Function description for LED Matrix DCF77, V1.00
2022-11-03, Armin Rehberger

Table of content

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

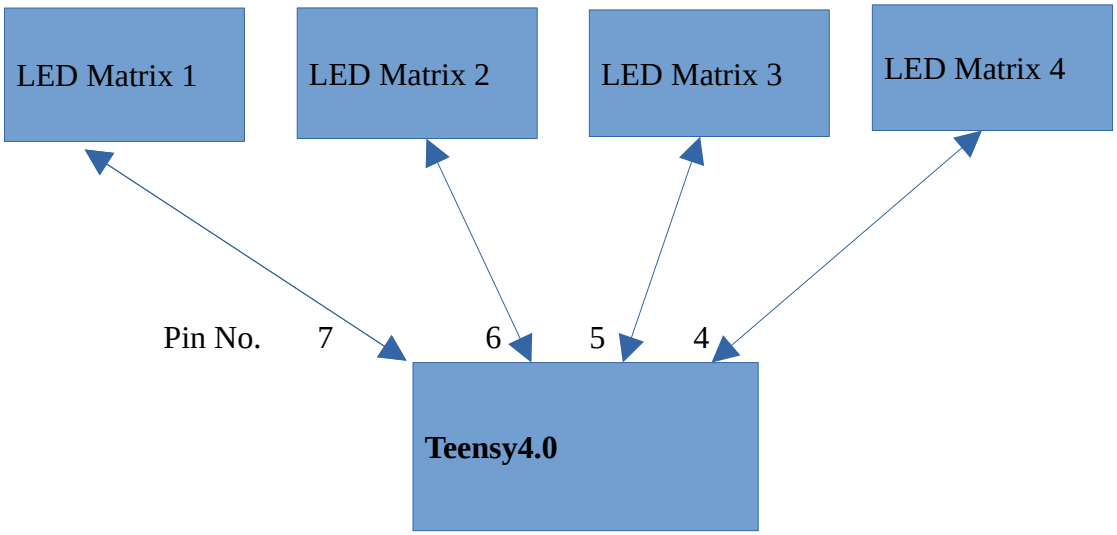
Used hardware

Teensy 4.0

Used software

Teensy 4.0
Arduino 1.8.15
Teensy Loader 1.54

Principle structure



Used libarys

Libary for LEDs driver: OctoWS2811
https://github.com/PaulStoffregen/OctoWS2811
OctoWS2811.h

Libary 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: 30us * 256LED = 7680us + 50us = 7730us = 7.73ms
Frequency: F=1/t = 1/0.00773s = 129.36Hz

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 drawen
StringNo: String no. in the StringToDraw array to be drawen
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

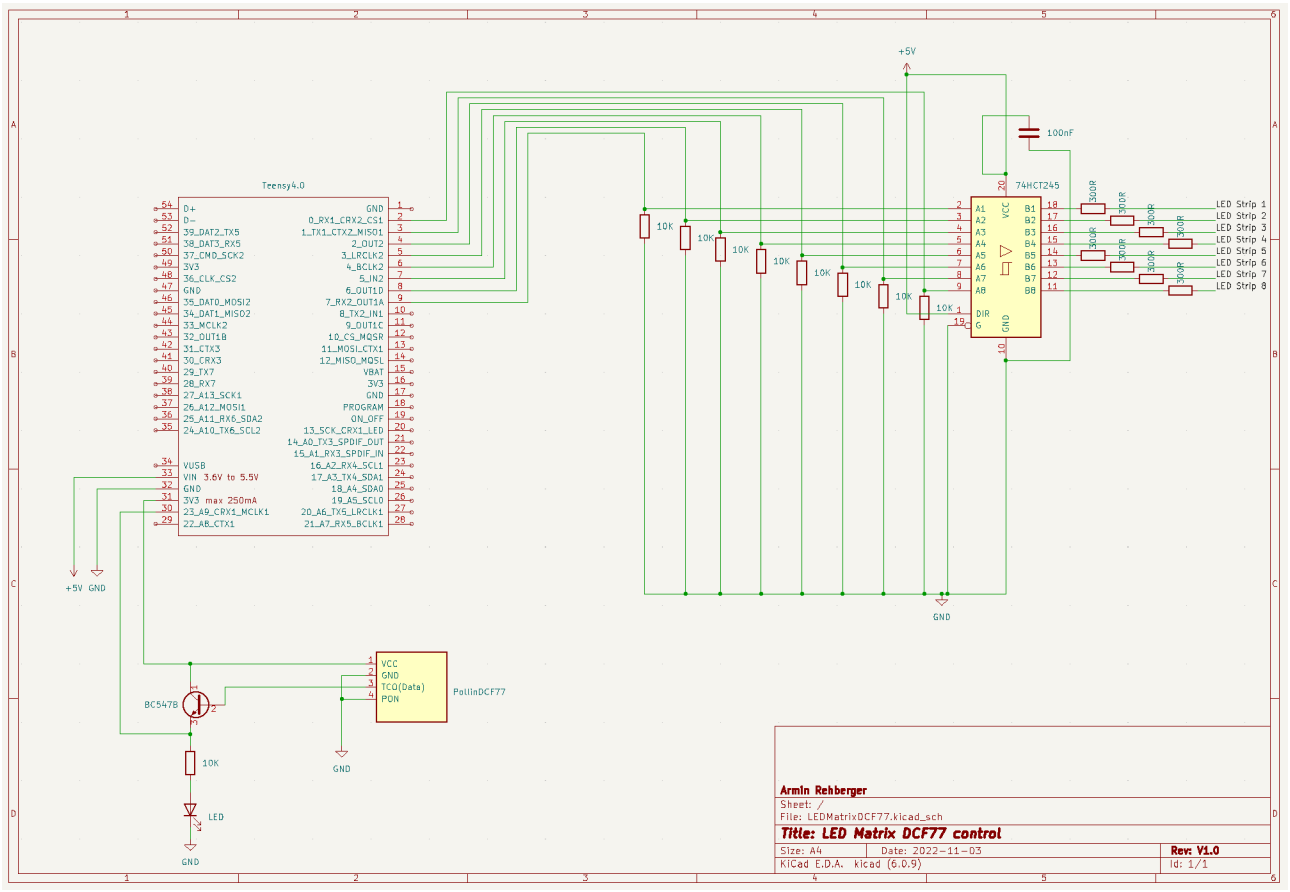
Example:
```
ParaDraw[Index].ArrayIndexUsed = true;
ParaDraw[Index].StringNo = 1;
ParaDraw[Index].DelaytimeMillis = 20;
ParaDraw[Index].ColorSceneNo = COLOR2;
ParaDraw[Index].Color = BLUE; // Just for COLOR2
ParaDraw[Index].MaxIntense = 96; // Just for COLOR1
ParaDraw[Index].AnimationNo = LEFT;
ParaDraw[Index].AmountNo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

Input / Output assignment Teensy 4.0

Pin	Used for
13	LED buildin
14	Reserve
15	Reserve
16	Reserve
17	Reserve
18	Reserve
19	Reserve
20	Reserve
21	Reserve
22	Reserve
23	DCF77 Signal (Input)
3.3V	Output 250mA
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)

KiCad


Teensy4.0
74HCT245
100nF
+5V
GND
10K
330R
LED Strip 1
LED Strip 2
LED Strip 3
LED Strip 4
LED Strip 5
LED Strip 6
LED Strip 7
LED Strip 8
BC547B
PollinDCF77
LED
Armin Rehberger
Sheet: /
File: LEDMatrixDCF77.kicad_sch
Title: LED Matrix DCF77 control
Size: A4
Date: 2022-11-03
Rev: V1.0
KiCad E.D.A. kicad (6.0.9)
Id: 1/1

Layout circuit board Teensy 4.0