

## Function description for LED Matrix, V1.00

2022-01-06, Armin Rehberger

### Table of content

|   |   |
|---|---|
| General description.....                  | 2 |
| Used hardware.....                        | 3 |
| Used software.....                        | 3 |
| Principle structure.....                  | 3 |
| Used libarys.....                         | 4 |
| Frequency calculation.....                | 4 |
| Software.....                             | 5 |
| Input / Output assignment Teensy 4.0..... | 6 |
| Layout circuit board Teensy 4.0.....      | 7 |
| Pictures.....                             | 8 |

## General description

Implementation of a LED matrix control.

Four LED-Matrix with each 8x32 pixel

Each matrix with 256 pixels, all together 1024 pixel.

Type LED-Matrix: BTF-LIGHTING WS2812BECO

[https://www.amazon.de/gp/product/B088K1KDW5/ref=ppx\\_od\\_dt\\_b\\_asin\\_title\\_s00?ie=UTF8&psc=1](https://www.amazon.de/gp/product/B088K1KDW5/ref=ppx_od_dt_b_asin_title_s00?ie=UTF8&psc=1)

## Used hardware

Teensy 4.0

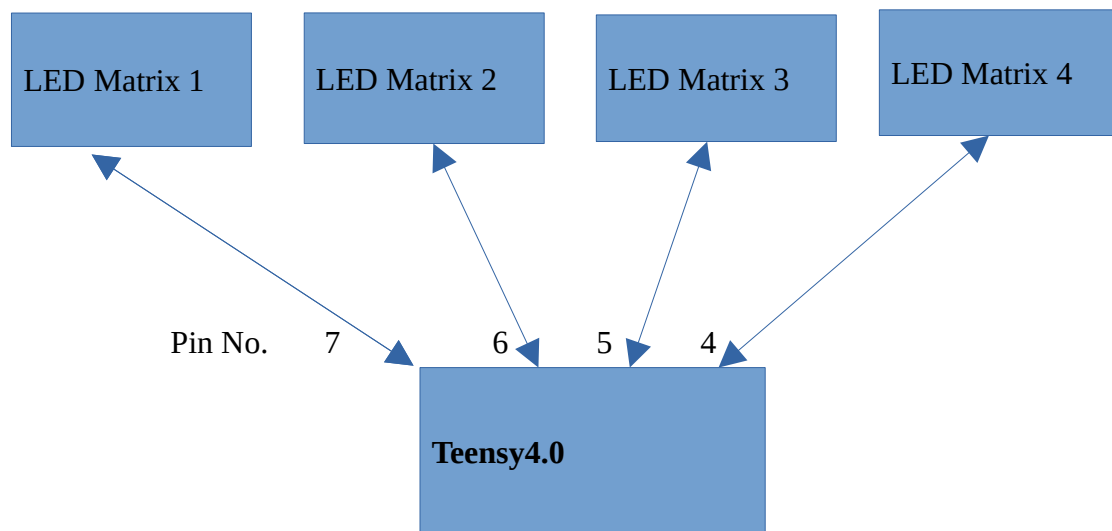
## Used software

Teensy 4.0

Arduino 1.8.15

Teensy Loader 1.54

## Principle structure



## Used libarys

**Library for LEDs driver: OctoWS2811**

<https://github.com/PaulStoffregen/OctoWS2811>

OctoWS2811.h

**Library for color and shift the LEDs**

LEDMatrix8.h

## Frequency calculation

Example RGB LED strip with 256LEDs

800Khz = 1.25us

Per bit (high or low): 1.25us

Per LED: 3 Byte = 24 Bit = 30us

Reset: 50us

Per 256 LED:  $30\text{us} * 256\text{LED} = 7680\text{us} + 50\text{us} = 7730\text{us} = 7.73\text{ms}$

Frequency:  $F=1/t = 1/0.00773\text{s} = 129.36\text{Hz}$

# Software

## Already defined letters in function "InitializeLetters"

```
"ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890!?:+ -=# {}[]"
{ Haert, part 1
} Haert, part 2
[ Smily, part 1
] Smily, part 2
```

## A string array „char StringToDraw[3][4000]“ must be initialized with the strings to draw.

```
char StringToDraw[3][4000] = {
    " [][]{}{}{}{} ",
    "MERRY CHRISTMAS AND A HAPPY NEW YEAR {}{} ",
    "FROHE WEIHNACHTEN UND EIN GUTES NEUES JAHR [][] ",
};
```

The string char array must not exceed 1773 characters.

## Scenes

The struct ParaDraw for 100 scenes is foreseen. These struct must be initialized.

**ArrayIndexUsed:** Must be true, when the scene should be drawn

**StringNo:** String no. in the StringToDraw array to be drawn

**DelaytimeMillis:** Delaytime in ms to shift the pixel array e.g. 10, 20, 25, 50, 100, 2000, 0=fastest possible speed

**ColorSceneNo:** COLOR0, whole matrix one times BLUE, then one times GREEN, then one times RED, ...YELLOW PINK ORANGE WHITE

**ColorSceneNo:** COLOR1, whole matrix blue MinIntense..MaxIntense..MinIntense, green MinIntense..MaxIntense..MinIntense, red MinIntense..MaxIntense..MinIntense

**ColorSceneNo:** COLOR2, whole matrix in value Color

**Color:** Used for COLOR2. RED, GREEN, BLUE, YELLOW, PINK, ORANGE, WHITE, BACKGROUNDCOLUR

**MaxIntense:** Used for Color1, MaxIntense 0..255. MinIntense = 1

**AnimationNo:** NONE, LEFT, RIGHT, UP, DOWN

**AmountNo:** Show string x times, e.g. LEFT 7 times

Example:

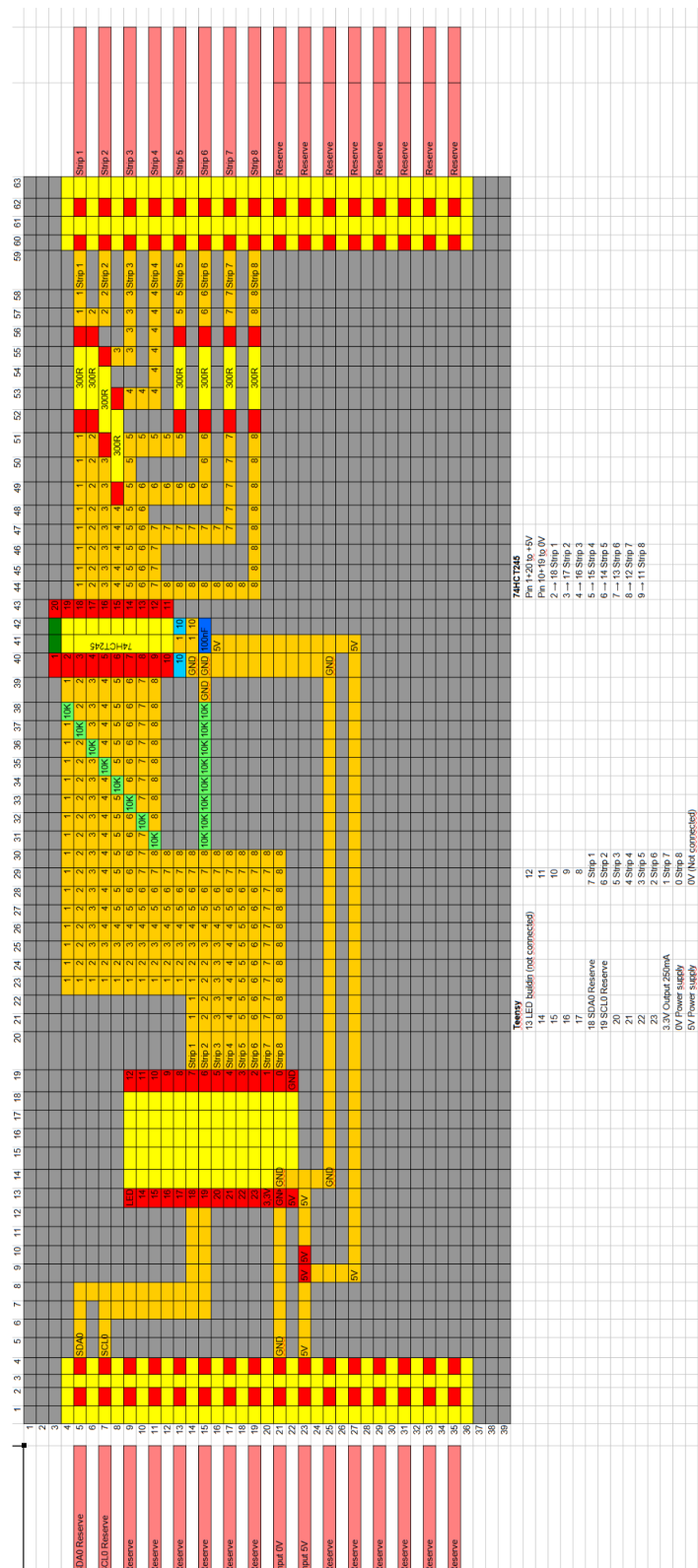
```
ParaDraw[Index].ArrayIndexUsed = true;
ParaDraw[Index].StringNo = 1;
ParaDraw[Index].DelaytimeMillis = 20;
ParaDraw[Index].ColorSceneNo = COLOR2;
ParaDraw[Index].Color = BLUE; // Just for COLOR2
ParaDraw[Index].MaxIntense = 96; // Just for COLOR1
ParaDraw[Index].AnimationNo = LEFT;
ParaDraw[Index].AmountNo = 2;
```

## Input / Output assignment Teensy 4.0

| Pin    | Used for                     |
|--------|------------------------------|
| 13     | LED buildin                  |
| 14     | Reserve                      |
| 15     | Reserve                      |
| 16     | Reserve                      |
| 17     | Reserve                      |
| 18     | SDA0 Reserve                 |
| 19     | SCL0 Reserve                 |
| 20     | Reserve                      |
| 21     | Reserve                      |
| 22     | Reserve                      |
| 23     | Reserve                      |
| 3.3V   | Output 250mA (Not connected) |
| GND 0V | Power supply 0V              |
| Vin 5V | Power supply 5V              |

|        |                       |
|--------|-----------------------|
| 12     | Reserve               |
| 11     | Reserve               |
| 10     | Reserve               |
| 9      | Reserve               |
| 8      | Reserve               |
| 7      | LED matrix 1 (Output) |
| 6      | LED matrix 2 (Output) |
| 5      | LED matrix 3 (Output) |
| 4      | LED matrix 4 (Output) |
| 3      | LED matrix 5 (Output) |
| 2      | LED matrix 6 (Output) |
| 1      | LED matrix 7 (Output) |
| 0      | LED matrix 8 (Output) |
| GND 0V | (Not connected)       |

## Layout circuit board Teensy 4.0



Pictures

