Design of OLED Driver Based on STM32

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Abstract. This paper describes the working principle of the STM32 drive OLED screen, design of the hardware circuit, program the software. English characters and numbers can be displayed on the OLED display. Graphics can display by font generation software at the same time. The design is especially suitable for the design of instrument and meter. It has a certain practical value.

Introduction

In the design of instrument and meter, it is necessary to choose a suitable display device. Not only show clear, but also low power consumption. Liquid crystal display is one of the best choice, but the ordinary liquid crystal display, because of no back-light, therefore, the display effect is poor, definition is not enough. One of the light-emitting diodes OLED and LCD light-emitting principle is different, was discovered in 1979 by the Chinese American professor Deng Qingyun in the laboratory. The display technology has the advantages of wide viewing angle, high brightness, high contrast, low power consumption, fast response, simple interface, etc.it can be used widely.

OLED Driving Circuit Design

OLED LCD screen is shown in figure 1. Pin one is a power supply GND, VCC is connected to +3.3V, SCL is the IIC interface clock signal line, SDA is the send data pin.

The connection diagram between OLED and STM32 is shown in figure 2. Pin SCL of OLED is connected to the PE1 pin of the STM32, and the SDA is connected to the PE0 pin of the STM32. Software programming, we use analog IIC to generate the required timing, timing on the OLED screen read and write operations.
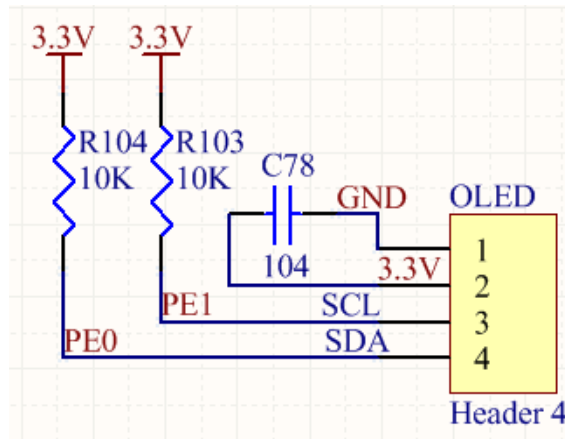

Figure 1.   OLED Outlook

Figure 2.   The connection between STM32 and OLED

Software Programming

In this design, the OLED read and write mainly through the IIC interface, figure 3 gives the IIC read and write timing. Read and write a byte of data each time.
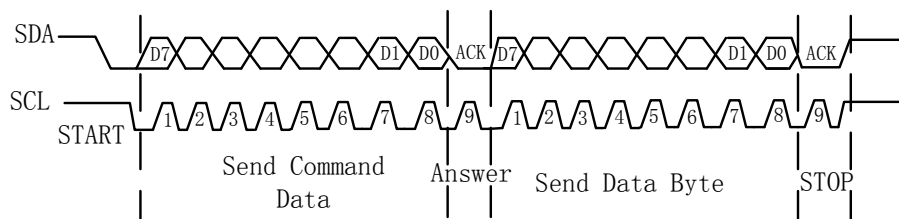

Figure 3.   IIC read and write timing

Part of code below：
```
void OLED_Init(void)
{
  GPIO_InitTypeDef    GPIO_InitStructure;
  RCC_APB2PeriphClockCmd(RCC_APB2Periph_GPIOE, ENABLE);
GPIO_InitStructure.GPIO_Pin = GPIO_Pin_1|GPIO_Pin_0;
  GPIO_InitStructure.GPIO_Mode = GPIO_Mode_Out_PP;
  GPIO_InitStructure.GPIO_Speed = GPIO_Speed_50MHz;
  GPIO_Init(GPIOE, &GPIO_InitStructure);
  GPIO_SetBits(GPIOE,GPIO_Pin_1|GPIO_Pin_0);
delay_ms(500);
OLED_WR_Byte(0xAE,OLED_CMD);//--display off
  OLED_WR_Byte(0x00,OLED_CMD);//---set low column address
  OLED_WR_Byte(0x10,OLED_CMD);//---set high column address
  OLED_WR_Byte(0x40,OLED_CMD);//--set start line address
  OLED_WR_Byte(0xB0,OLED_CMD);//--set page address
  OLED_WR_Byte(0x81,OLED_CMD); // contract control
  OLED_WR_Byte(0xFF,OLED_CMD);//--128
  OLED_WR_Byte(0xA1,OLED_CMD);//set segment remap
  OLED_WR_Byte(0xA6,OLED_CMD);//--normal / reverse
  OLED_WR_Byte(0xA8,OLED_CMD);//--set multiplex ratio(1 to 64)
  OLED_WR_Byte(0x3F,OLED_CMD);//--1/32 duty
```

```
    OLED_WR_Byte(0xC8,OLED_CMD);//Com scan direction
    OLED_WR_Byte(0xD3,OLED_CMD);//-set display offset
    OLED_WR_Byte(0x00,OLED_CMD);//
    OLED_WR_Byte(0xD5,OLED_CMD);//set osc division
    OLED_WR_Byte(0x80,OLED_CMD);//
    OLED_WR_Byte(0xD8,OLED_CMD);//set area color mode off
    OLED_WR_Byte(0x05,OLED_CMD);//
    OLED_WR_Byte(0xD9,OLED_CMD);//Set Pre-Charge Period
    OLED_WR_Byte(0xF1,OLED_CMD);//
    OLED_WR_Byte(0xDA,OLED_CMD);//set com pin configuartion
    OLED_WR_Byte(0x12,OLED_CMD);//
    OLED_WR_Byte(0xDB,OLED_CMD);//set Vcomh
    OLED_WR_Byte(0x30,OLED_CMD);//
    OLED_WR_Byte(0x8D,OLED_CMD);//set charge pump enable
    OLED_WR_Byte(0x14,OLED_CMD);//
    OLED_WR_Byte(0xAF,OLED_CMD);//--turn on oled panel
}
```

The above code is fulfilling the initialization of OLED. By initializing the PE0 and PE1 as output pins. Writing OLED related registers with different initial values to complete the initialization of the OLED.

Summary

This paper describes the working principle of driver OLED by STM32, designed the hardware circuit, programmed the software, realized the initialization of the OLED, it can display English letters or numbers on the OLED, it has a certain practical value.

Reference

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