LedMatrixGame

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1 Abstract

A small piece of PCB has a Matrix of LEDs that can reproduce many colors. There are buttons on each side of the Matrix. The buttons can be used to play simple games with up to 4 players. The board can be programmed with new Games if the user desires. The Led Matrix has a size of 12 by 12.

2 Games

There are 4 Games programmed so far. Here is a table so see witch button for witch game to press. Click on the Game name to see the details. To leave the game press the all the buttons at the same time. On how to read the scores click How to read the score.

Button location	Game name	Players
North	Reaction	4 vs. 4
East	Timeguesser	4 vs. 4
South	Aim	2 vs. 2
West	Colorblind	4 vs. 4

2.1 Reaction

You clicked one of the North Buttons. Who has a shorter reaction time you or you opponent? Try this game and find out. Wait for all the lights to turn on and press your button. Now the winner gets one point. After the round got decided We wait for 0.5 to 10.5 seconds to see the again light and press again. If you press at any time other then 500ms after the winner presses their button your score resets to 0. It does not matter if you press the right or left button.

2.2 Timeguesser

You clicked one of the East Buttons. Who has a good sense of time you or you opponent? Try this game and find out. The Leds light up for a random timespan. But for how long? After the Leds go out you have to try to hold your button as long as the Leds were on. The goal is to have the lowest time difference between your time held vs the Leds being on. The game only continues if every player has pressed one of their buttons at least once. This means if one player hasn't yet pressed they button you could try to adjust your time by pressing and holding it again.

Right or left button has no impact. The button that got pressed longer is only important. Be aware that pressing the button while the scores are shown or the Lighs are on resets your score.

2.3 Aim

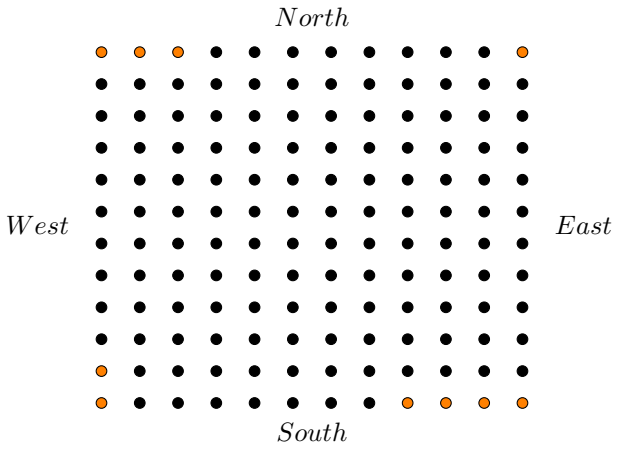
You clicked one of the South Buttons. Communicate with your partner to be the first to finish. This game needs 4 players. Your Teammate is on the opposite side of you.
North and South are red. East and West are green.
Three dots spawn randomly on the field. One Green one Red and one White. The goal is to reach the white dot. You and your partner control your dot with the buttons. The catch is that you don't know witch button is corresponding to witch direction. Try to figure it out. The bounds of the Matrix cannot be left. By reaching the white dot your team get a point on the score counter. There is a 1:144 chance you spawn in the aim.
The corresponding directions for each button get changed after every round.

2.4 Colorblind

Choose the right color that appeared before. You have two options. A color gets shown, until one of the participants presses a button. The color will disappear. Be careful to not press a button right after one of your opponents presses it to immediately give your guess. It is wise to press the button if you registerd the color and are ready to choose the same color from two options.

2.5 How to read the score

The scores are shown for each player in the bottom right corner spanning to the left for each player respectively. Below you can see how to read the scores. In the example below North has 3 points, East 1, South 2 and West has 4.



3 Code Documentation

The code can be found here, this is just for documentation.

3.1 Matrix

The $LED_{x,y}$ matrix looks like this.

$$
\begin{array}{c} \\ South \end{array}
\begin{array}{c}
\begin{array}{cccc} & & North & \end{array} \\
\begin{bmatrix}
LED_{0,0} & LED_{1,0} & \cdots & LED_{12-1,0} \\
LED_{0,1} & LED_{1,1} & \cdots & LED_{12-1,1} \\
\vdots & \vdots & \ddots & \vdots \\
LED_{0,12-1} & LED_{1,12-1} & \cdots & LED_{12-1,12-1}
\end{bmatrix} \\
\begin{array}{cccc} & & West & \end{array}
\end{array}
\begin{array}{c} \\ East \end{array}
$$

4 Hardware

Name	Price	Quantity	Shipping	Fees
Feyang store				
Esp32	2.09	6	0	0
CP2102	1.61	3	4.2	0
High view elec				
SMD Buttons 100pcs	2.1	1	1.81	0
WS2812B 1000pcs	32.08	1	0	0
JLCPCB				
PCB 5cps	23	1	13.73	7
Acrylic plates	25	4	0	0

SUM=125€

4.1 Datasheets

Leds	WS2812b
CPU	ESP32 Wroom
Buttons	B3FS
3V3 Voltage Regulator	CX6220
USB Bridge	CP2102

Table 1: Datasheets