The OLED displays the light sensitivity value

This tutorial demonstrates how a 0.91 inch OLED driven by a **hardware I2C** displays the converted values of a photosensor ADC.

1、software-hardware

- **STM32F103CubeIDE**
- **STM32 robot expansion board**

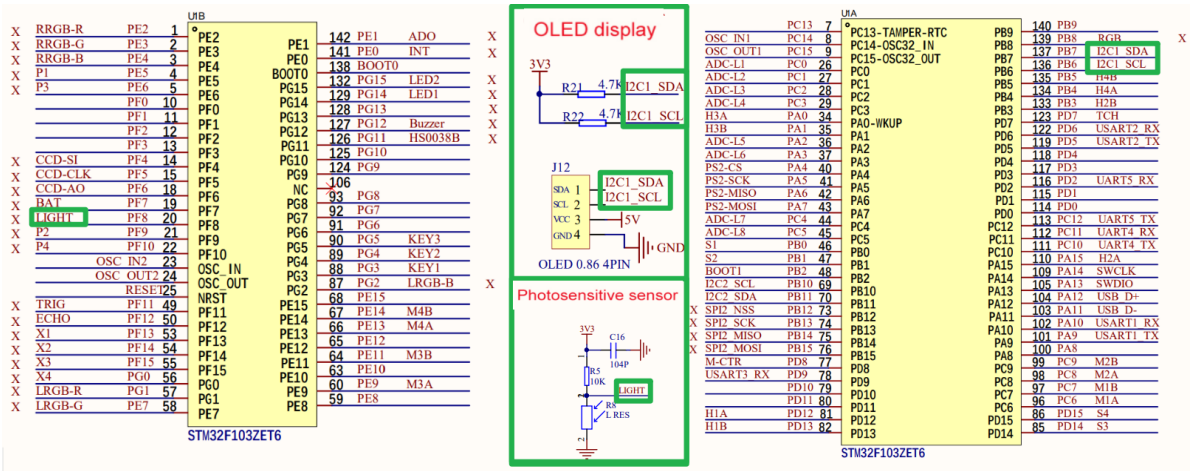
  0.91 inch OLED display, in which the photosensitive sensor is integrated on the development board
- **Type-C cable or ST-Link**

  Download or simulate the program of the development board

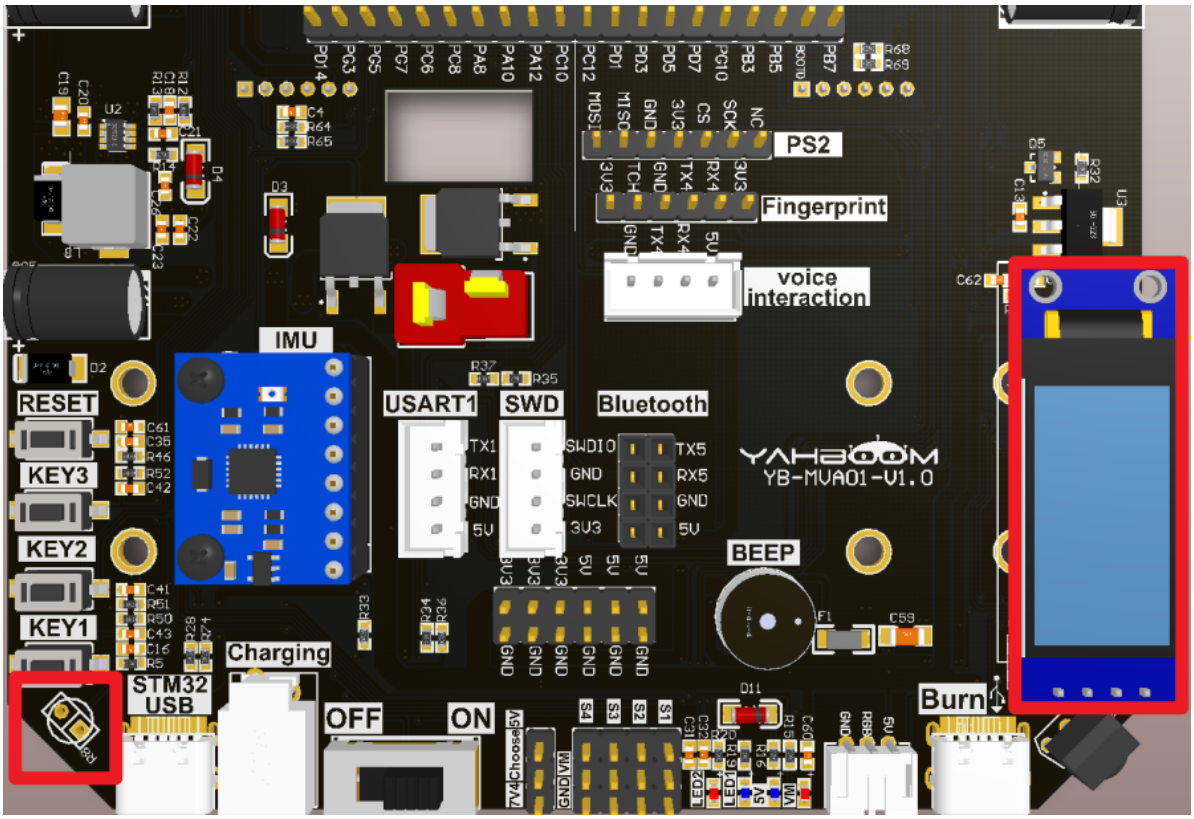
2、Brief principle

2.1、Hardware schematic diagram

The schematic only shows the I2C (I2C1) and photosensor interfaces used in the tutorial



2.2、Physical connection diagram



OLED	STM32 board
VCC	VCC
SCL	SCL
SDA	SDA
GND	GND

2.3、Principle of control

- **I2C**

The use of I2C1 peripheral interface and 0.91 inch OLED display for communication, I2C related knowledge will not be introduced, you can see before [3, development board basic tutorial: I2C Communication]

- **ADC**

By using an ADC (analog-to-digital converter), the analog voltage output by the photosensor can be converted to a digital value.

The STM32F103ZET6 contains three 12-bit analog-to-digital converters, and the converted value range is 0 to 2^12-1 (i.e., 0 to 4095).

Photosensitive sensor (development board integrated)	Corresponding pin
LIGHT (analog signal output)	PF8（ADC3_IN6）

- **OLED**

product	0.91 inch OLED screen
resolution	128*32
Control chip	SSD1306
Means of communication	I2C（IIC）
Voltage of operation	3.3~5V
I2C interface	VCC：Power supply positive（3.3/5V） GND：Power supply ground SCL：I2C bus clock signal SDA：I2C bus data signal

3、Engineering configuration

Project Configuration: Prompts for configuration options in the STM32CubeIDE project configuration process

3.1、Notes

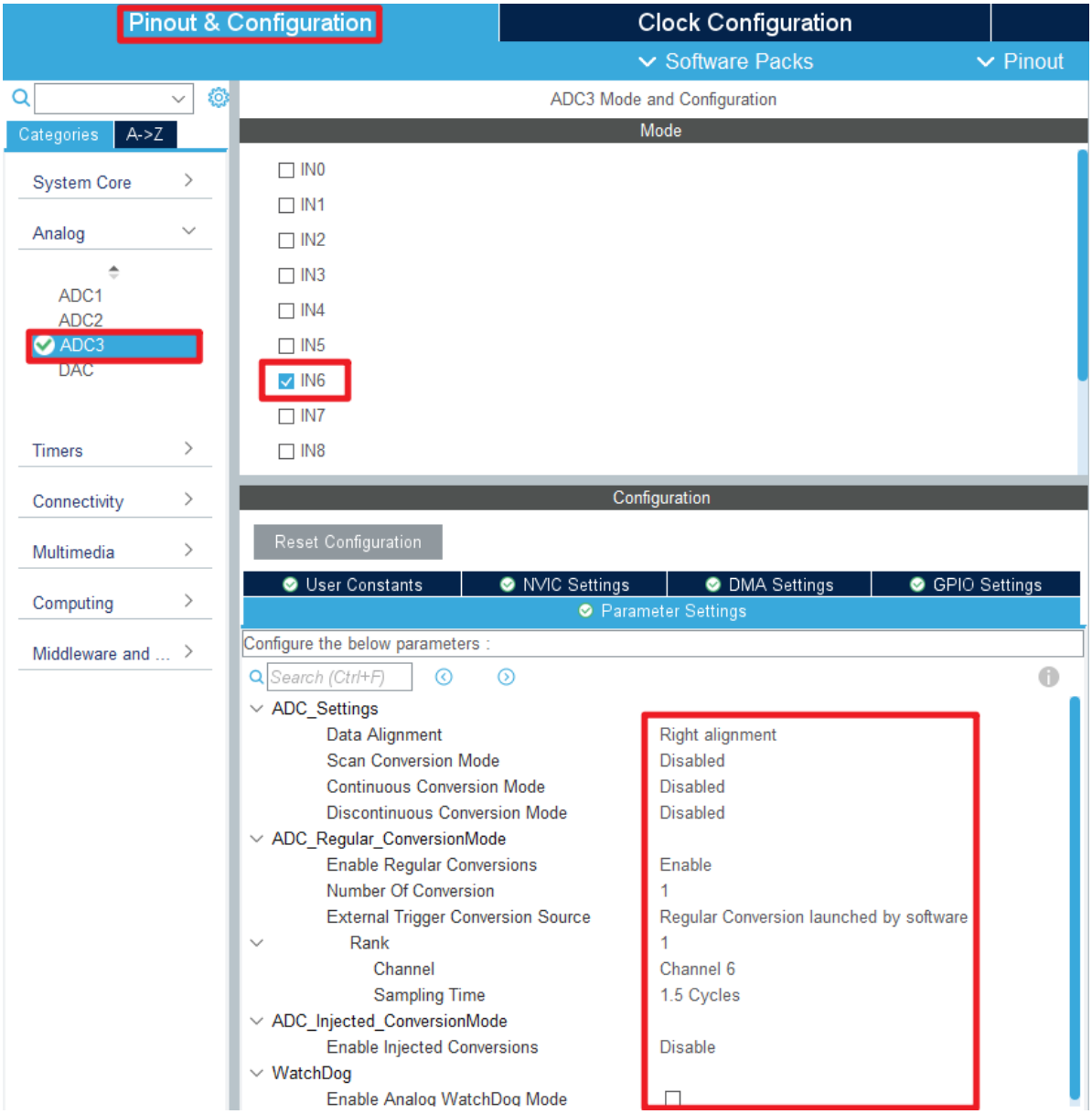
Omitted project configuration: **New project, chip selection, project configuration, SYS for pin configuration, RCC configuration, clock configuration, and project configuration** content

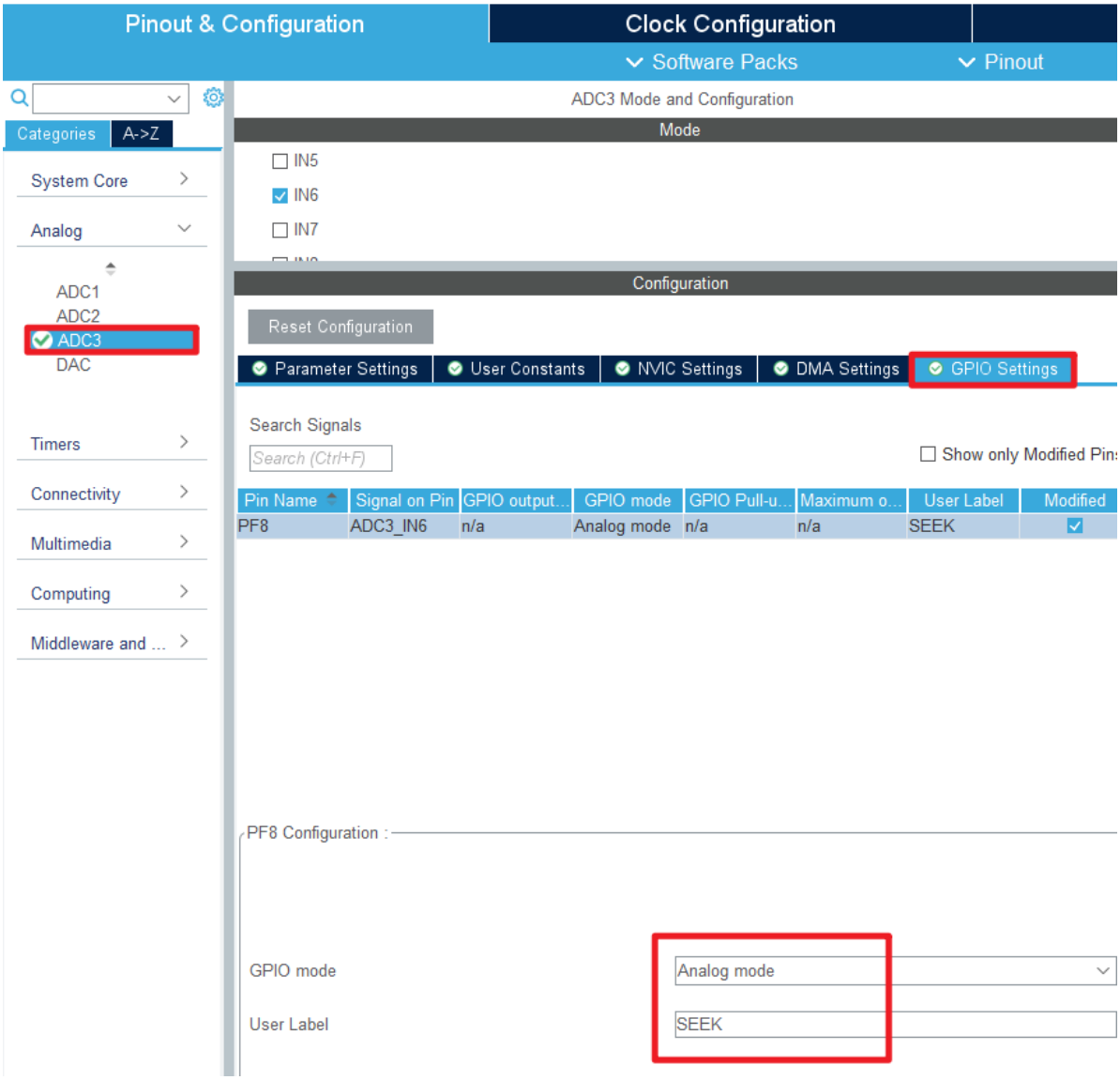
The project configuration part, which is not omitted, is the key point to configure in this tutorial.

```
Please refer to [2, development environment construction and use: STM32CubeIDE installation - Use] to understand how to configure the omitted part of the project
```

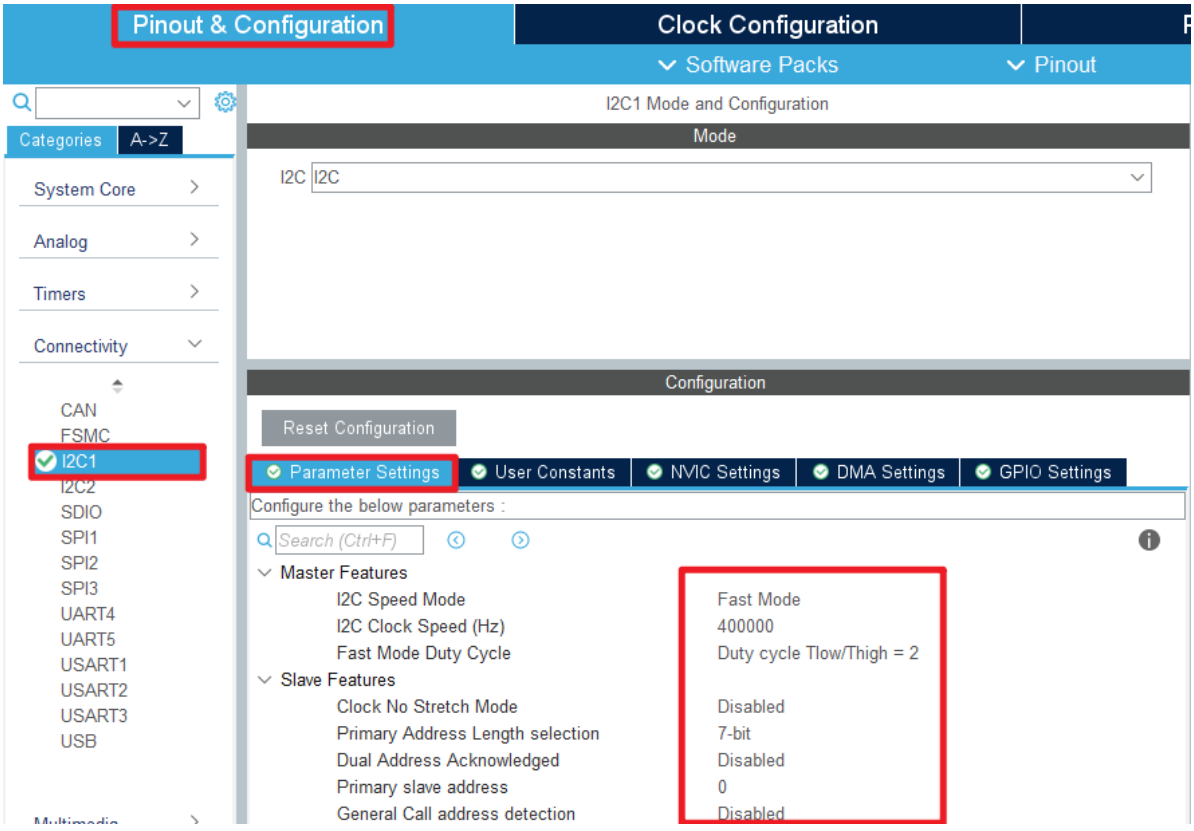
3.2、Pin configuration

- **ADC**

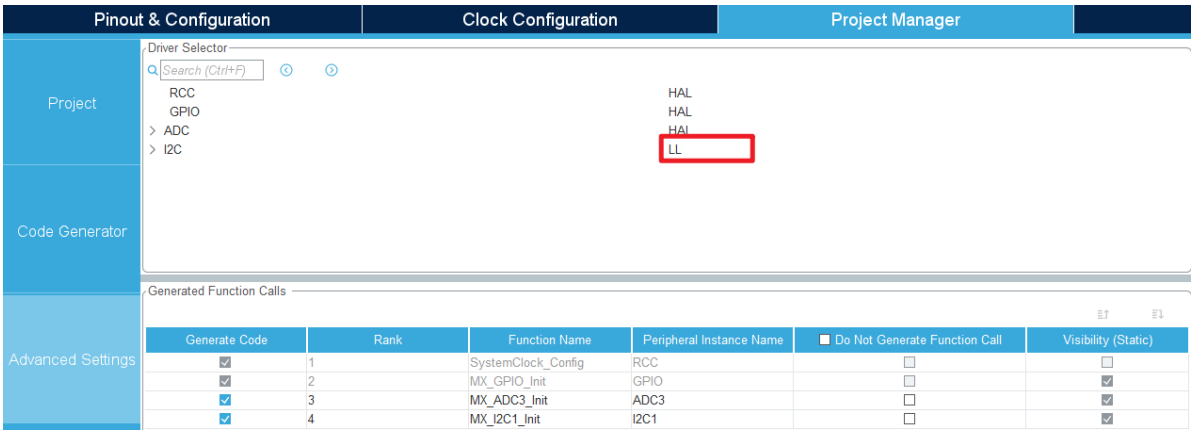

Pinout & Configuration
Clock Configuration
Software Packs
Pinout
Categories
A->Z
System Core
Analog
ADC1
ADC2
ADC3
DAC
Timers
Connectivity
Multimedia
Computing
Middleware and ...
ADC3 Mode and Configuration
Mode
IN0
IN1
IN2
IN3
IN4
IN5
IN6
IN7
IN8
Configuration
Reset Configuration
User Constants
NVIC Settings
DMA Settings
GPIO Settings
Parameter Settings
Configure the below parameters :
Search (Ctrl+F)
ADC_Settings
Data Alignment
Right alignment
Scan Conversion Mode
Disabled
Continuous Conversion Mode
Disabled
Discontinuous Conversion Mode
Disabled
ADC_Regular_ConversionMode
Enable Regular Conversions
Enable
Number Of Conversion
1
External Trigger Conversion Source
Regular Conversion launched by software
Rank
1
Channel
Channel 6
Sampling Time
1.5 Cycles
ADC_Injected_ConversionMode
Enable Injected Conversions
Disable
WatchDog
Enable Analog WatchDog Mode


Pinout & Configuration
Clock Configuration
Software Packs
Pinout
ADC3 Mode and Configuration
Mode
IN5
IN6
IN7
Configuration
Reset Configuration
Parameter Settings
User Constants
NVIC Settings
DMA Settings
GPIO Settings
Search Signals
Search (Ctrl+F)
Show only Modified Pins
Pin Name
Signal on Pin
GPIO output...
GPIO mode
GPIO Pull-u...
Maximum o...
User Label
Modified
PF8
ADC3_IN6
n/a
Analog mode
n/a
n/a
SEEK
PF8 Configuration :
GPIO mode
Analog mode
User Label
SEEK
Categories
A->Z
System Core
Analog
ADC1
ADC2
ADC3
DAC
Timers
Connectivity
Multimedia
Computing
Middleware and ...

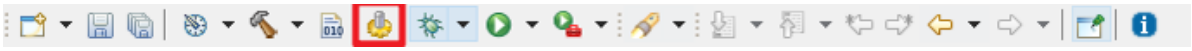
- **I2C**


Pinout & Configuration
Clock Configuration
Software Packs
Pinout
I2C1 Mode and Configuration
Mode
I2C
I2C
Configuration
Reset Configuration
Parameter Settings
User Constants
NVIC Settings
DMA Settings
GPIO Settings
Configure the below parameters :
Search (Ctrl+F)
Master Features
I2C Speed Mode
Fast Mode
I2C Clock Speed (Hz)
400000
Fast Mode Duty Cycle
Duty cycle Tlow/Thigh = 2
Slave Features
Clock No Stretch Mode
Disabled
Primary Address Length selection
7-bit
Dual Address Acknowledged
Disabled
Primary slave address
0
General Call address detection
Disabled
Categories
A->Z
System Core
Analog
Timers
Connectivity
CAN
FSMC
I2C1
I2C2
SDIO
SPI1
SPI2
SPI3
UART4
UART5
USART1
USART2
USART3
USB

- **Advanced Settings**



- **Generating code**



4、Main Function

This part mainly introduces the functional code written by users. **Detailed code can be opened by yourself in the project file we provide, and enter the Bsp folder to view the source code.**

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User function

Many of the common HAL library functions were covered in Chapter 3, but they will not be covered here.

> **function：user_lightseek_detect**

Function prototypes	**void user_lightseek_detect(void)**
Functional Description	OLED displays the resistance of the light sensitivity
Input parameters	None
Return value	None

> **function：Adc_Get_seek_finally**

Function prototypes	**uint32_t Adc_Get_seek_finally(void)**
Functional Description	The photosensitive voltage is converted to resistance
Input parameters	None
Return value	Value of resistance

> **function：Adc_Get_seek_finally**

Function prototypes	**uint16_t Adc_Get_seek(uint32_t ch)**
Functional Description	The photosensitive voltage was collected
Input parameters	ADC channel

Function prototypes	uint16_t Adc_Get_seek(uint32_t ch)
Return value	Value of voltage

5、Experimental phenomenon

After downloading the program successfully, press the RESET button of the development board to observe the OLED display

```
Program download can refer to [2, development environment construction and use: program download and simulation]
```

Phenomenon::

OLED display The first line shows oled init success! (boot display once), the third row shows the photosensitive sensor resistance value.

```
The experimental phenomenon can be seen [OLED display light sensitivity value _ Experimental phenomenon.mp4]
```