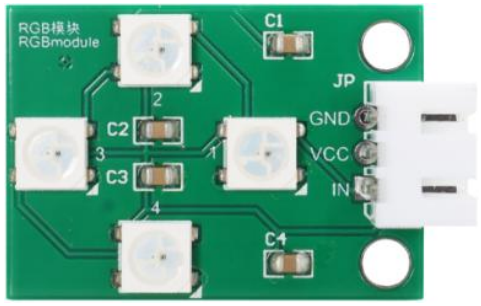
Project 6-WS2812B Breathing Light

1. project description

Through this project, you can learn how to use ZY -type-c Nano to light up a WS2812B module. The function of this program is that the RGB light will gradually brighten, then slowly dim , then gradually brighten again, and so on, just like human breathing, so it is called a breathing light.

2. Introduction to modules

2.1 WS2812B RGB light



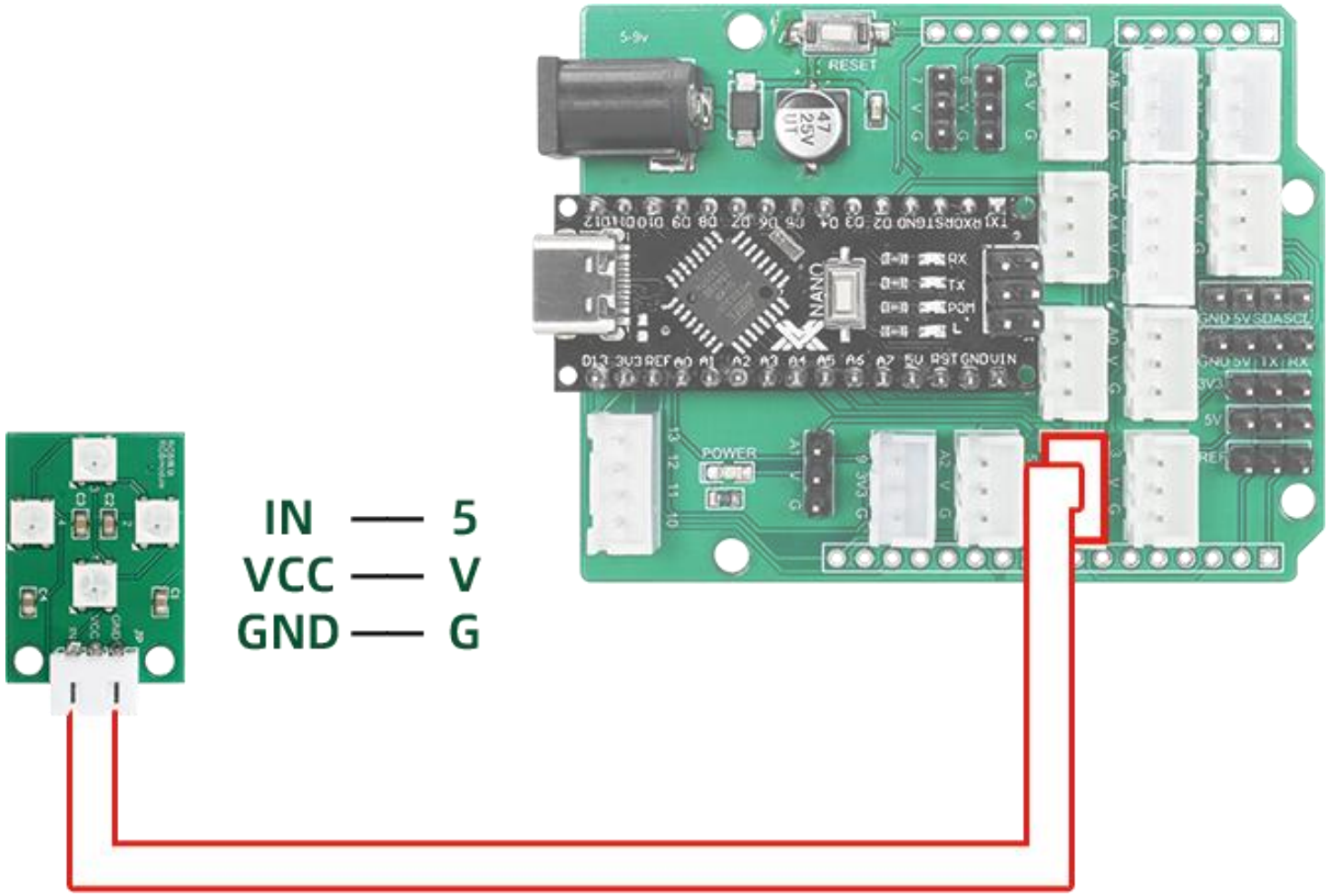
WS2812B is an intelligent externally controlled LED light source that integrates control circuit and light-emitting circuit. Its appearance is the same as a 5050LED lamp bead, and each component is a pixel. There is an intelligent digital interface data

latch signal shaping amplification drive circuit, a high-precision internal oscillator and a 12V high-voltage programmable fixed current control part inside the pixel, which effectively ensures that the pixel light color is highly consistent.

The data protocol adopts single-line zero return code communication method. After the pixel is powered on and reset, the DIN client receives the data from the controller and first sends out the 24-bit data. After extracting the first pixel, it is sent to the pixel data latch. The remaining data is shaped and amplified by the internal shaping processing circuit. . It starts to be forwarded to the next cascade pixel through the DO output port. After each pixel is transmitted, the signal is reduced by 24 bits.

The pixels adopt automatic shaping and forwarding technology, so that the number of cascades of pixels is not limited by signal transmission, but only limited by the signal transmission speed requirements. LED has the advantages of low-voltage drive, environmental protection and energy saving, high brightness, large scattering angle, good consistency, ultra-low power consumption, and long life. The control circuit is integrated into the LED, making the circuit simpler, smaller and easier to install.

3. Project wiring diagram



4. How to install other libraries in Arduino IDE

Once you are familiar with the Arduino software and using the built-in features, you may want to extend the capabilities of the Arduino with additional libraries.

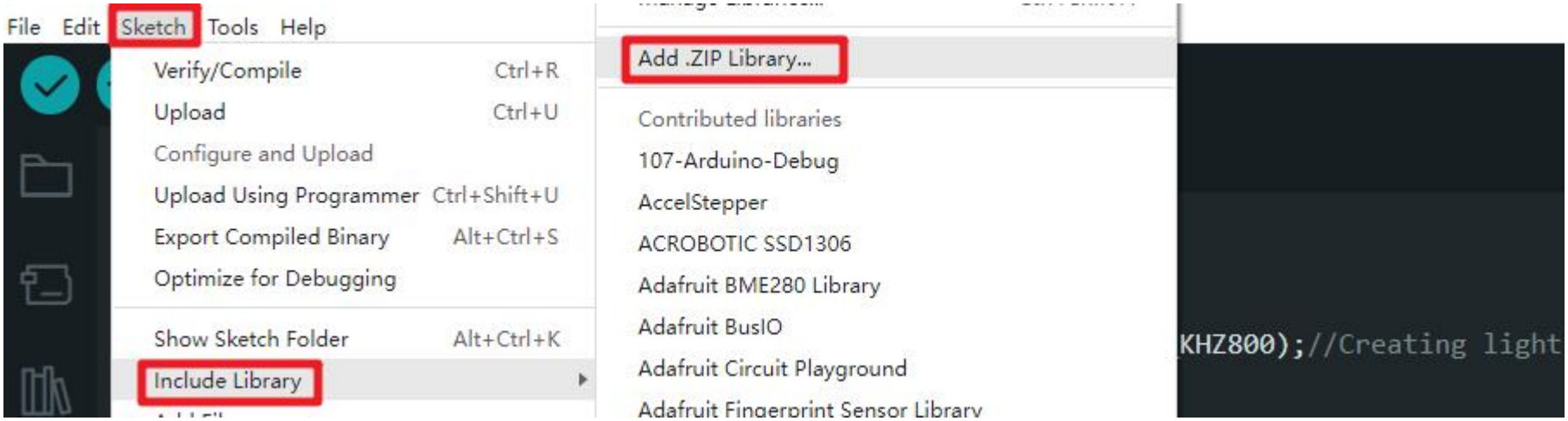
What are Libraries?

A library is a set of code that allows you to easily connect to sensors, displays, modules, and more. For example, the LiquidCrystal library allows you to easily interact with character LCD displays. There are thousands of libraries available for download directly through the Arduino IDE, all of which you can find in the Library Manager. When the desired library third-party library cannot be found in Library Manager, you have to manually import the .zip library.

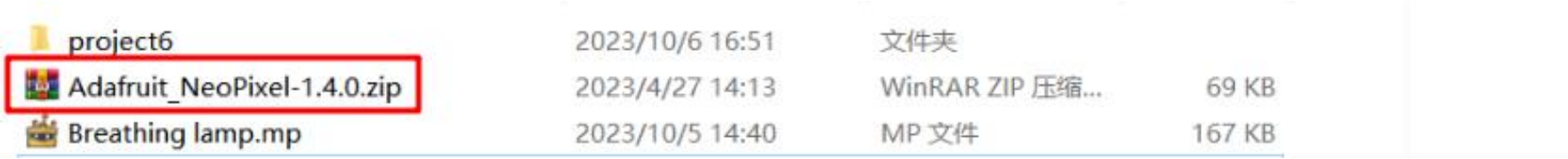
Import .zip library

Libraries are usually distributed as ZIP files or folders. The name of the folder is the name of the library. Inside this folder will be a .cpp file, a .h file, usually a keywords.txt file, the examples folder and other files required by the library. Starting with version 1.0.5, you can install 3rd party libraries in the IDE. Here, the RGB lights use *the Adafruit_NeoPixel library* .

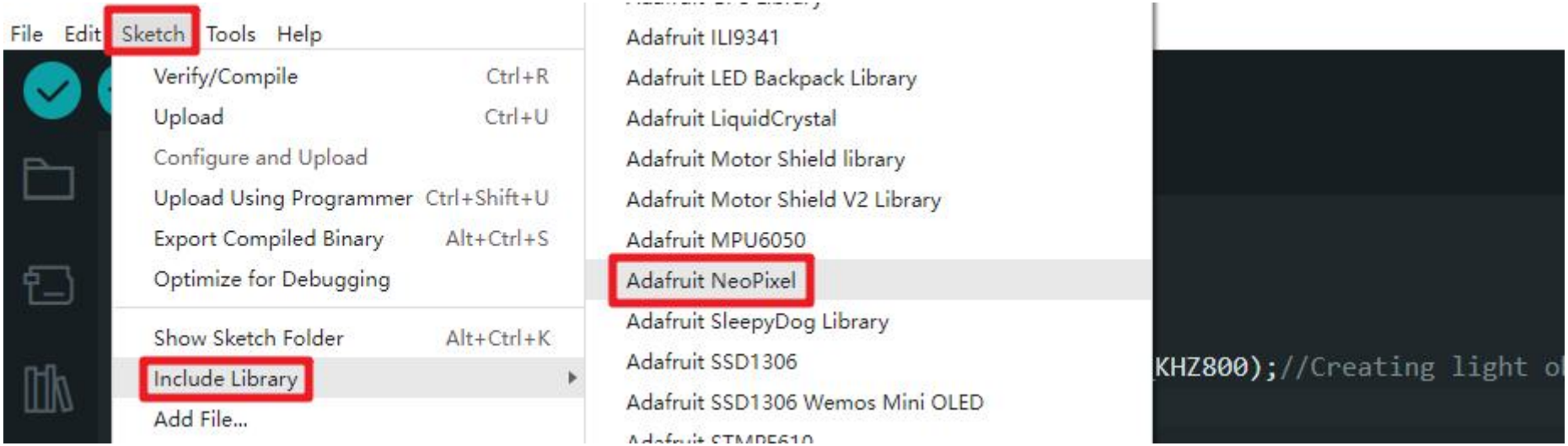
In the Arduino IDE, navigate to Sketch > Include Library > Add .ZIP Library and at the top of the drop-down list, select the "Add .ZIP Library" option.



The system will prompt you to select the library to add , as shown below, navigate to the path location of the saved *Adafruit_NeoPixel* .zip file on your computer (*Project 6 WS2812B Breathing Light\Adafruit_NeoPixel.zip*) and open it .



Open the Sketch > Include Library menu. You should now see Libraries at the bottom of the drop-down menu. It's ready to use in your sketches .



Use this method to add all the local libraries you need to the Arduino IDE.

5. Download Arduino code

Open the project Arduino code file (path: project 6 WS2812B breathing light\project6\project6.ino)

Connect the main control board to the computer using USB, select the board type as Nano, select the newly displayed COM number, click "Download" to start compiling and downloading the program to the main control board.

Code analysis:

```
#include <Adafruit_NeoPixel.h>  //添加ws2812库    Add the ws2812 library
#define NUMPIXELS 4             // 定义ws2812 灯数  Number of 2812 lamps
#define  RGB_PIN  5             // 定义ws2812引脚5  ws2812 pin definition 5

int count_G;
Adafruit_NeoPixel pixels(NUMPIXELS, RGB_PIN, NEO_GRB + NEO_KHZ800);//实例化灯对象   Creating light objects
```

```
void setup ()          //设置函数    Function initialization
{
  pixels.begin();      //初始化库函数    Initialize 2812 library functions
  pixels.show();
  Serial.begin(9600);
```

```
26    for(count_G=200;count_G>0;count_G--){   //灯亮度逐渐变暗    The light dimmed
27      pixels.setPixelColor(0, pixels.Color(0, count_G, 0));   //设置0~3号RGB灯颜色及亮度   Set RGB light color
28      pixels.setPixelColor(1, pixels.Color(0, count_G, 0));
29      pixels.setPixelColor(2, pixels.Color(0, count_G, 0));
30      pixels.setPixelColor(3, pixels.Color(0, count_G, 0));
31      pixels.show();
32      delay(10);                            //延时10ms
33    }
34    for(count_G=0;count_G<200;count_G++){   //灯亮度逐渐变亮    The light is getting brighter
35      pixels.setPixelColor(0, pixels.Color(0, count_G, 0));
36      pixels.setPixelColor(1, pixels.Color(0, count_G, 0));
37      pixels.setPixelColor(2, pixels.Color(0, count_G, 0));
38      pixels.setPixelColor(3, pixels.Color(0, count_G, 0));
39      pixels.show();
40      delay(10);
```

6. Download Mind+ graphical code

Open the project Mind+code file (path: project 6 WS2812B breathing lamp\Breathing lamp.mp)

Connect the main control board to the computer with a USB cable and select the newly appeared CH340 serial port COM number. Click "Upload to Device" to complete the code upload.

Programming analysis:

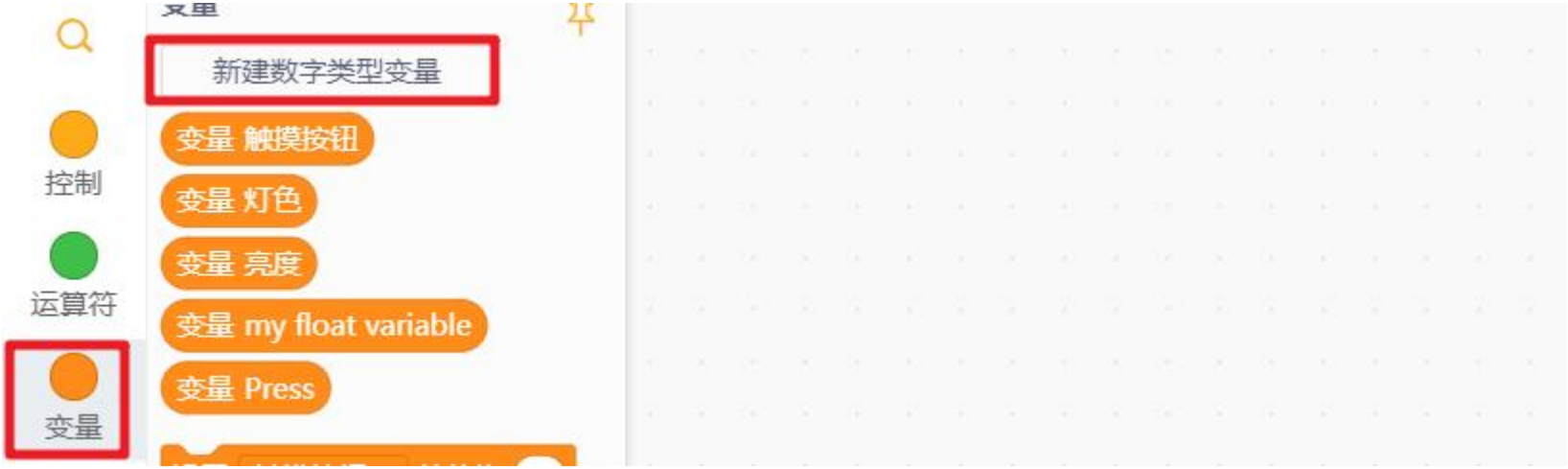
Click "Extend" in the lower left corner, and then select the main control board type as Nano.

Add the WS2812 RGB light library file : click the "Display" type and select the WS2812 RGB light

After the addition is successful, you can see that there are two more categories in the programming block column on the left: Nano and "Display"

The complete programming is as follows:

Programming Tip: Creating Numeric Variables



Set variable name

You can see the newly created variable "Brightness" in the "Variable" option, and you can directly choose to use it.