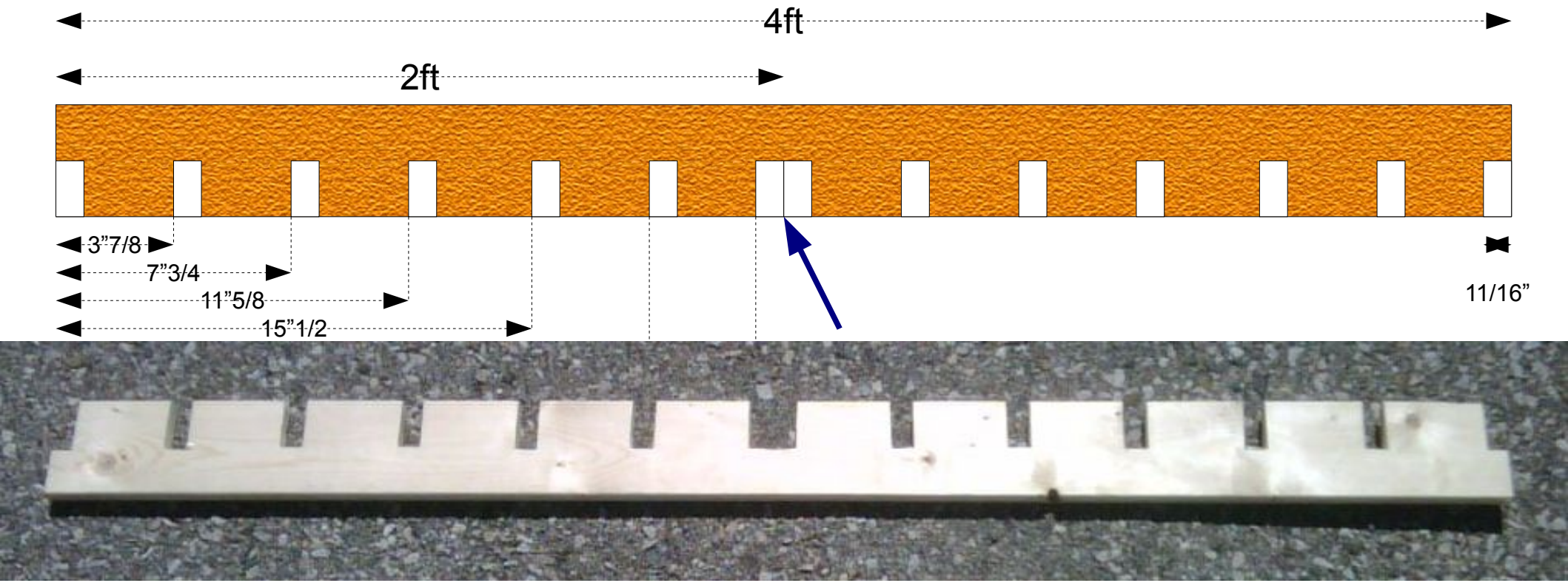
Each module is 6x6 cells, sized to fit the cheapest acrylic we could find.
Each cell is 4x4 inches, minus “1 inch” (before planing) spruce which makes up the cell walls, slotted into each other.
There are pressure-switches in between each 2x2 cells to detect players standing/jumping there (so 12x12 sensors total).

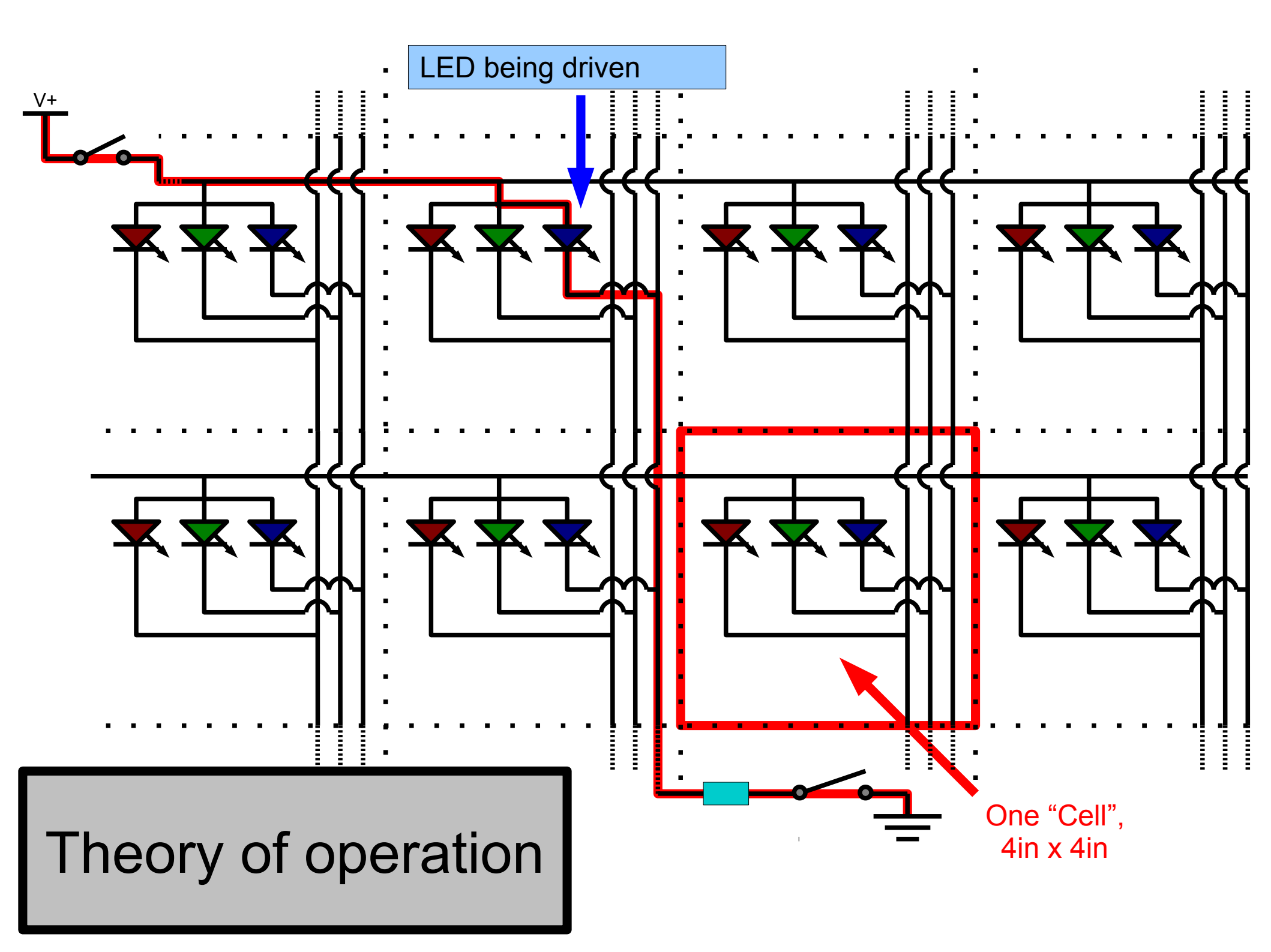
Side view of a cell:



Boxing - Wood cutting guide

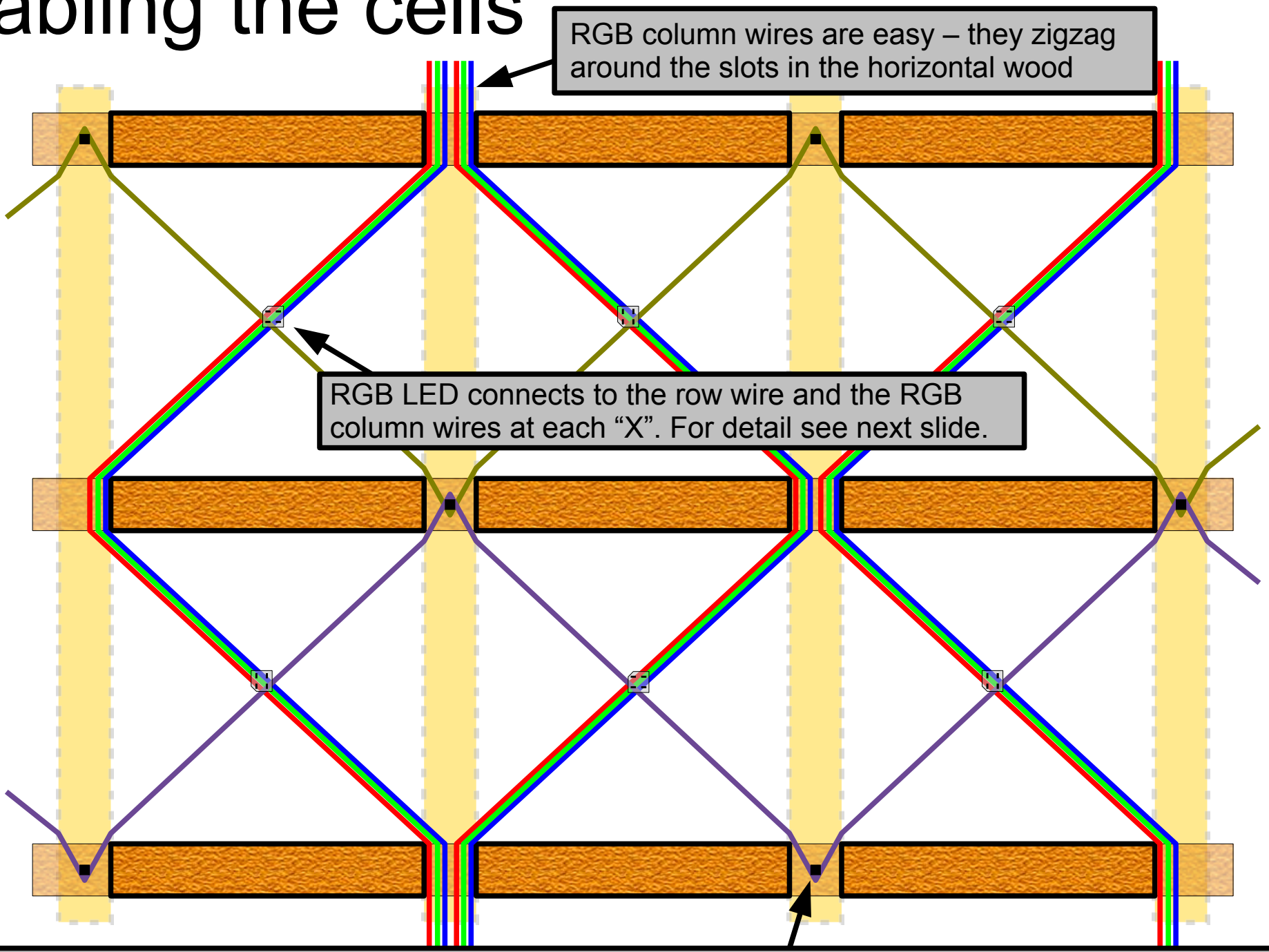
After planing, 1”x4”x8' wood is more like 11/16” x 3”7/16 x 8'
So slots for boxing need to be 11/16” wide and 1”3/4 deep.
All 4 sides of the 2'x4' acrylic need proper support.
We're making slightly-fake 2”x2” boxes, so one sheet of acrylic sits over 2 such boxes.
We're building the dance-floor in four 4'x4' quarters for a certain amount of portability. Each quarter will hold 2 sheets of 2'x4' acrylic, with wood doubled where required to support the edges of the acrylic and for symmetry

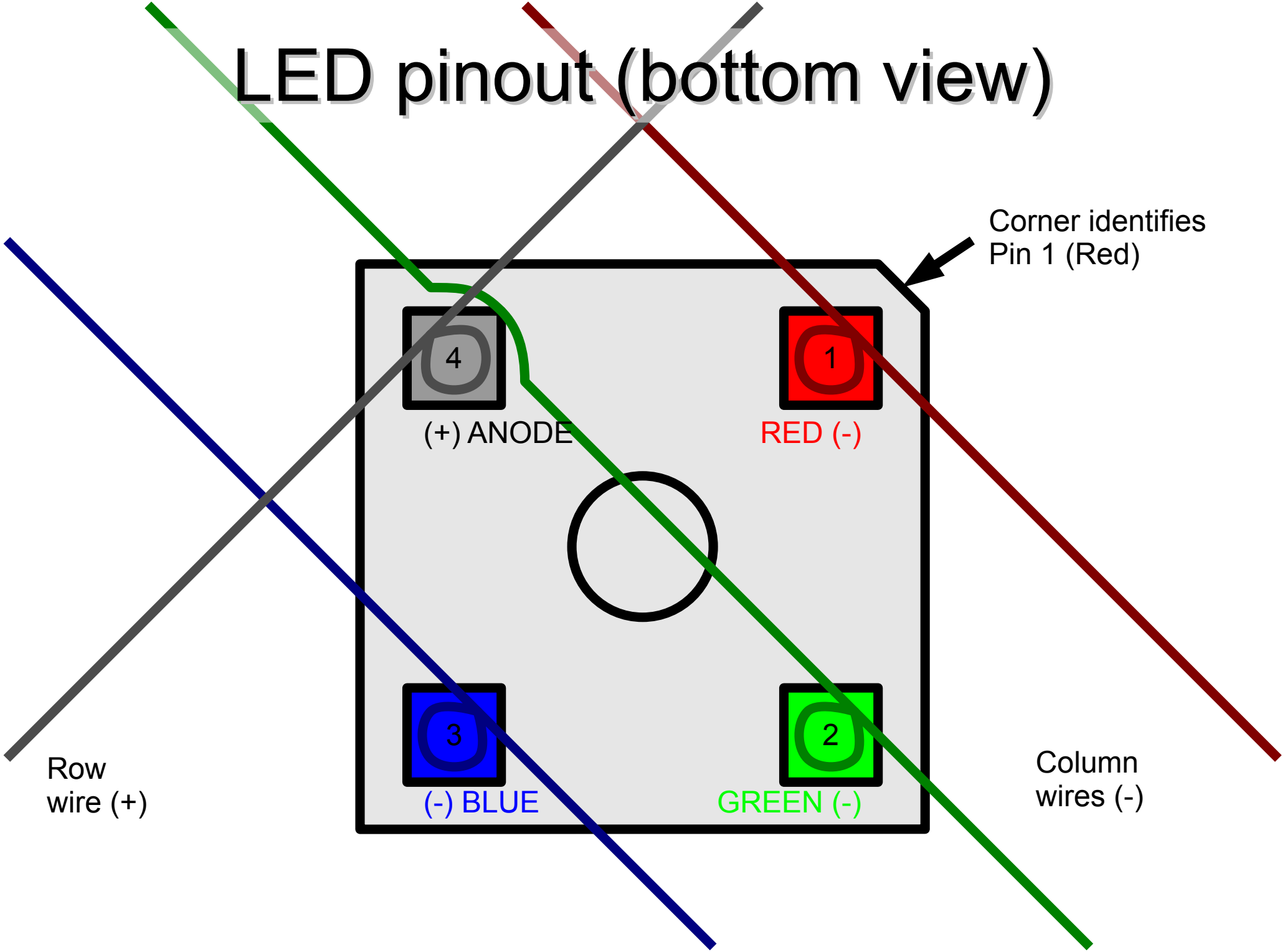




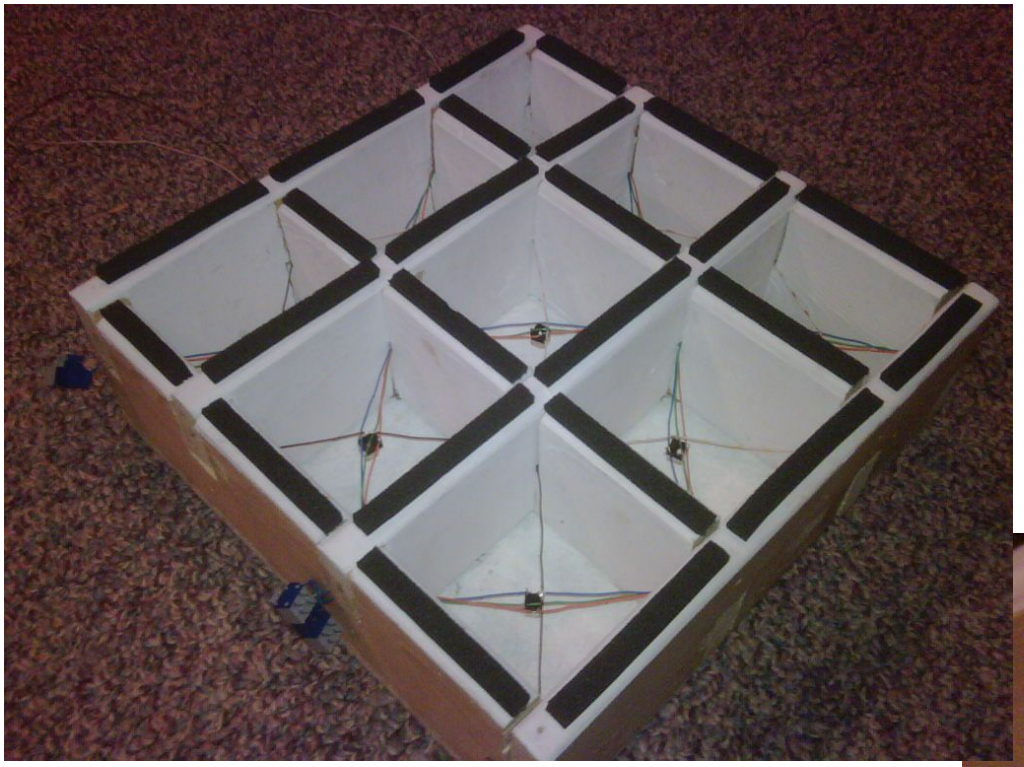
Theory of operation

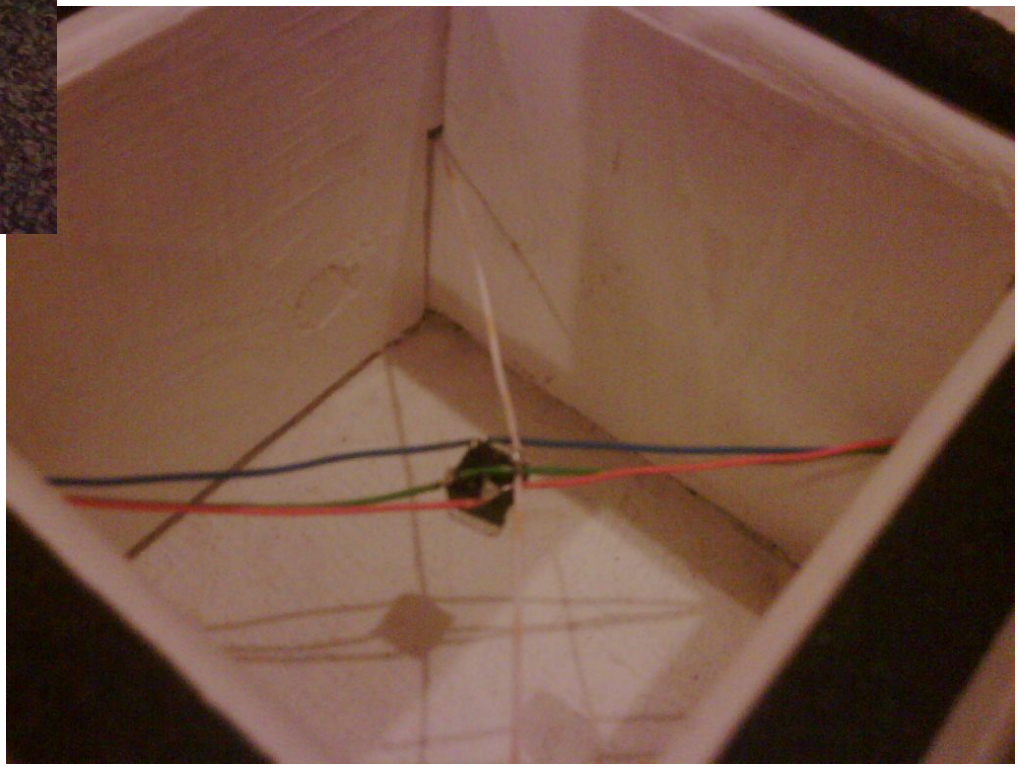
Cabling the cells



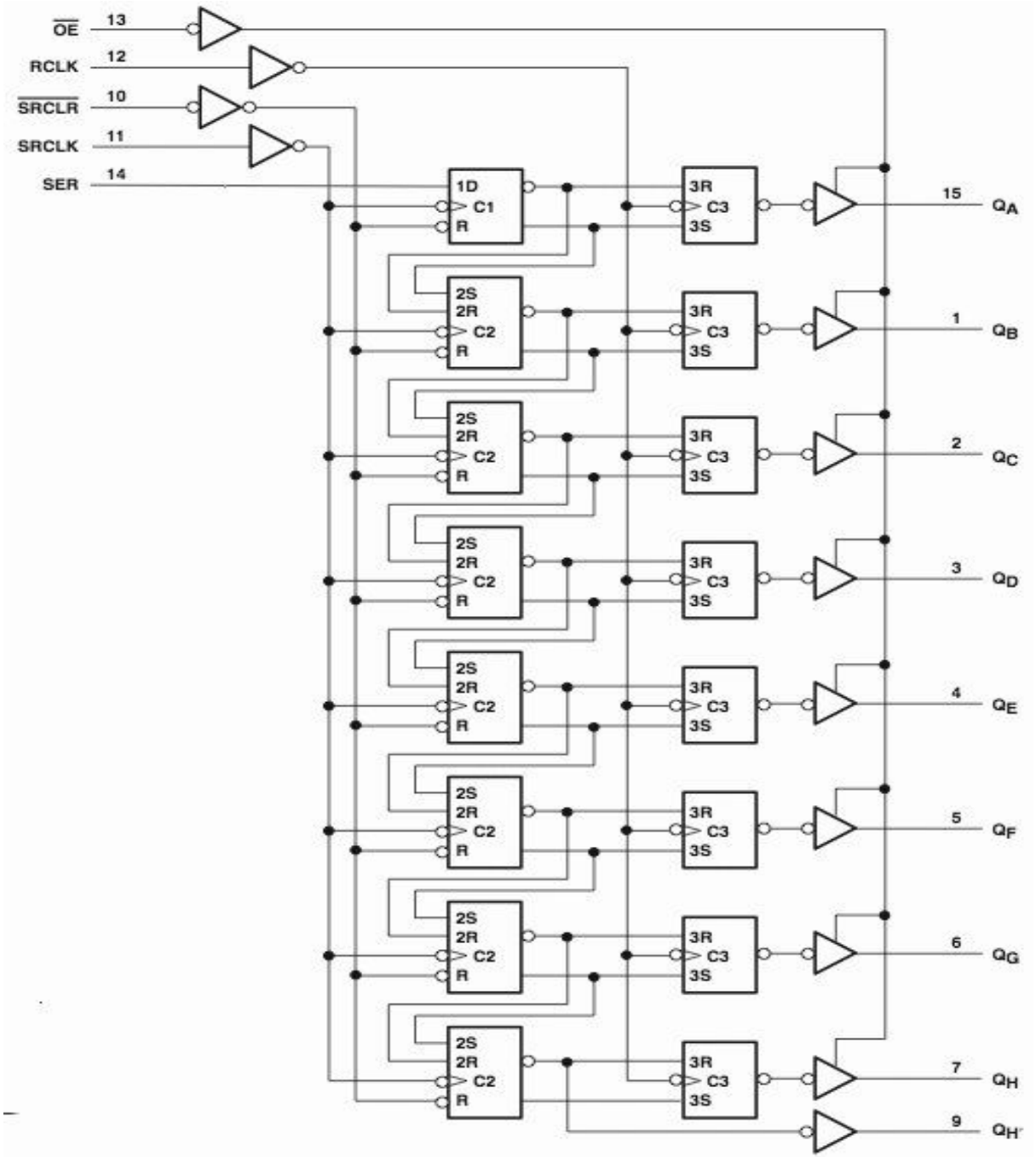

LED pinout (bottom view)
Corner identifies
Pin 1 (Red)
4
1
(+) ANODE
RED (-)
3
2
(-) BLUE
GREEN (-)
Row
wire (+)
Column
wires (-)

Cabling the cells

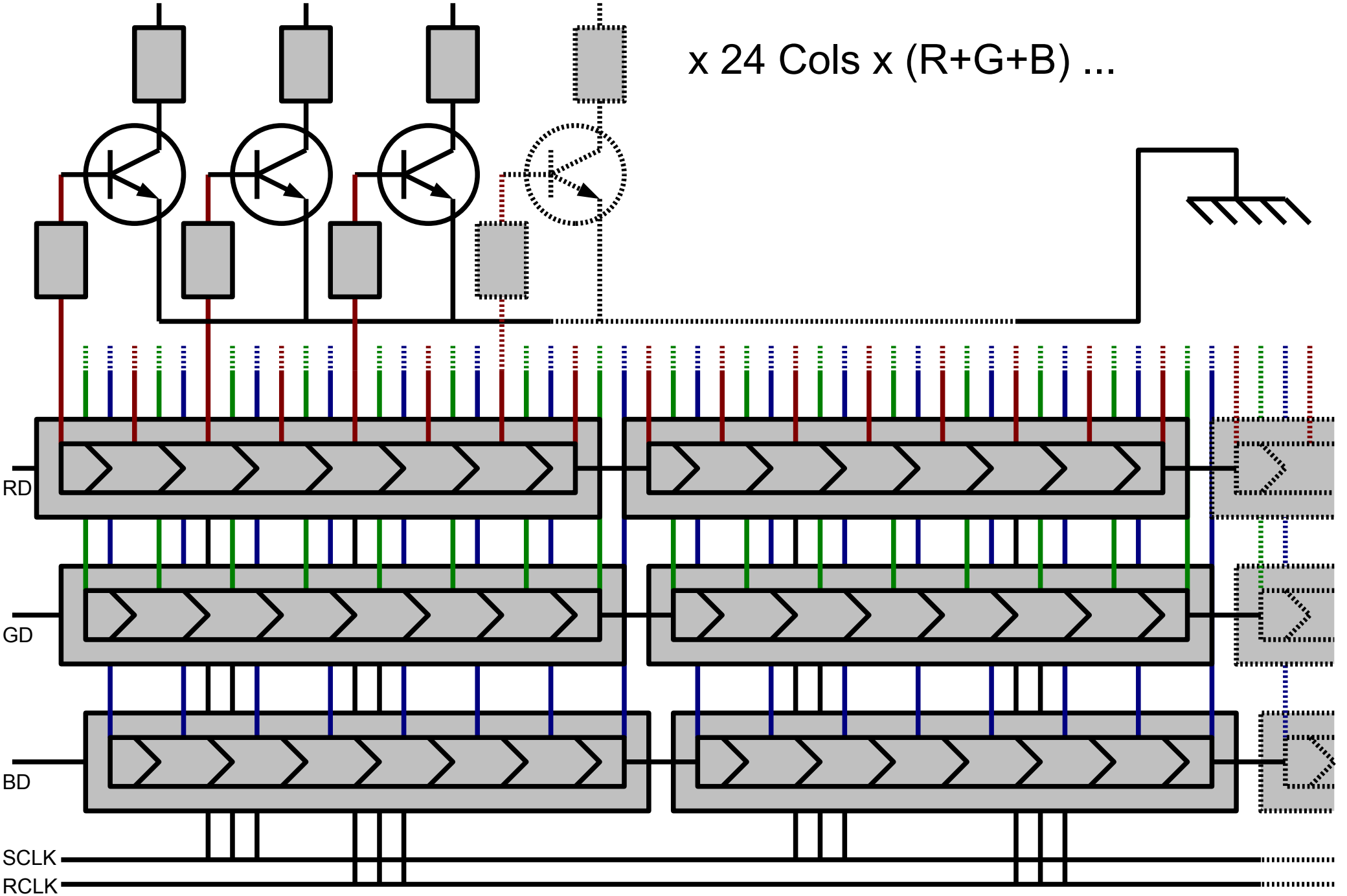




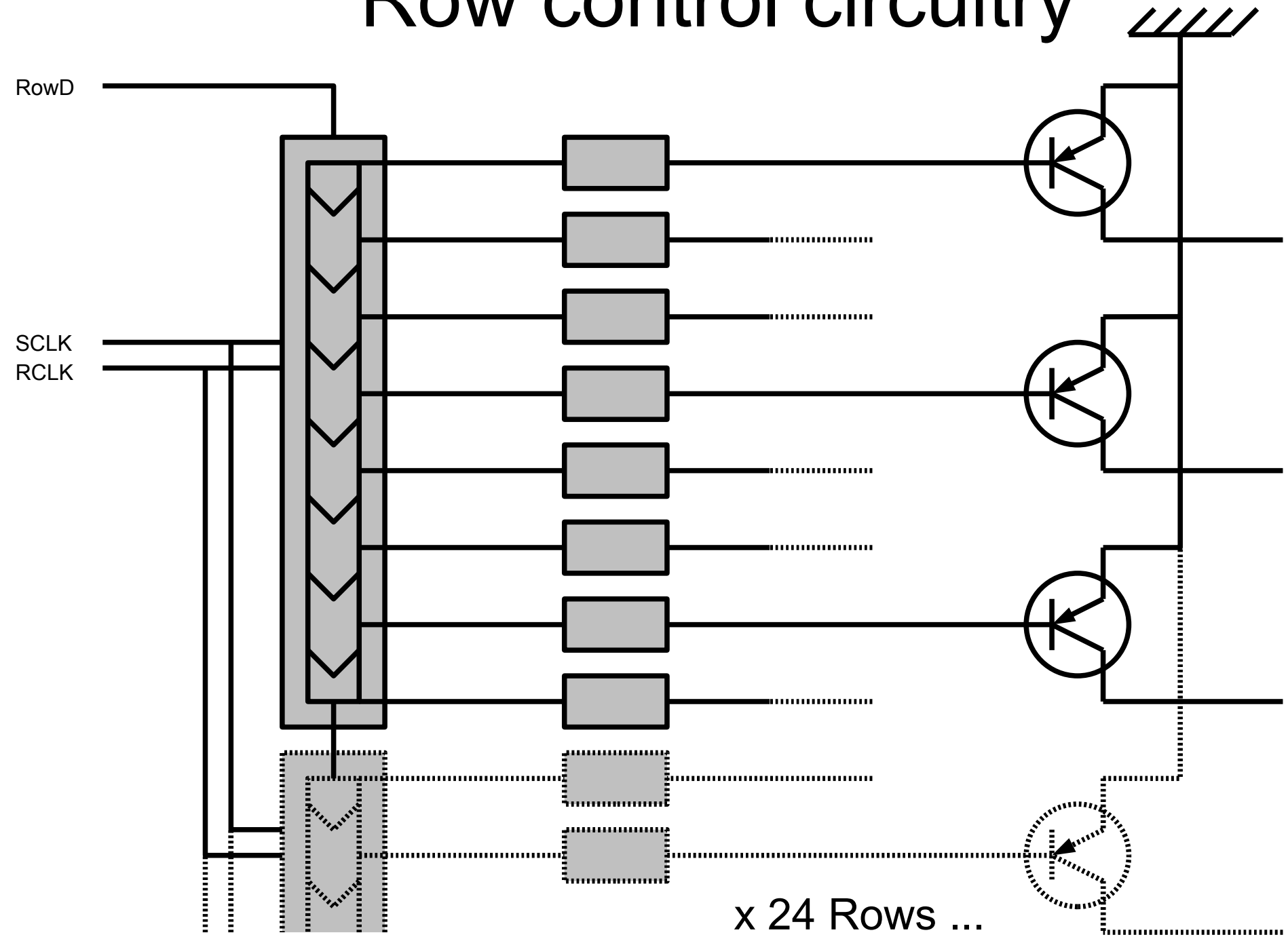
Control via 74HC595 shift/latch registers



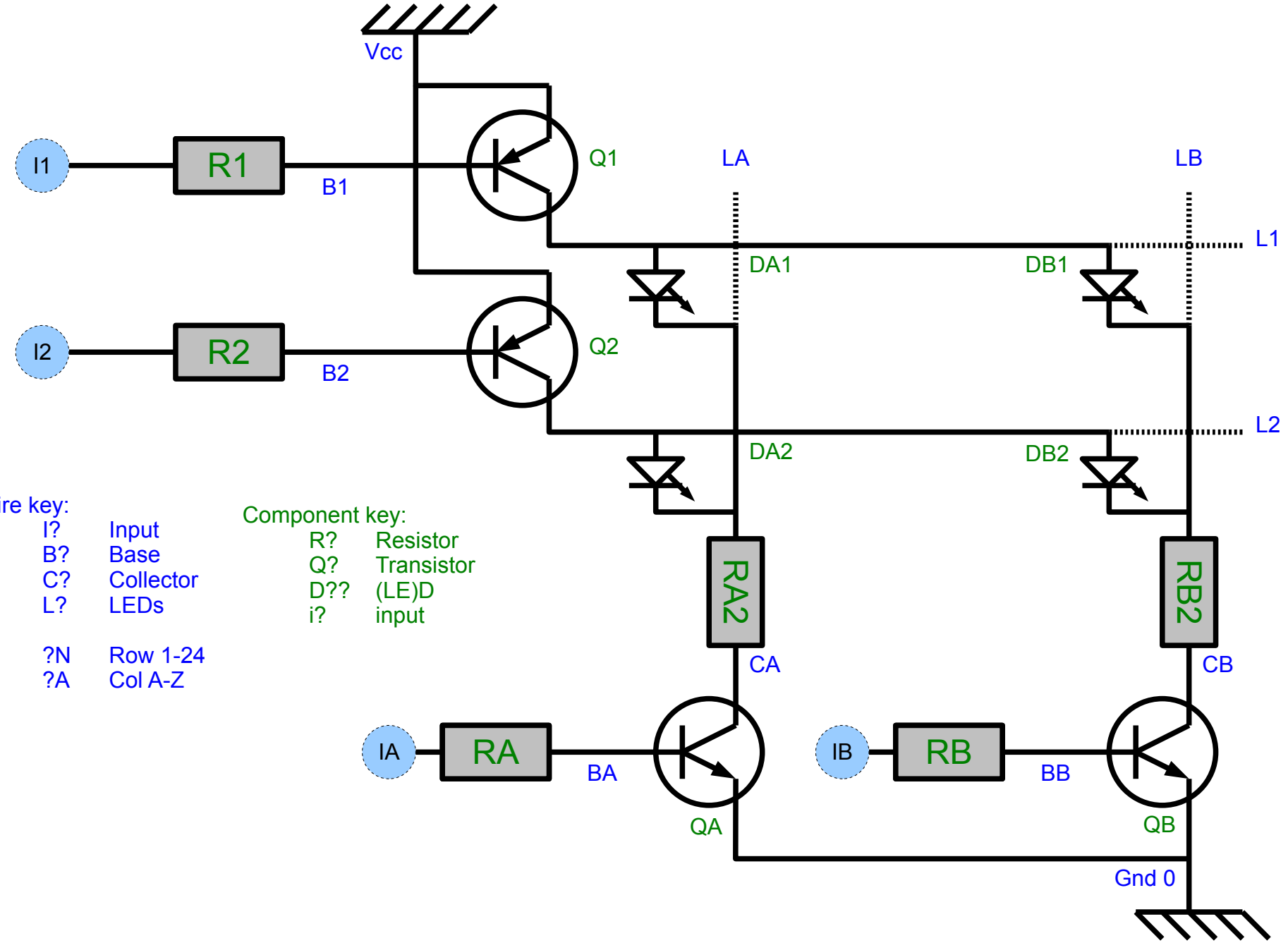
Column control circuitry



Row control circuitry



SPICE test circuit (2rows 2cols)



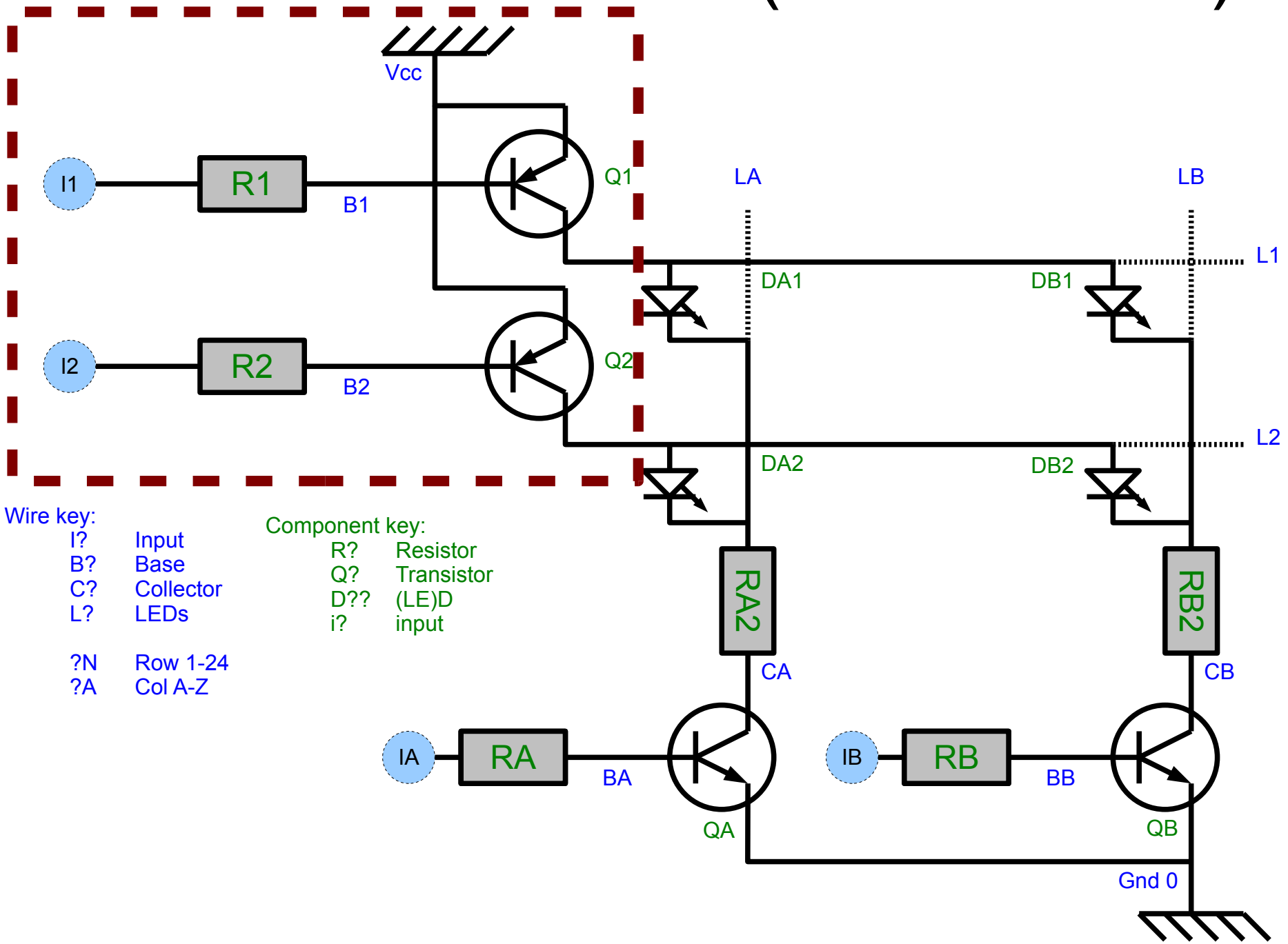
Wire key:

I?	Input
B?	Base
C?	Collector
L?	LEDs
?N	Row 1-24
?A	Col A-Z

Component key:

R?	Resistor
Q?	Transistor
D??	(LE)D
i?	input

SPICE test circuit (2rows 2cols)



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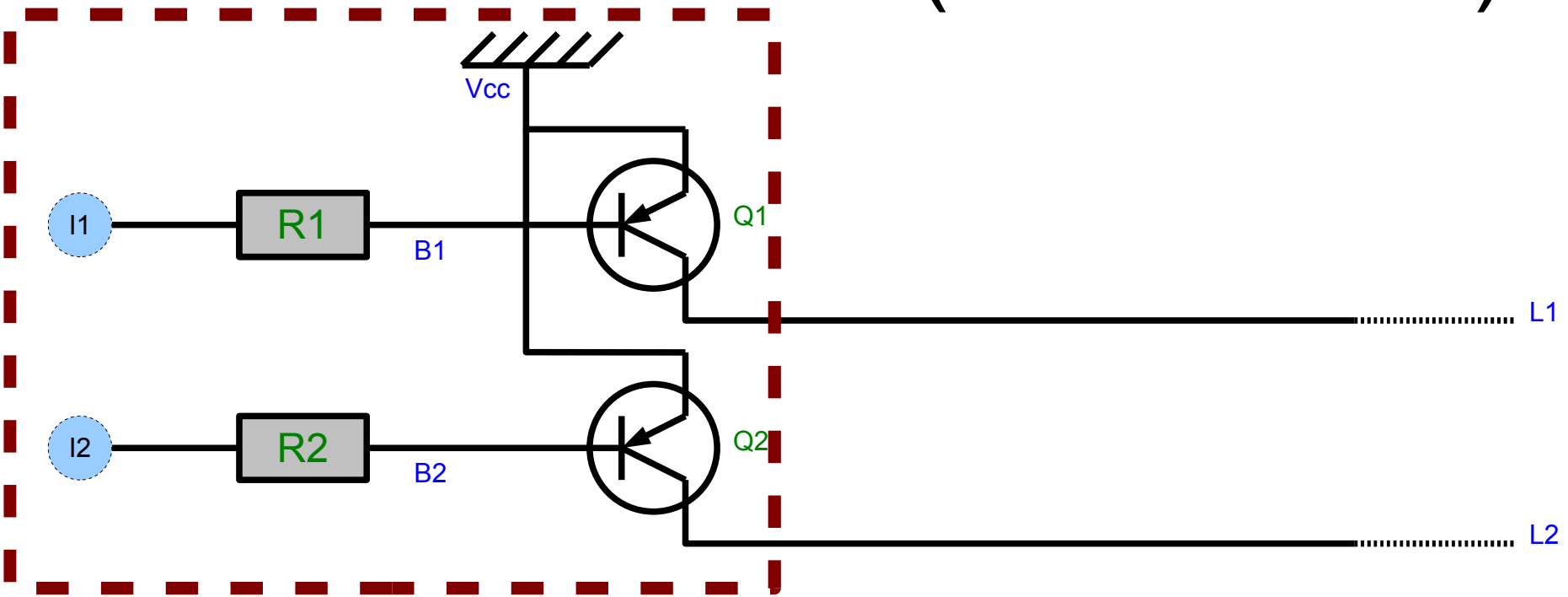
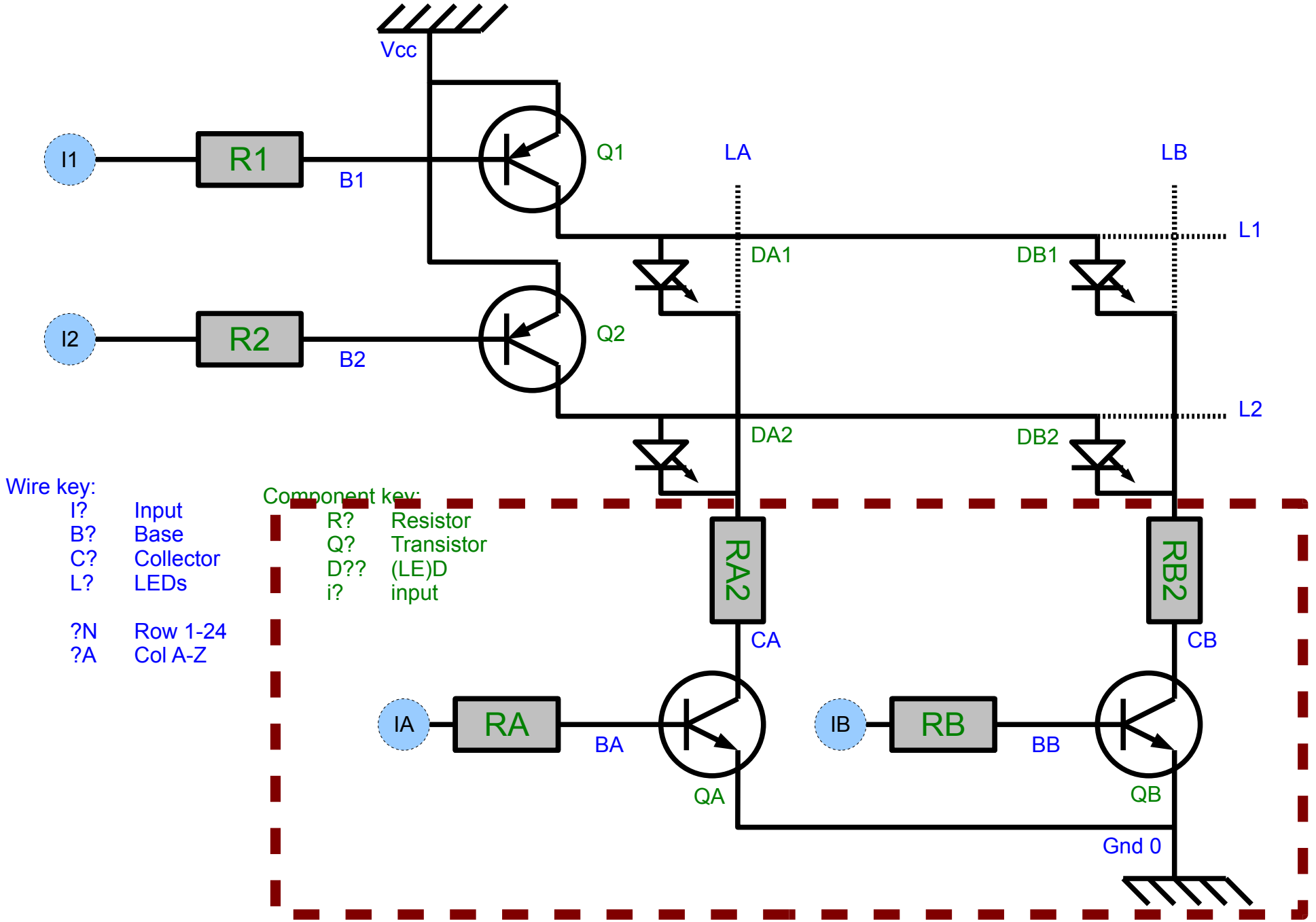



```
* Comp  N+  N-      Value    ...
Vcc     Vcc 0      DC 5V

* Row driver circuitry
R1      I1  B1       510
R2      I2  B2       510
* Trans C   B   E    Model
Q1      L1  B1  Vcc  PNP
Q2      L2  B2  Vcc  PNP
```

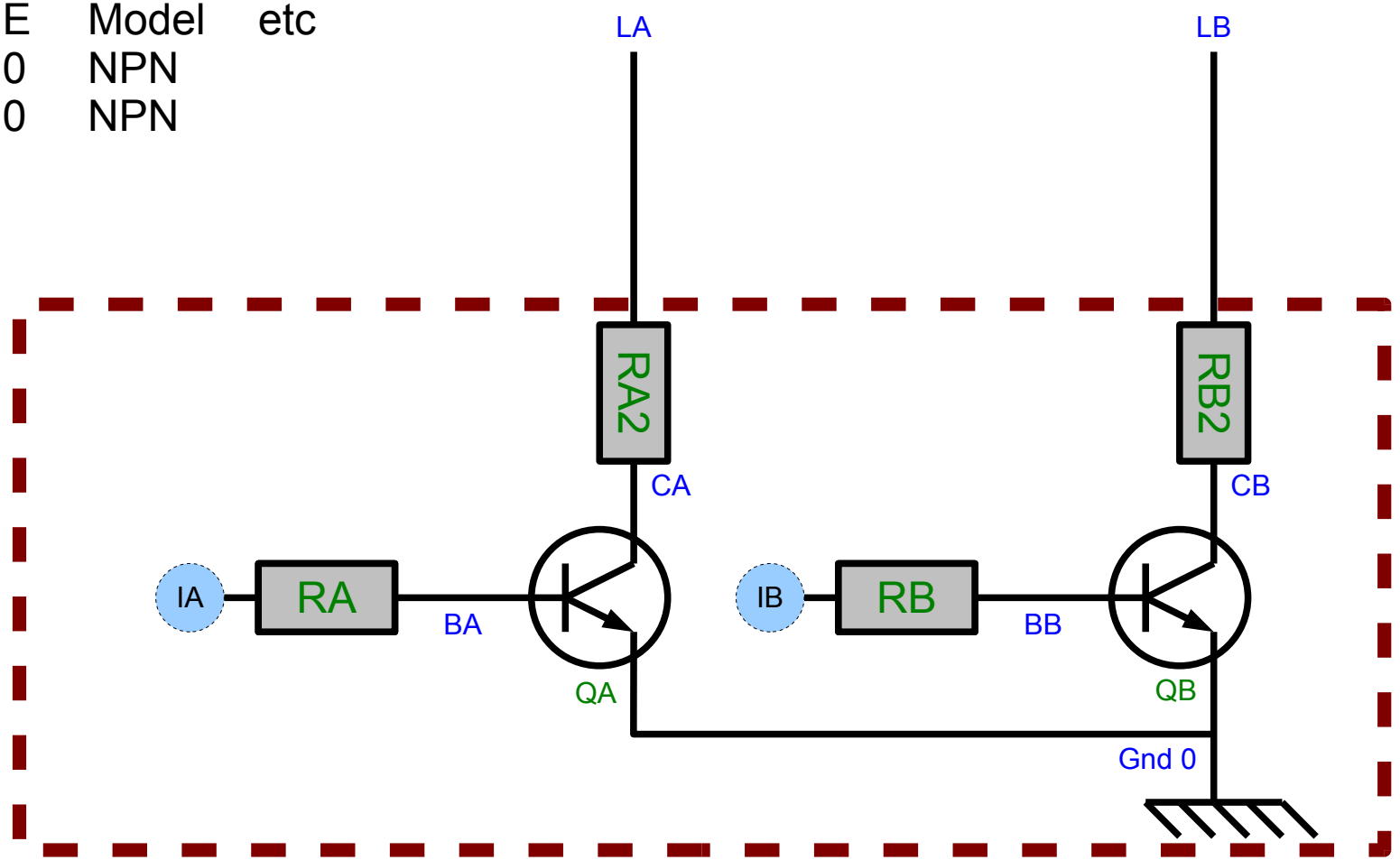
SPICE test circuit (2rows 2cols)



SPICE test circuit (2rows 2cols)

* Column Driver circuitry

* Comp	N1	N2		Value	...
RA	IA	BA		510	
RB	IB	BB		510	
RA2	LA	CA		150	
RB2	LB	CB		150	
* Trans	C	B	E	Model	etc
QA	CA	BA	0	NPN	
QB	CB	BB	0	NPN	



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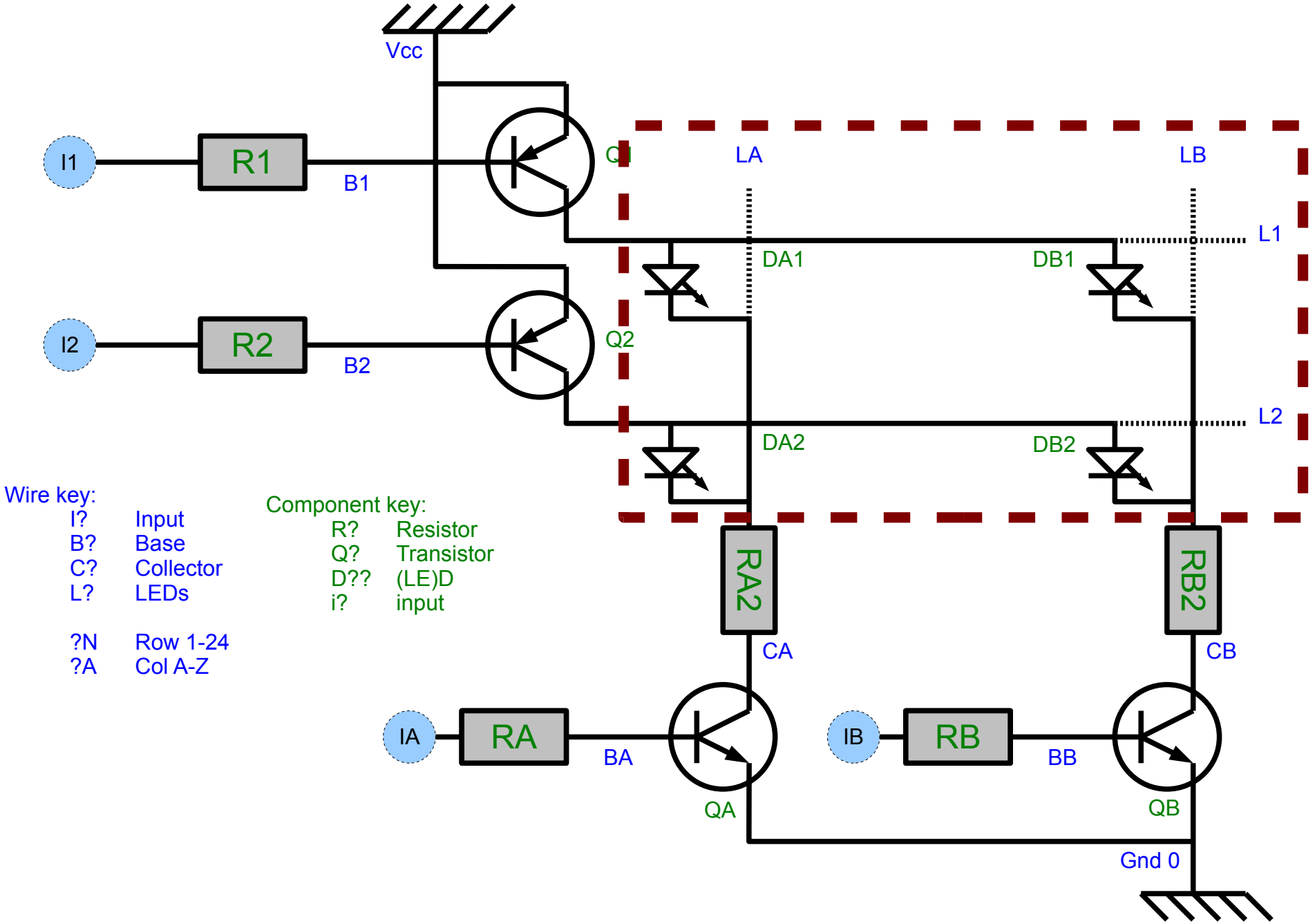

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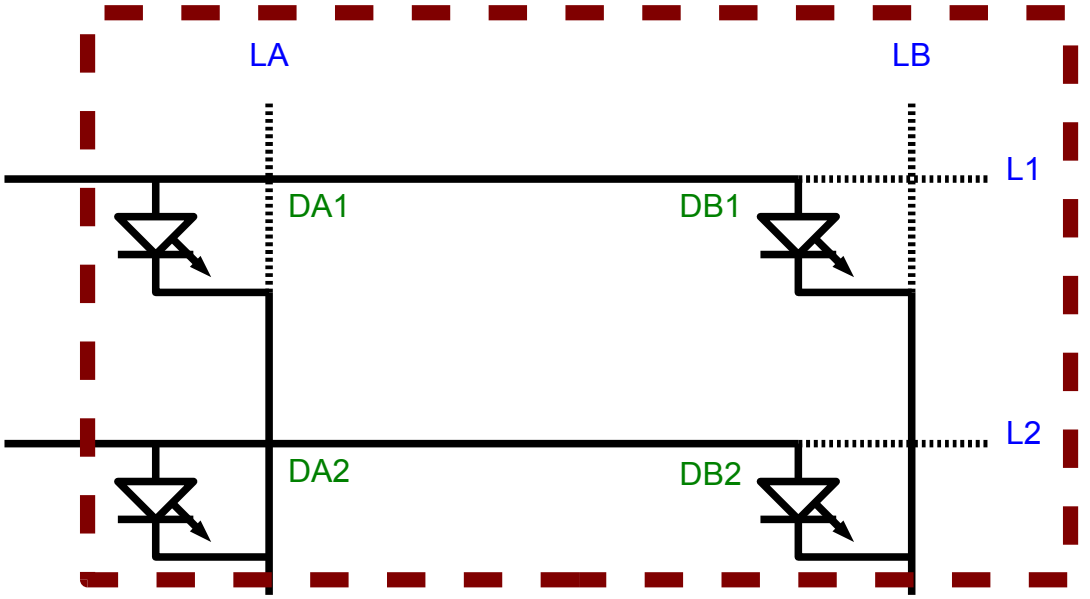
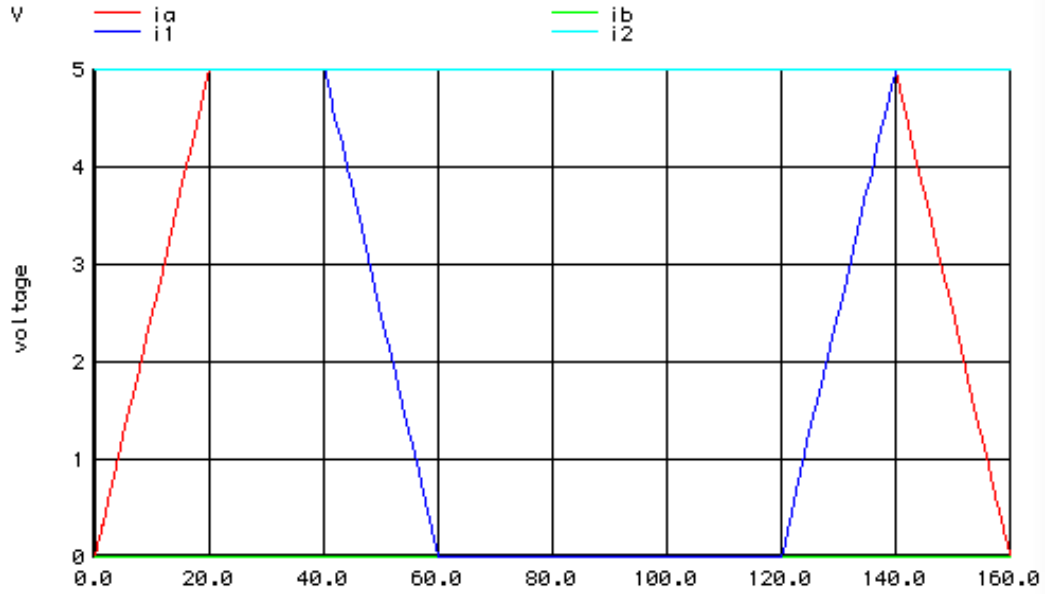


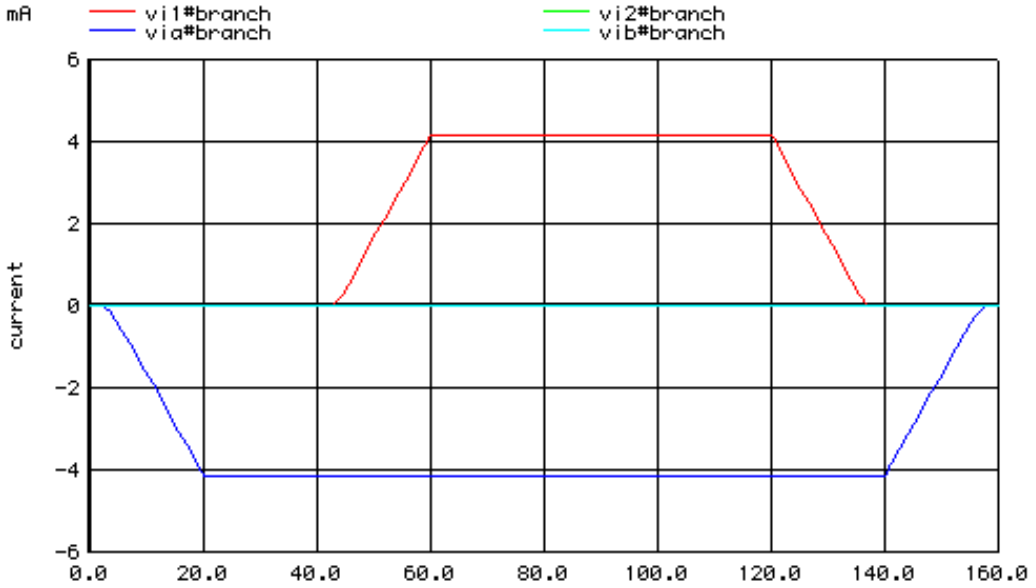

```
* Diode  N+  N-      Model    ...
* LEDs
DA1      L1  LA      LED
DA2      L2  LA      LED
DB1      L1  LB      LED
DB2      L2  LB      LED

* Yes, there's probably better ways to do this with .SUBCKT stuff
* – maybe when I want to simulate the whole 24x24   :-)
```

First SPICE results



Our input signals.
0-20µs we select one column
40-60 we activate one row
120-140 we deactivate the row
140-160 we deselect the column

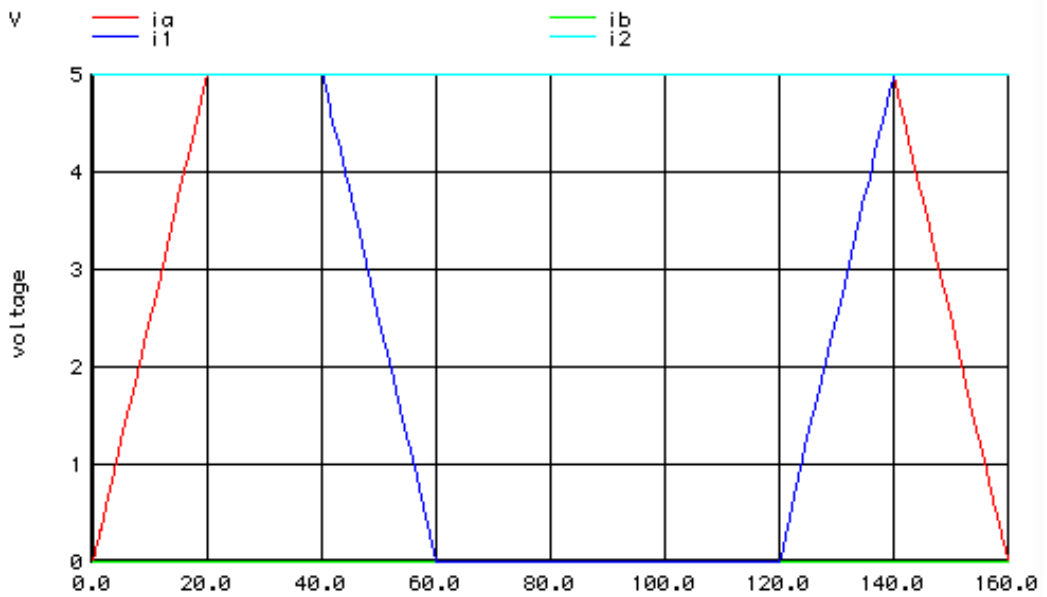


Our input currents.

There's a reasonably good reason why one current looks positive (sinking) and one looks negative (sourcing).

These currents would certainly not burn out the shift registers, but could probably be reduced. This was just with a “first guess” of 1kΩ for the base resistors – not too bad!

First SPICE results



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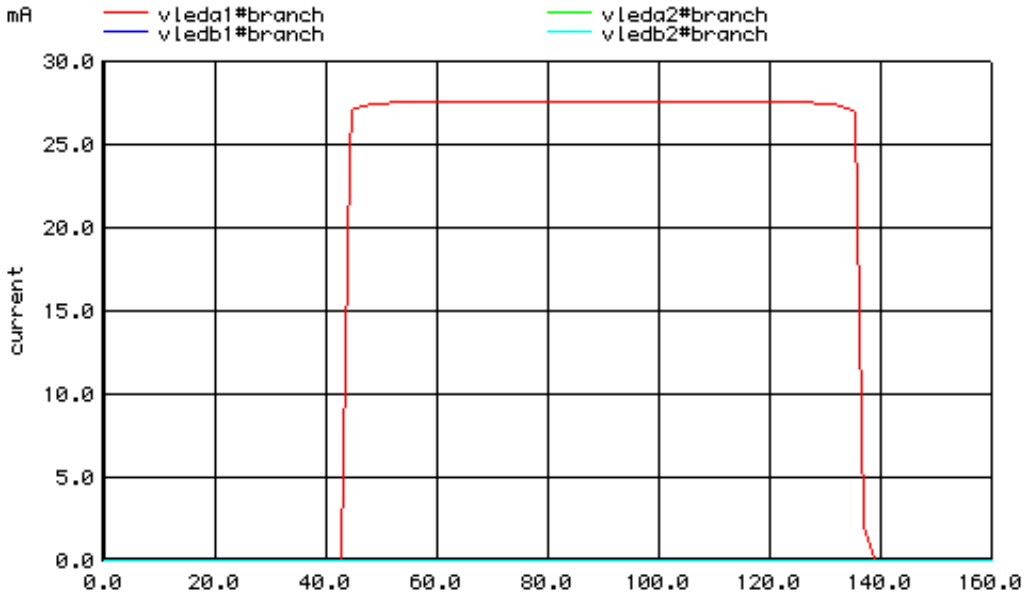


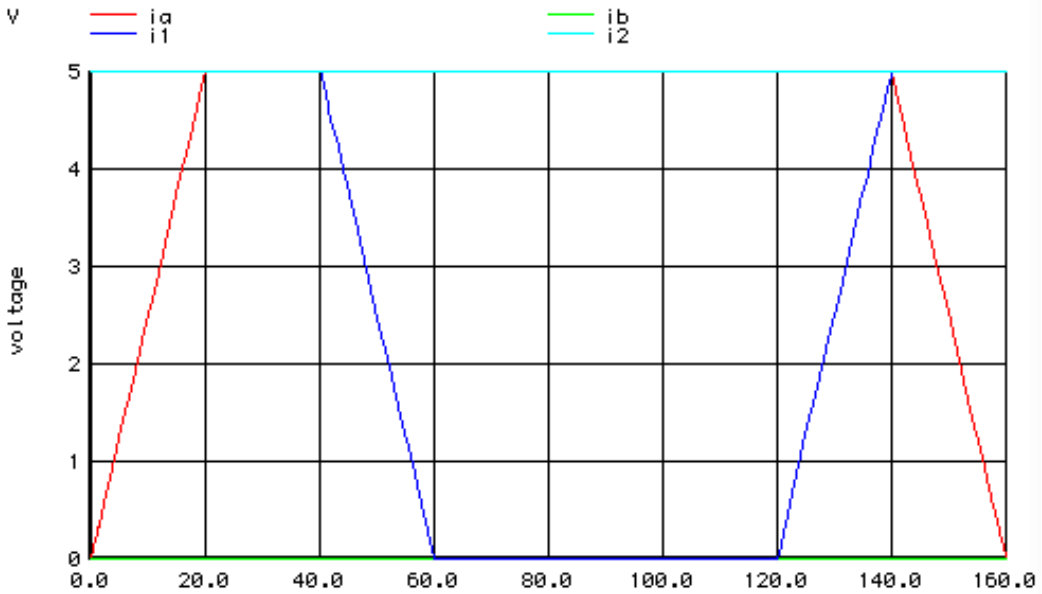
Our LED currents.

As expected, only 1 of the 4 LEDs in our test circuit is lit.

The current looks high, but I'm pretty sure that's because version 1 of my test circuit used a plain 0.7V diode model.

I could do with a more accurate LED model with 2.1V-3.2V forward voltage.

First SPICE results



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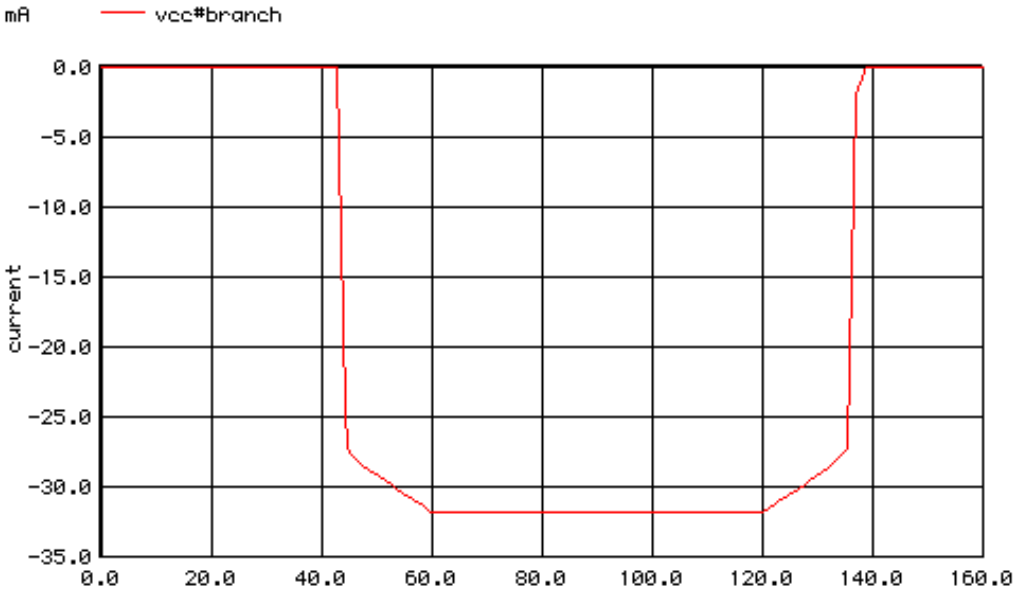
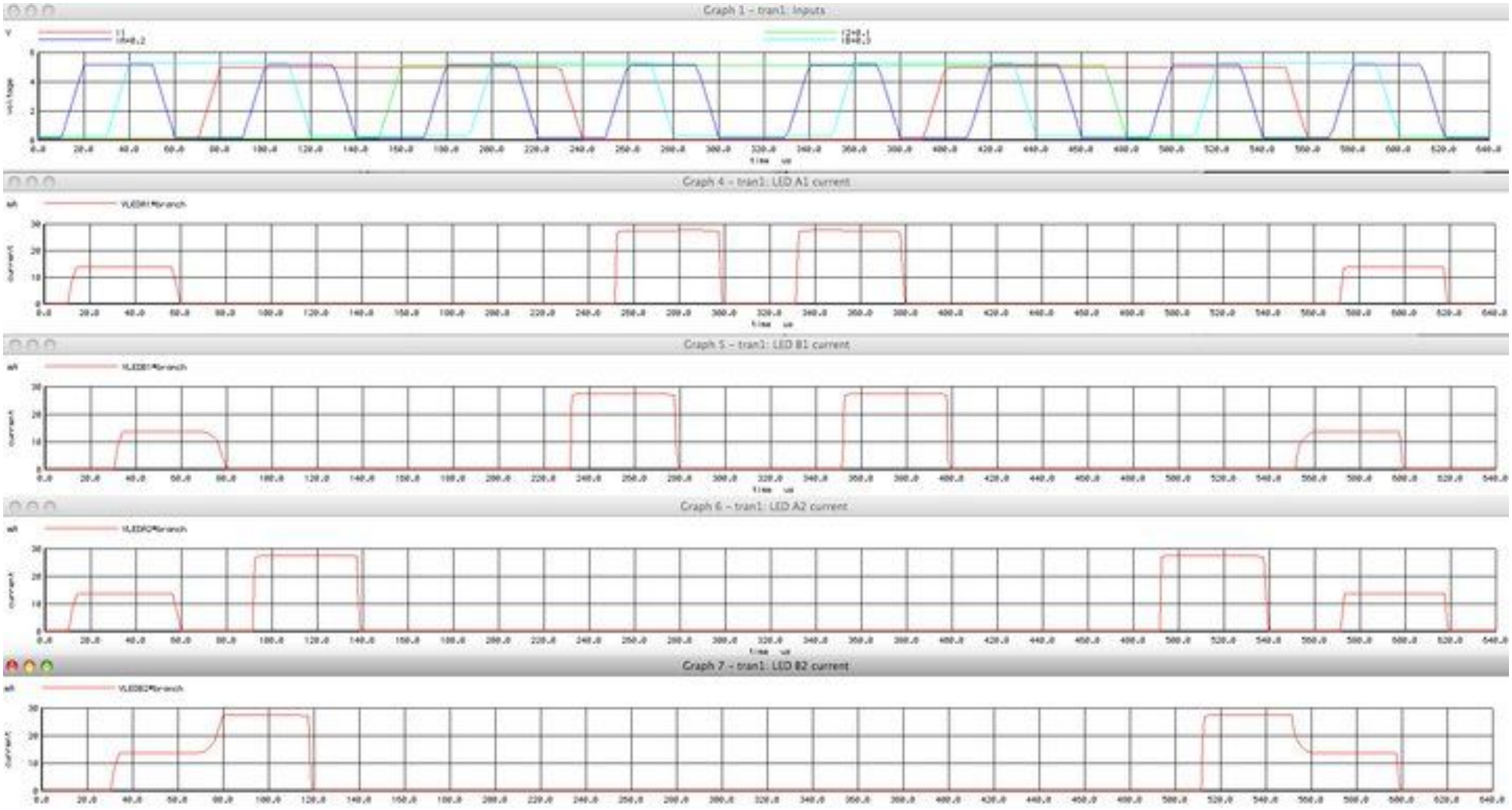


Total supply current.

Again, there's a good reason why this counts as being negative.

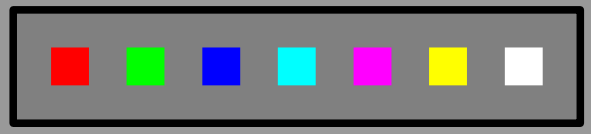
We're certainly not short-circuiting anywhere though. Looks pretty believable for a first LED dance floor circuit simulation, and my first attempt to use SPICE for nearly 2 decades!

More SPICE results

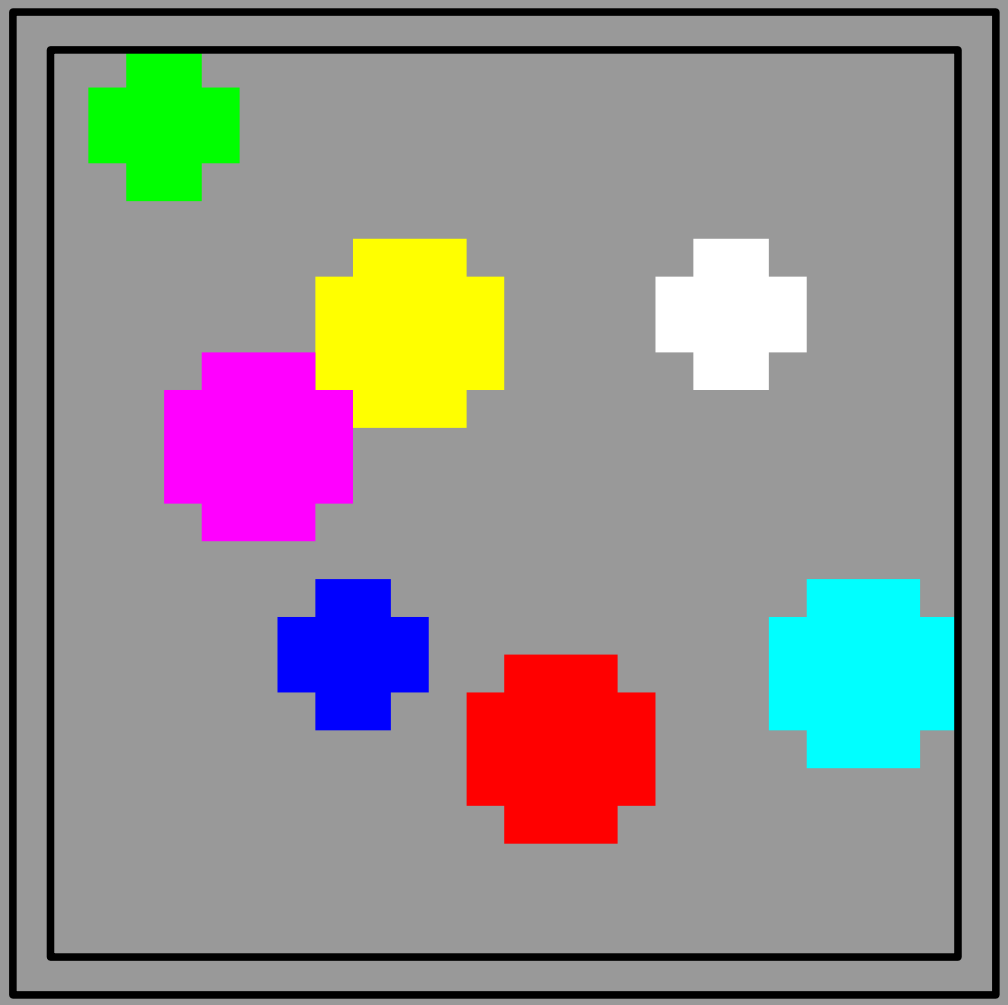


Testing 3x3 cells

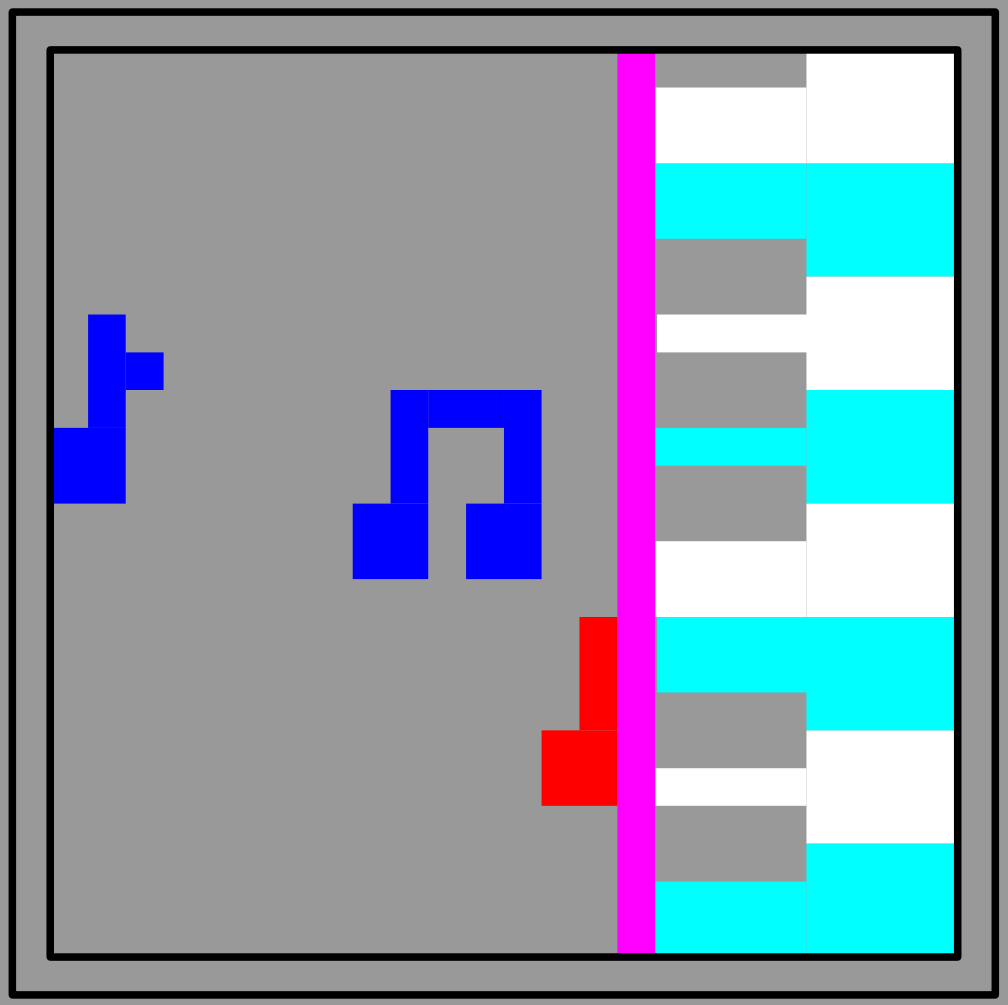
Some game ideas



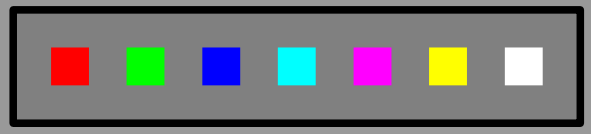
Dot Chase (by Aiden): Dots move around. Chase the dots of your colour, jump on them, they will reappear elsewhere. Player who stomped their own colour in the time limit the most wins. Maybe size handicap for good players?



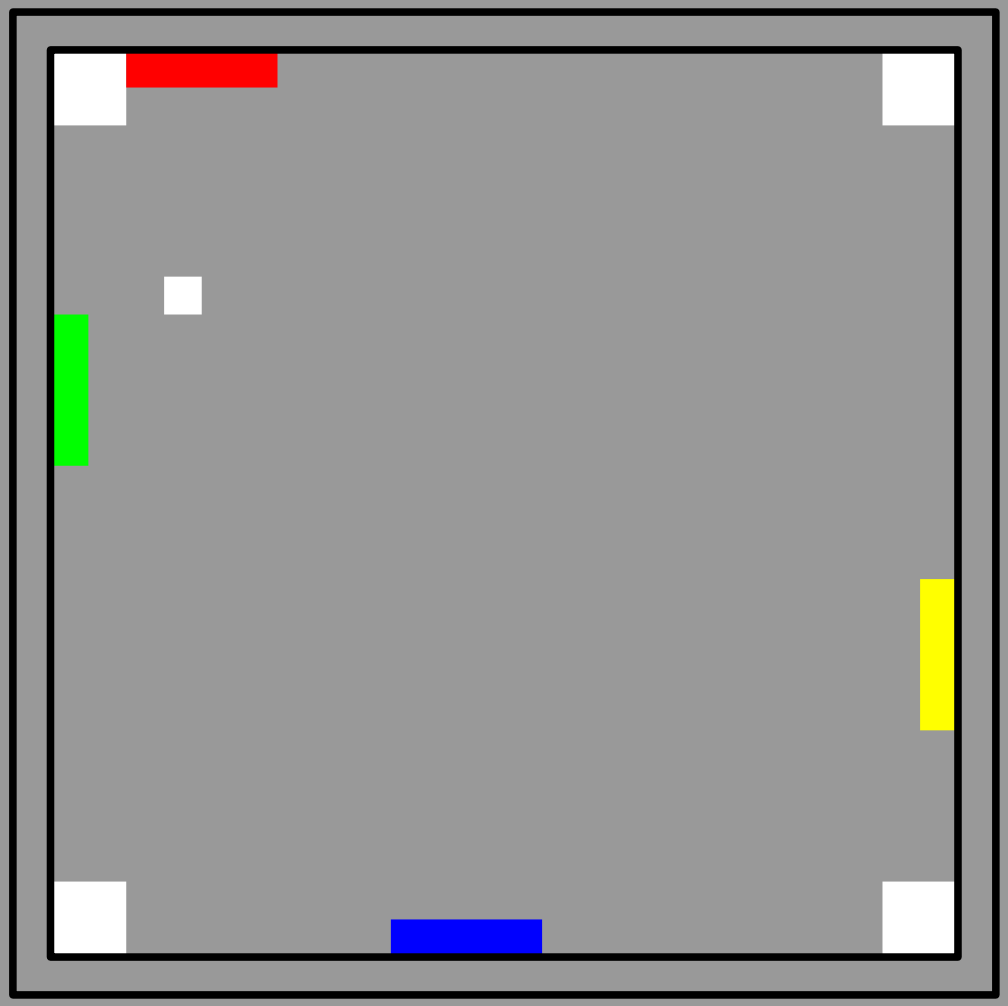
Music time!



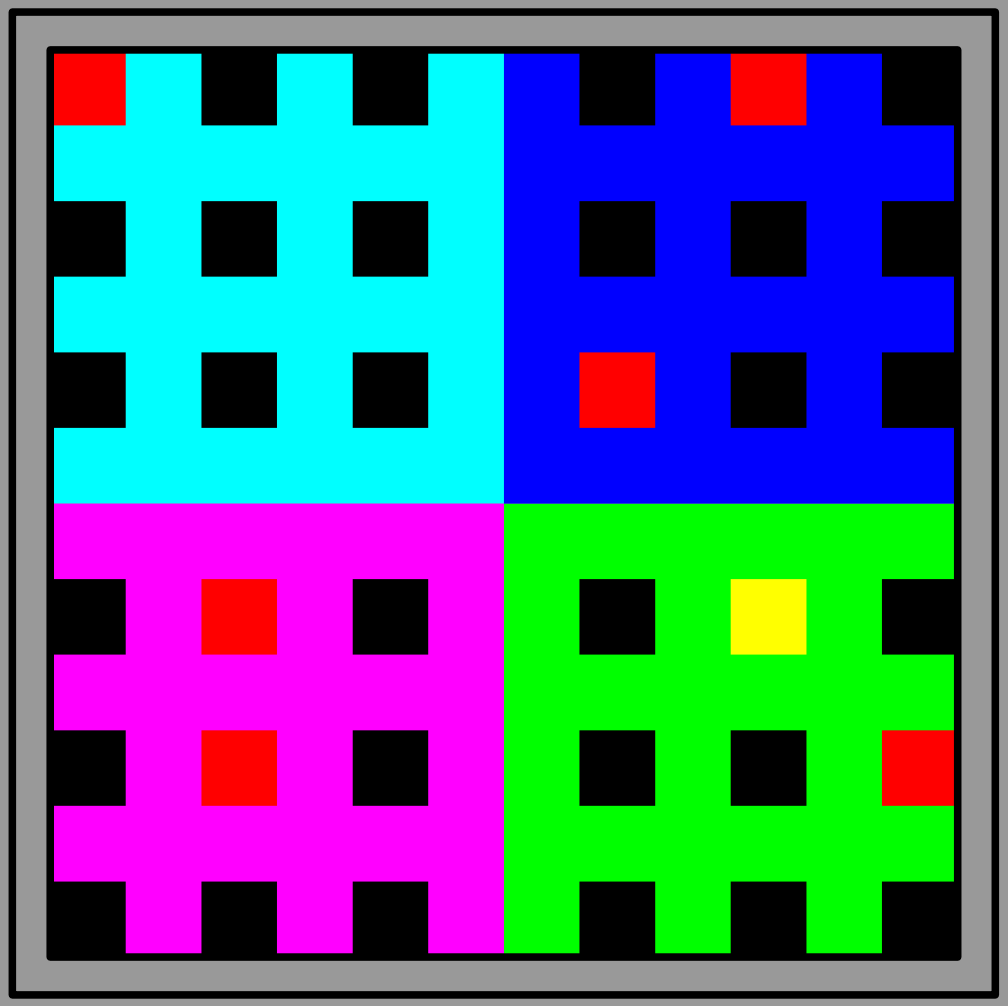
Some game ideas



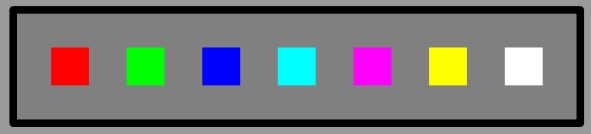
Multi-Player-Pong! Obvious one really



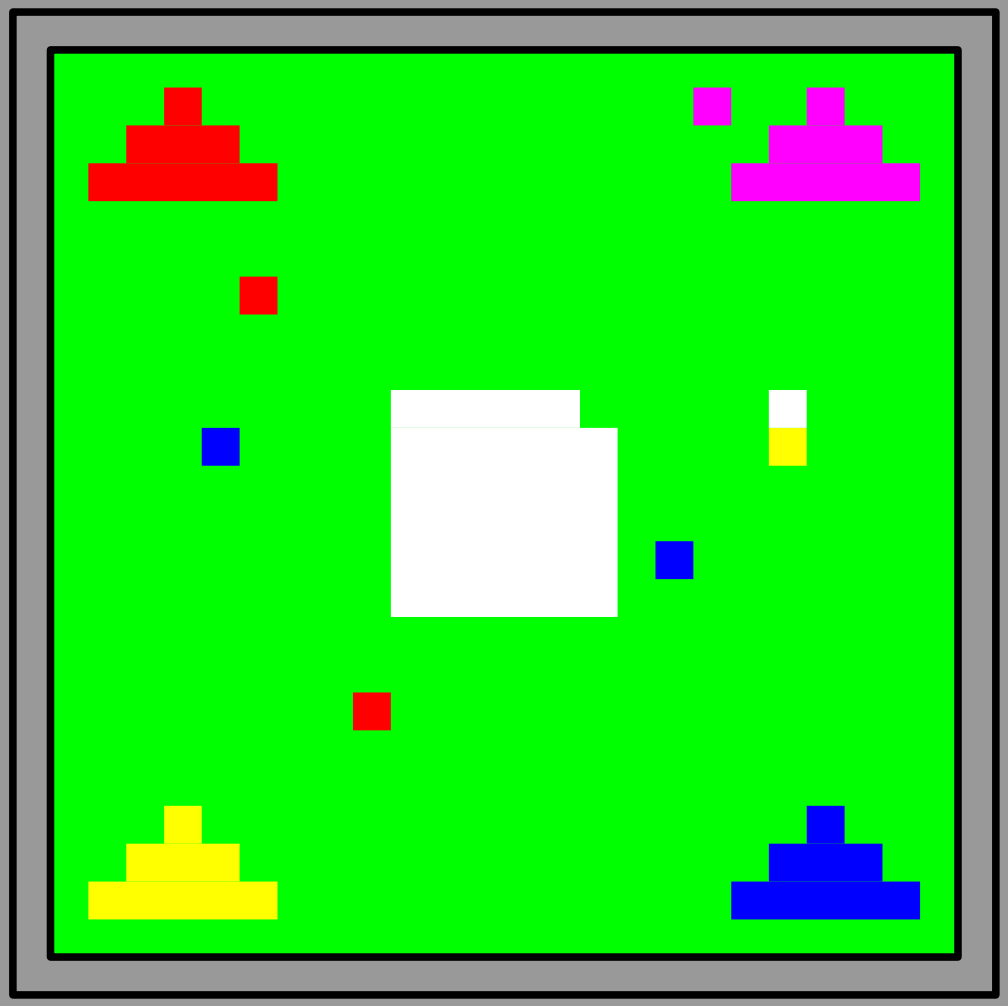
Fire-brigade, by KJ. Windows in the 4 buildings light up with red/yellow flames. Step on them to put them out



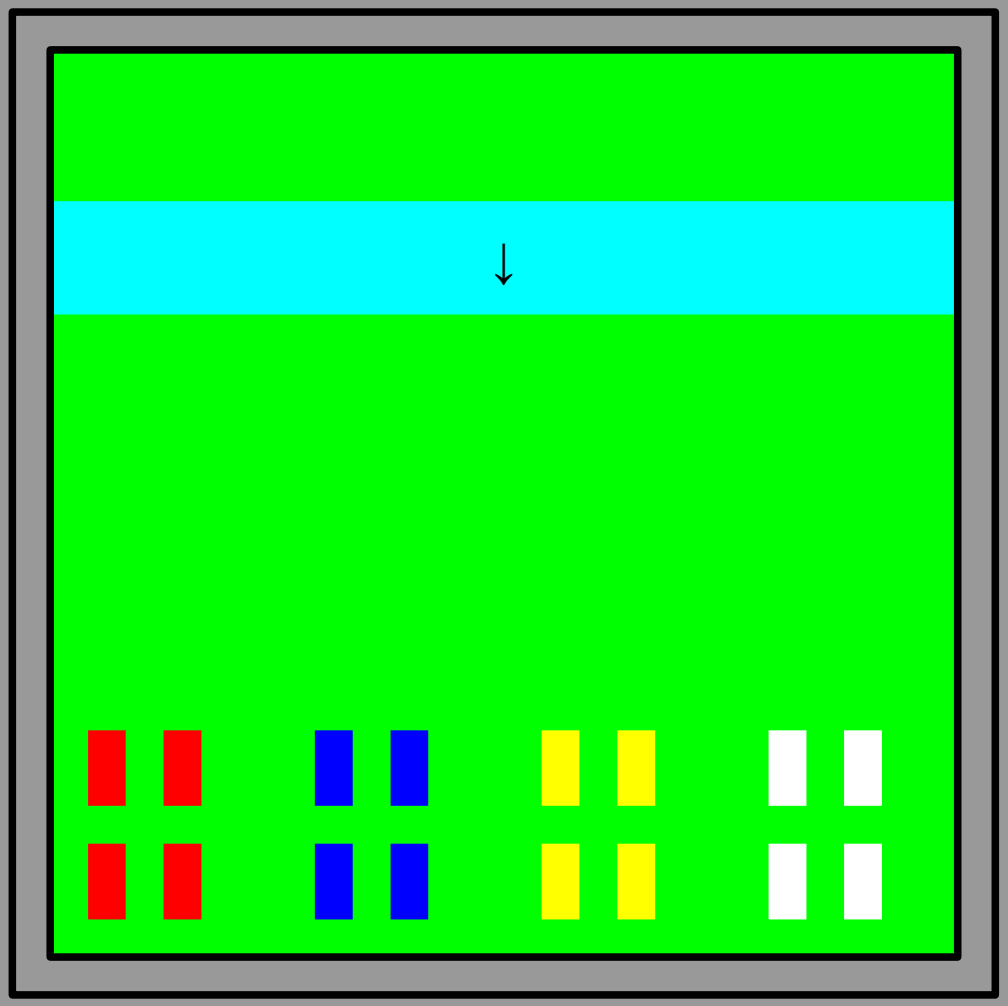
Some game ideas



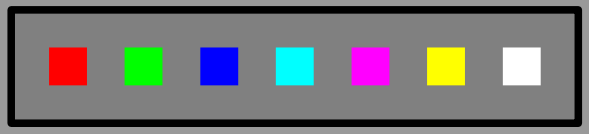
Ant Attack (by KJ) – ants (possibly single-pixel?) appear out of the hills and crawl around in a spiral to the food on the picnic blanket in the middle (taking some white with them?), and back to their nests. Squish the ants!



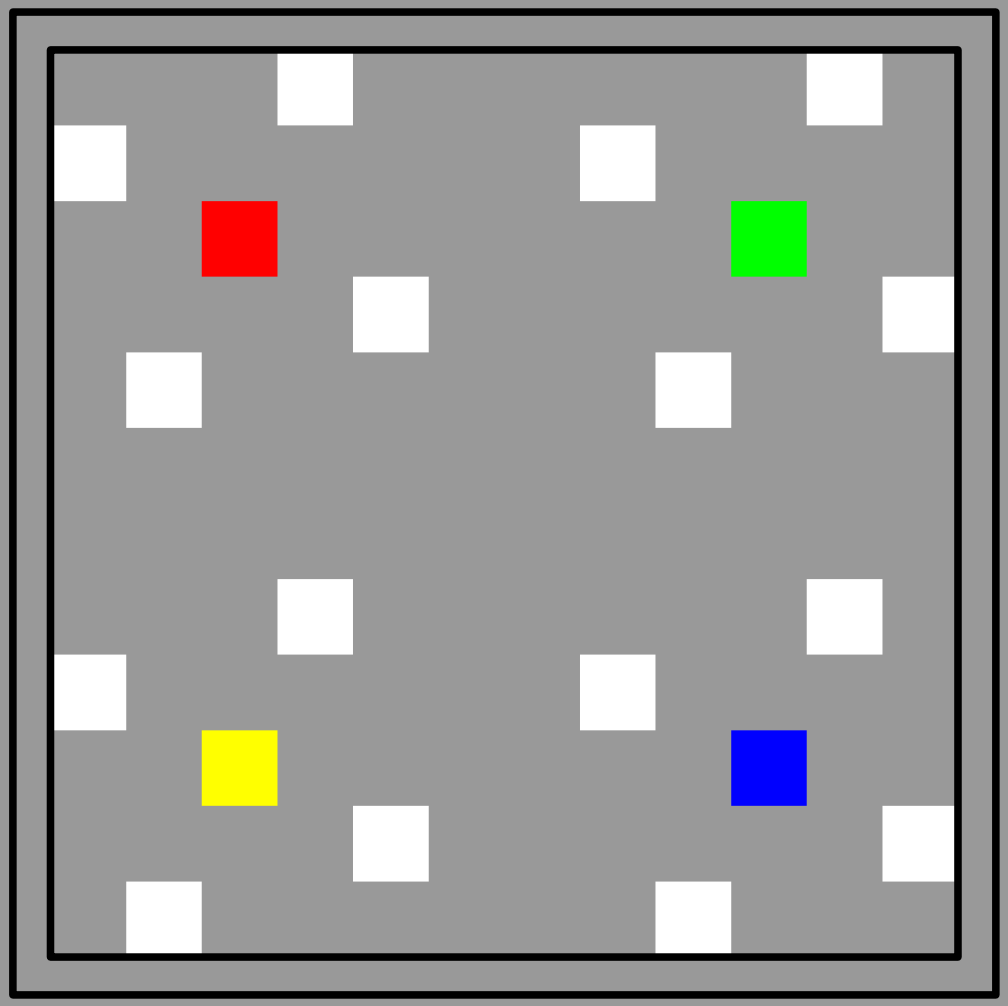
Horse jump (by Estelle, for KJ): Players kneel on all fours at one end of the floor. Obstacles come down the screen and you must jump over them



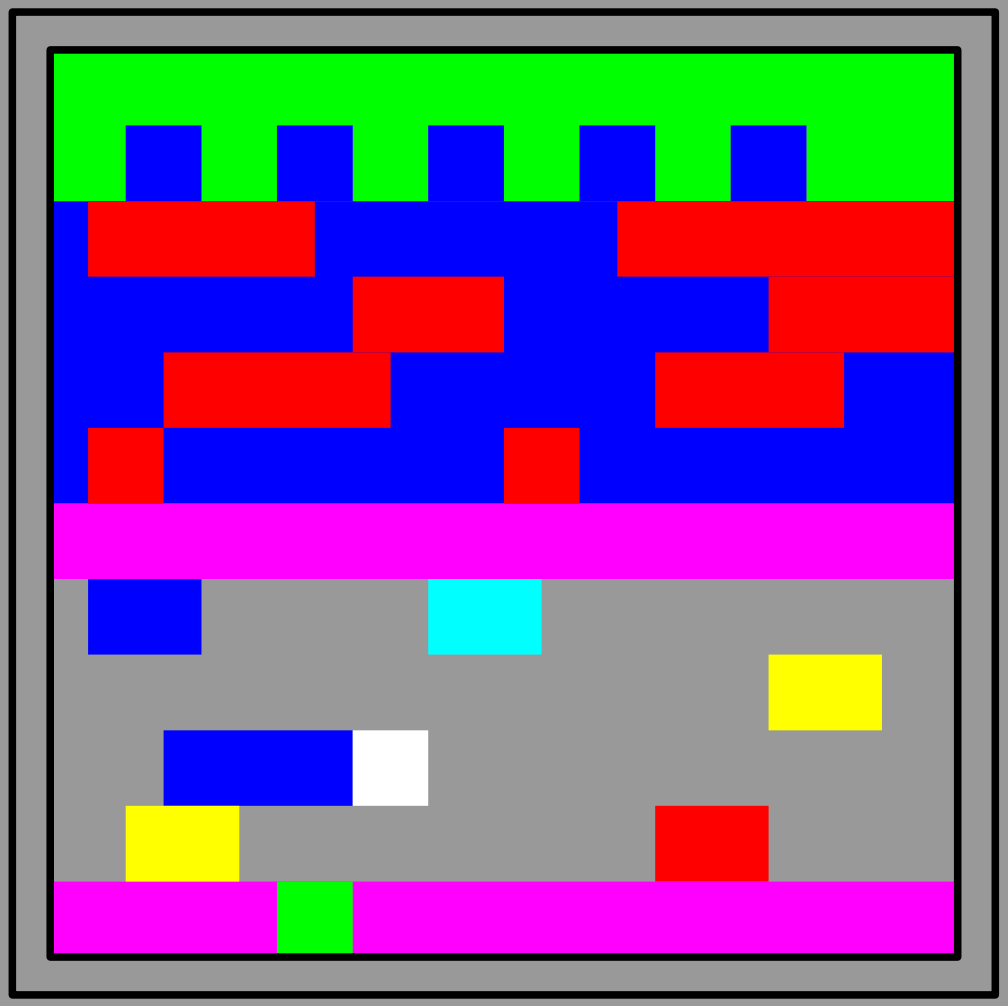
Some game ideas



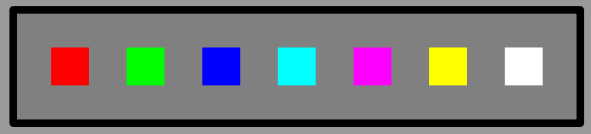
Dance-off – one player dances, their moves scroll across the board to another player who has to copy them as accurately as possible. Repeat a few times for different players sending to different players. 1-player or 2-pl cooperative DDR-like also possible



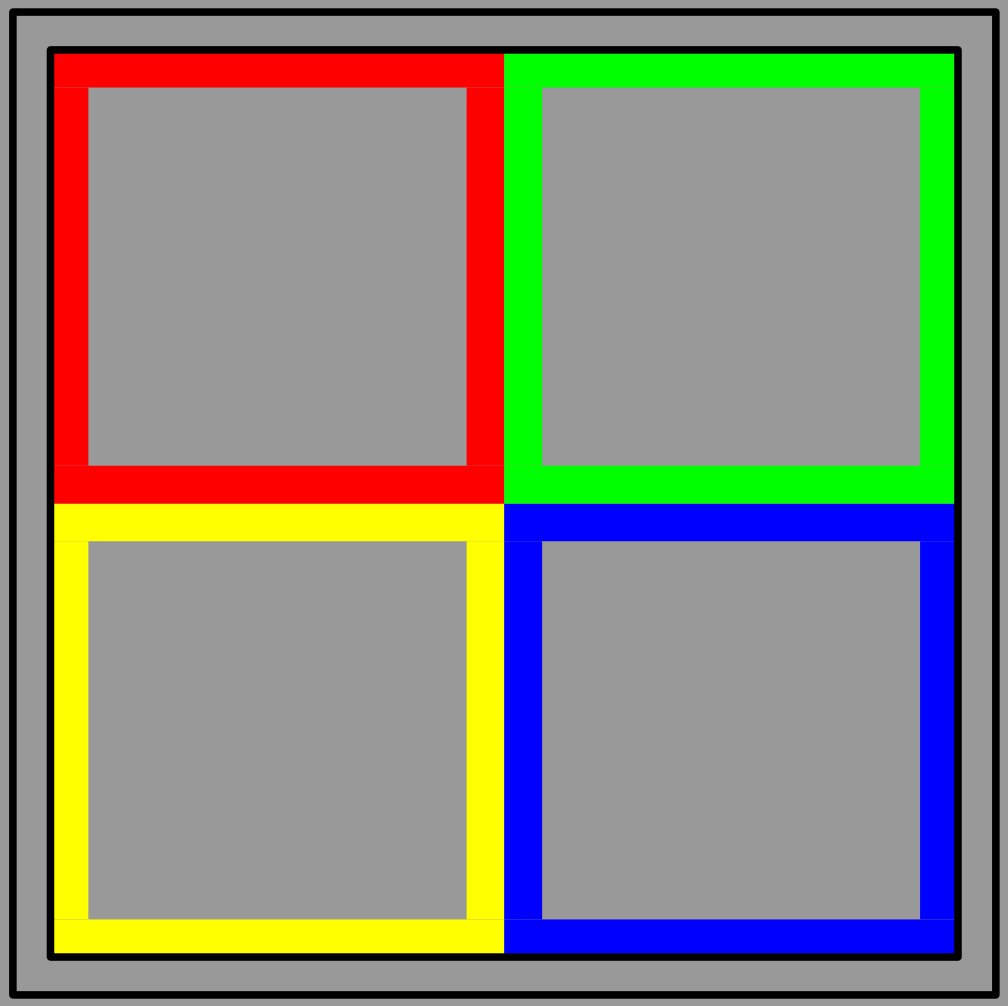
Frogger? These frogs and cars made out of small numbers of pixels are tricky!



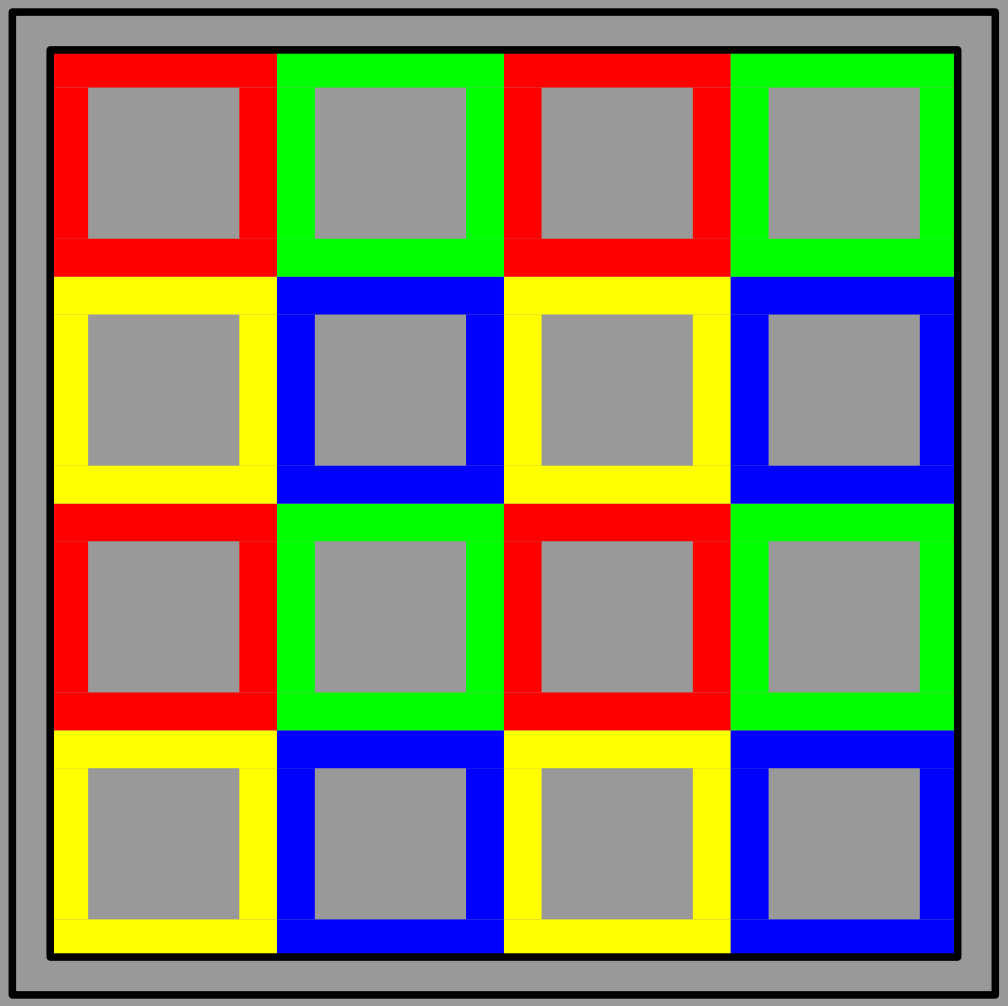
Some game ideas



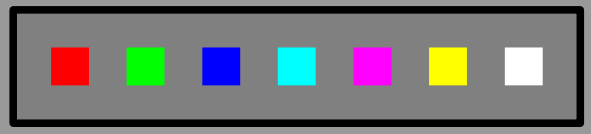
Simon... Seriously, you need me to explain Simon?



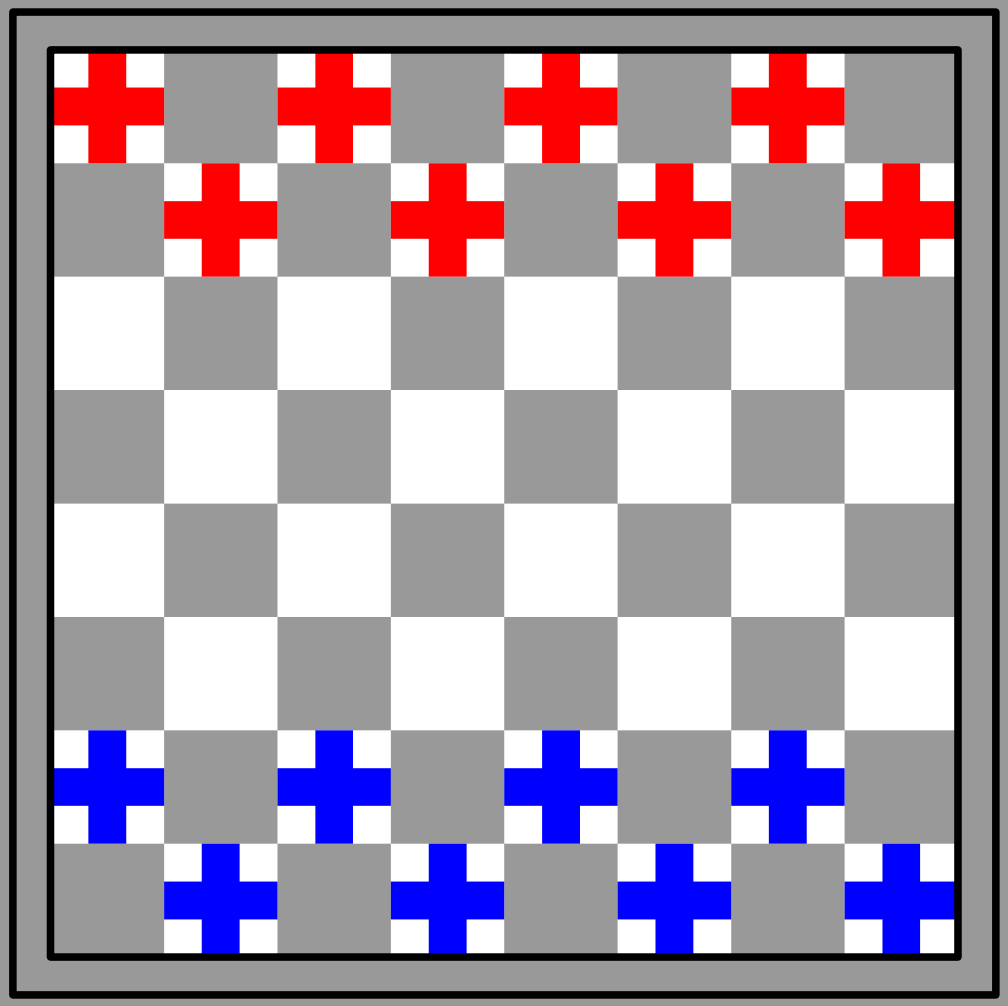
Multi-player Simon – same patterns, see who remembers the longest sequence?



Some game ideas



For a more relaxing low-exercise game... Checkers / Draughts, anyone? Problem here is the squares are 3x3 and the sensors are 2x2.
Chess pieces in 3x3 would be REALLY tricky, but KJ's going to give it a try



Instead, use some border space for scoring or something? Squares are now the same size as the sensors