Snake with Arduino

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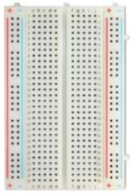
About the project

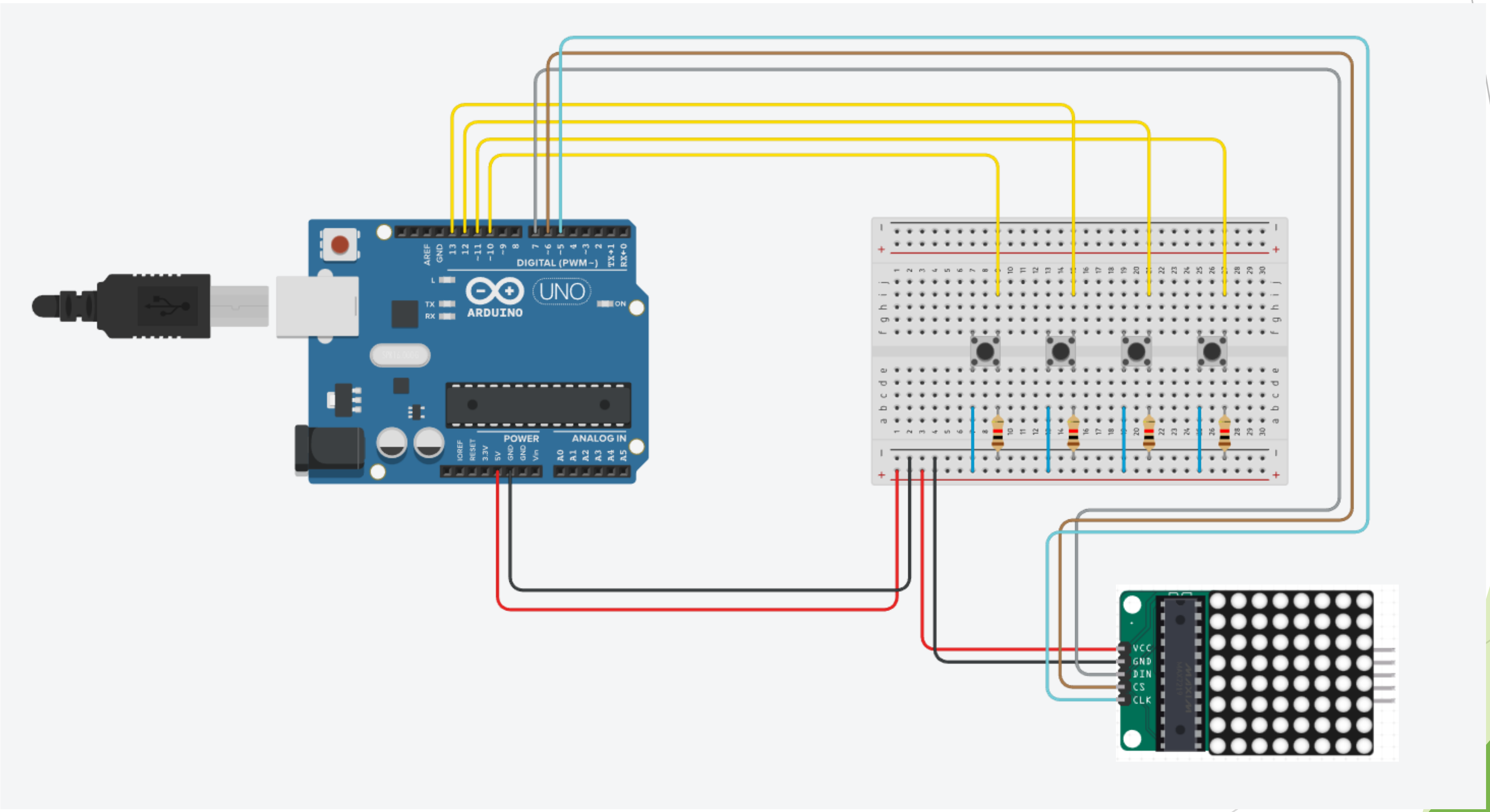
- Snake is a very popular videogame published in 1977 for many mobile phone as a pre-installed software.
- The videogame features a sequence of dots, which form a snake-like shape, going in a certain direction (up, down, left, right).
- The gameplay consists in catching as many as possible «fruits», represented as single dots, by passing through with the snake.
- It is allowed only to pass on empty spaces and fruit dots while reaching the edge of the playground makes the snake restart the line from the opposite side in a Pac-Man effect.
- The gameover comes when the head of the snake touches one part of its body.

Components required

- Arduino UNO (or later version)
- Breadboard
- LED Dot Matrix Display 8x8
- Female/Female Jumper Wires
- Male/Male Jumper Wires
- Buttons
- Resistors 220Ω



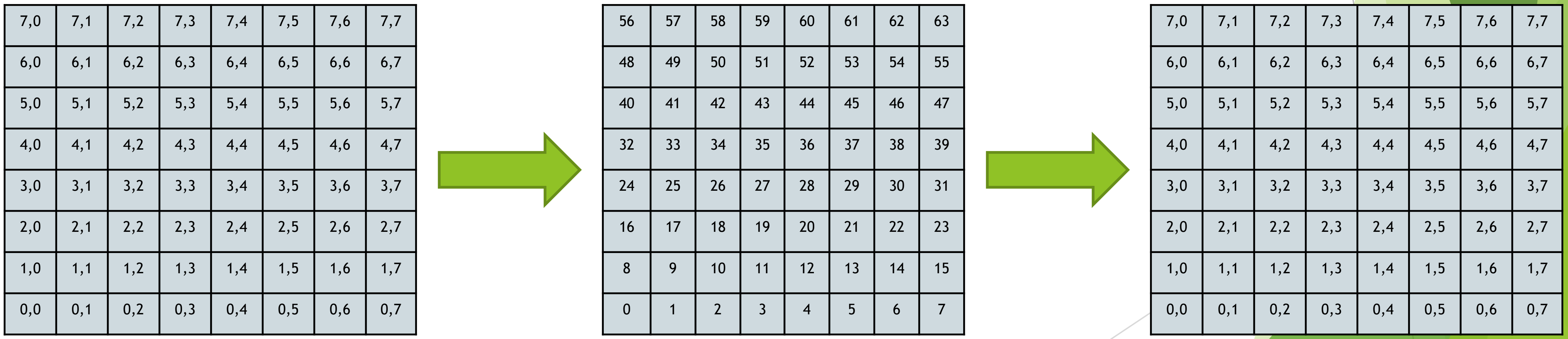
Electrical circuit



About the code

The led matrix is the playground and it is controlled through some functions provided by LedControl library that can easily interface the cells.

For storage purpose, the logic positions of the snake and the fruit are computed by considering the matrix as a row vector and then re-transfoming to cartesian coordinates in order turn on/off the leds.



7,0	7,1	7,2	7,3	7,4	7,5	7,6	7,7
6,0	6,1	6,2	6,3	6,4	6,5	6,6	6,7
5,0	5,1	5,2	5,3	5,4	5,5	5,6	5,7
4,0	4,1	4,2	4,3	4,4	4,5	4,6	4,7
3,0	3,1	3,2	3,3	3,4	3,5	3,6	3,7
2,0	2,1	2,2	2,3	2,4	2,5	2,6	2,7
1,0	1,1	1,2	1,3	1,4	1,5	1,6	1,7
0,0	0,1	0,2	0,3	0,4	0,5	0,6	0,7

56	57	58	59	60	61	62	63
48	49	50	51	52	53	54	55
40	41	42	43	44	45	46	47
32	33	34	35	36	37	38	39
24	25	26	27	28	29	30	31
16	17	18	19	20	21	22	23
8	9	10	11	12	13	14	15
0	1	2	3	4	5	6	7

7,0	7,1	7,2	7,3	7,4	7,5	7,6	7,7
6,0	6,1	6,2	6,3	6,4	6,5	6,6	6,7
5,0	5,1	5,2	5,3	5,4	5,5	5,6	5,7
4,0	4,1	4,2	4,3	4,4	4,5	4,6	4,7
3,0	3,1	3,2	3,3	3,4	3,5	3,6	3,7
2,0	2,1	2,2	2,3	2,4	2,5	2,6	2,7
1,0	1,1	1,2	1,3	1,4	1,5	1,6	1,7
0,0	0,1	0,2	0,3	0,4	0,5	0,6	0,7

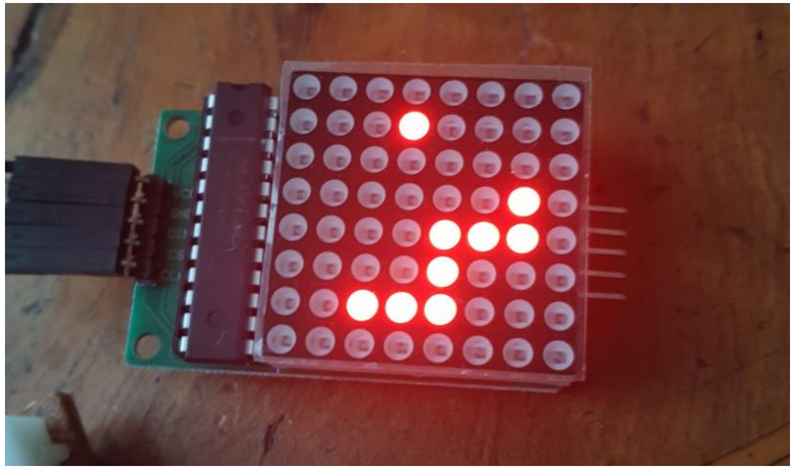
The coordinates’ transformation is computed by the following functions:

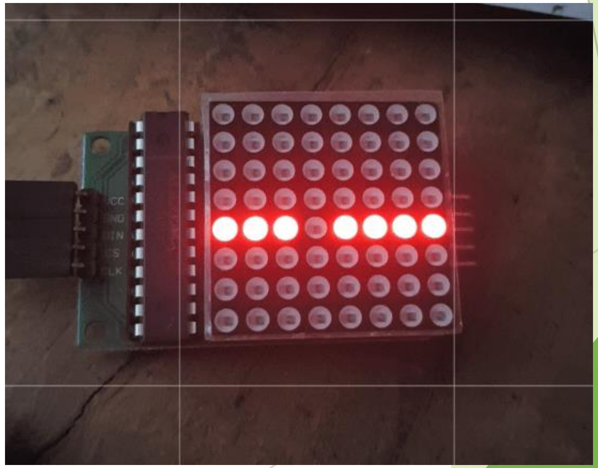
```
//compute the coordinates (x,y) from a given position pos in range [0-63]
void getXY(char pos, char* x, char* y) {
        *x = pos % 8;
        *y = pos / 8;
}

//compute position of a fruit or a snake’s dot in range [0-63]
char getPos(char x, char y) {
        return y * 8 + x;
}
```

The position of the head at the beginning of the game is random in range [0-63] and starts moving to the right direction at a fixed speed by default.

The position of the fruit is generated randomly but avoiding the position of the already computed snake's head.

Instead of running with just a delay, the polling on the buttons' state is done more frequently than the animation of the snake by doing a separated clock check in order to minimize input lag.

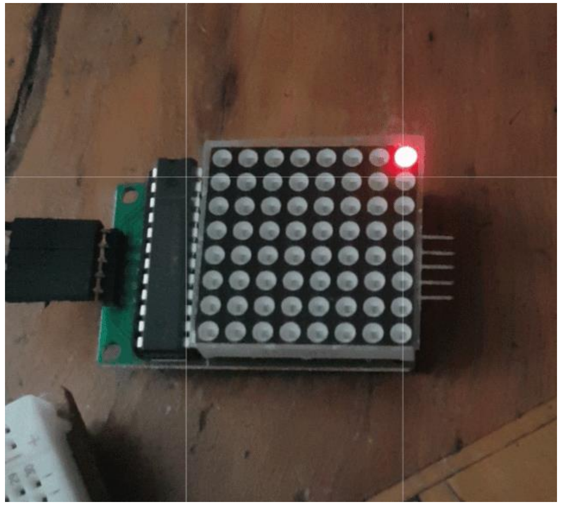


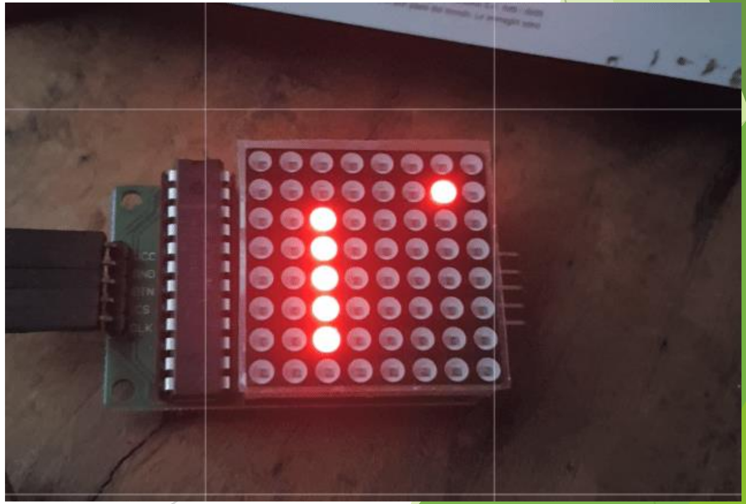


Like the original game, the Pac-Man effect is respected by a trivial re-computation of the position and when the snake «eats» a fruit, the number of dots increases by one and a new fruit appears in the grid.

If the snake hits a dot belonging to its own body, a gameover variable is set to 1 and the body of the snake starts flashing.

After the end of a playthrough, the game can be restarted by pressing any button and the player can now choose a new faster speed depending on the press button.





Thank you and have fun!