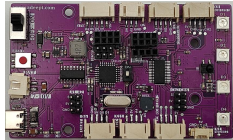




## Lesson 7 How to Control the WS2812 LED

In this lesson, we will learn how to control the WS2812 LED.

### 7.1 Components used in this course

Components	Quantity	Picture
Adeept Robot Control Board	1	
Type-C USB Cable	1	
WS2812 LED	1	

### 7.2 The introduction of the WS2812 LED

Red, green, and blue are called the three primary colors. When you combine these three primary colors of different brightness, it can produce almost all kinds of visible light.

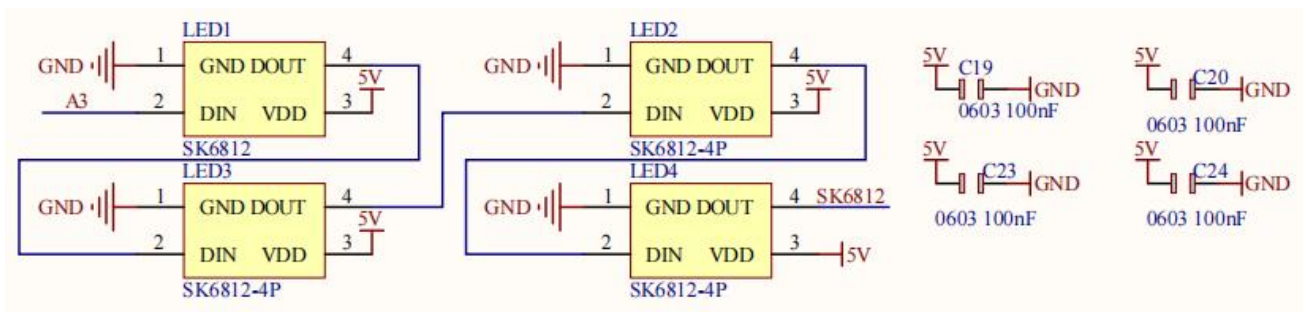
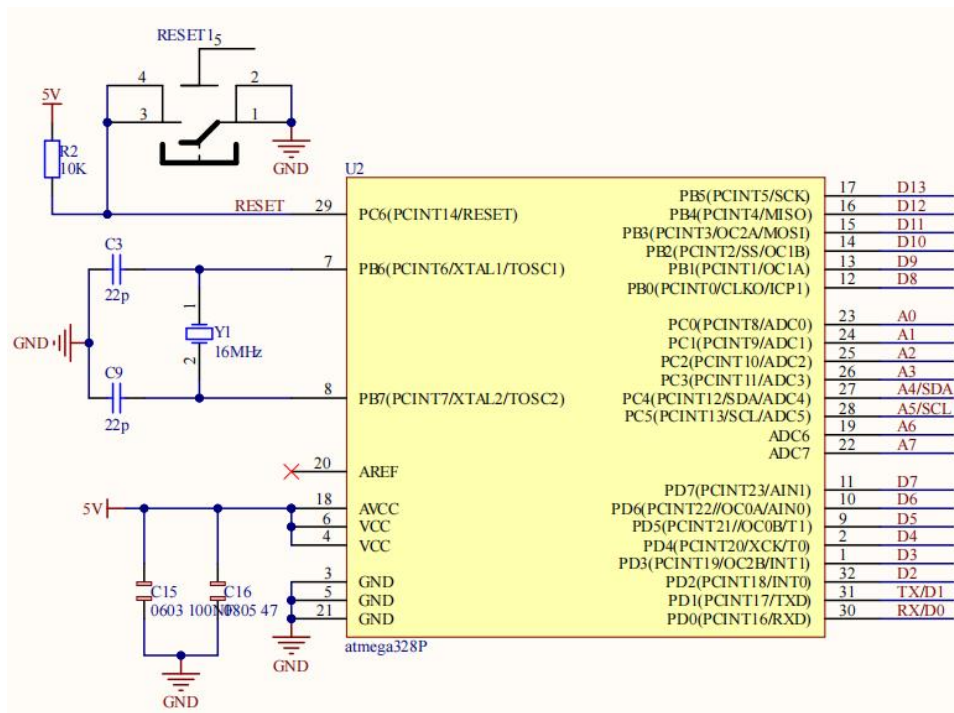
WS2812 RGB module is a low-power RGB tri-color lamp with integrated current control chip. Its appearance is the same as a 5050LED lamp bead, and each element is a pixel. The pixel contains an intelligent digital interface data latch signal shaping amplifier driving circuit, and also contains a high-precision internal oscillator and a 12V high-voltage programmable

constant current control part, which effectively guarantees that the color of the pixel light is highly consistent.

Four WS2812 LEDs are integrated on the Adeept Robot Control Board, and the number of WS2812 LEDs can also be increased through the WS2812 LED port.

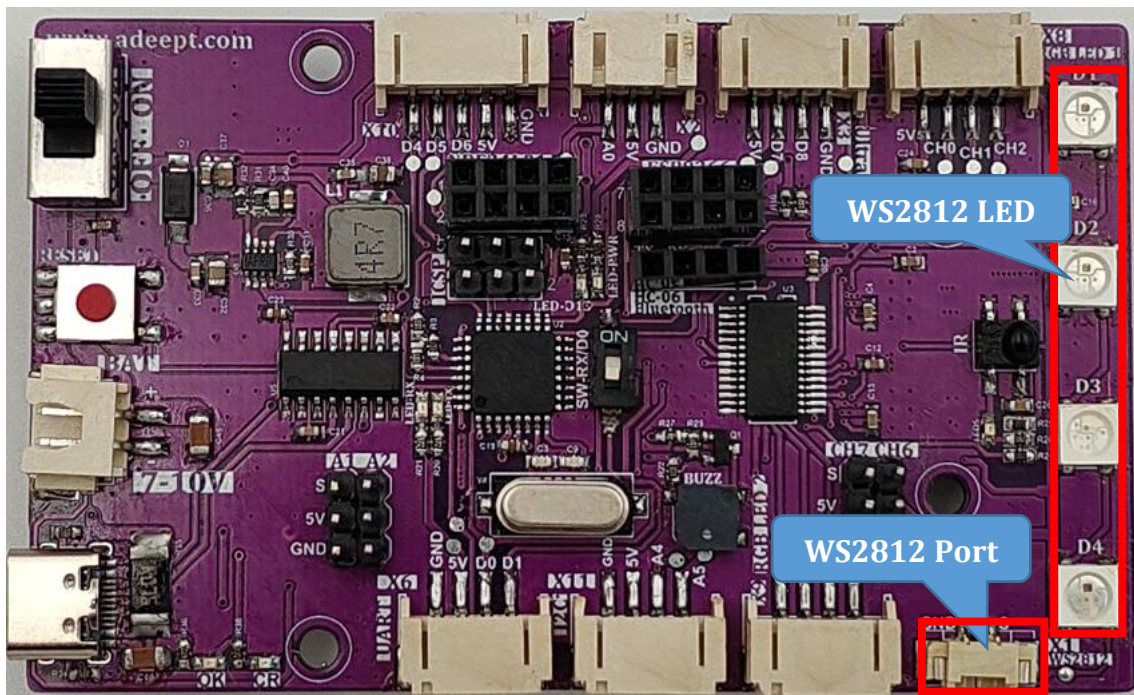


WS2812 LED is a very commonly used module on our robot products. There are three WS2812 LEDs on each module. Pay attention to the direction of the signal line when connecting. The signal line needs to be connected to the “IN” port of WS2812 LED after being led from the Adeept Robot Control Board WS2812 Port. When the next WS2812 LED needs to be connected, we connect a signal wire drawn from the "OUT" port of the previous WS2812 LED with the "IN" port of the next WS2812 LED.



## 7.3 Wiring diagram

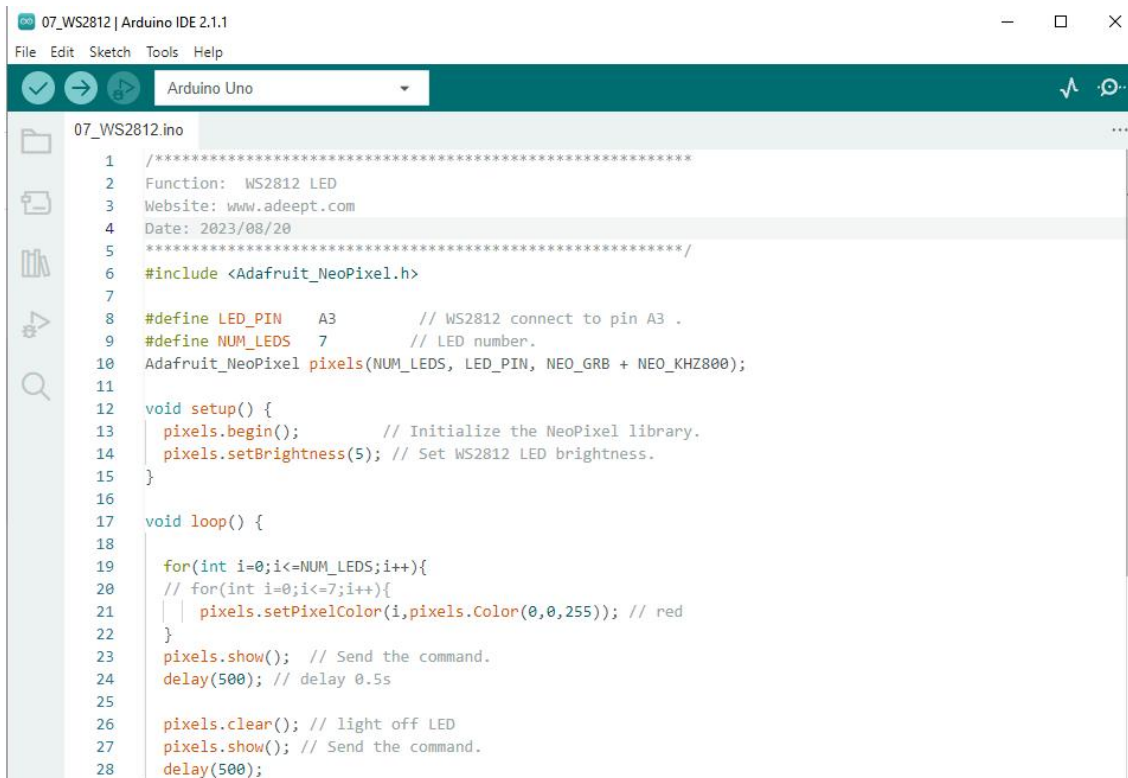
Figure as below:



WS2812 Port uses a small red 3pin cable with a length of 20CM.

## 7.4 How to control WS2812 LED

1. Connect your computer and Adeept Robot Control Board(Arduino Board) with a USB cable.
2. Open "07\_WS2812" folder in "[Adeept\\_UnoCar-B/Code](#)", double-click "[07\\_WS2812.ino](#)".



```

07_WS2812.ino
1  /*****
2  Function: WS2812 LED
3  Website: www.adeept.com
4  Date: 2023/08/20
5  *****/
6  #include <Adafruit_NeoPixel.h>
7
8  #define LED_PIN    A3      // WS2812 connect to pin A3 .
9  #define NUM_LEDS   7      // LED number.
10 Adafruit_NeoPixel pixels(NUM_LEDS, LED_PIN, NEO_GRB + NEO_KHZ800);
11
12 void setup() {
13     pixels.begin();        // Initialize the NeoPixel library.
14     pixels.setBrightness(5); // Set WS2812 LED brightness.
15 }
16
17 void loop() {
18
19     for(int i=0;i<=NUM_LEDS;i++){
20         // for(int i=0;i<=7;i++){
21         pixels.setPixelColor(i,pixels.Color(0,0,255)); // red
22     }
23     pixels.show(); // Send the command.
24     delay(500); // delay 0.5s
25
26     pixels.clear(); // light off LED
27     pixels.show(); // Send the command.
28     delay(500);

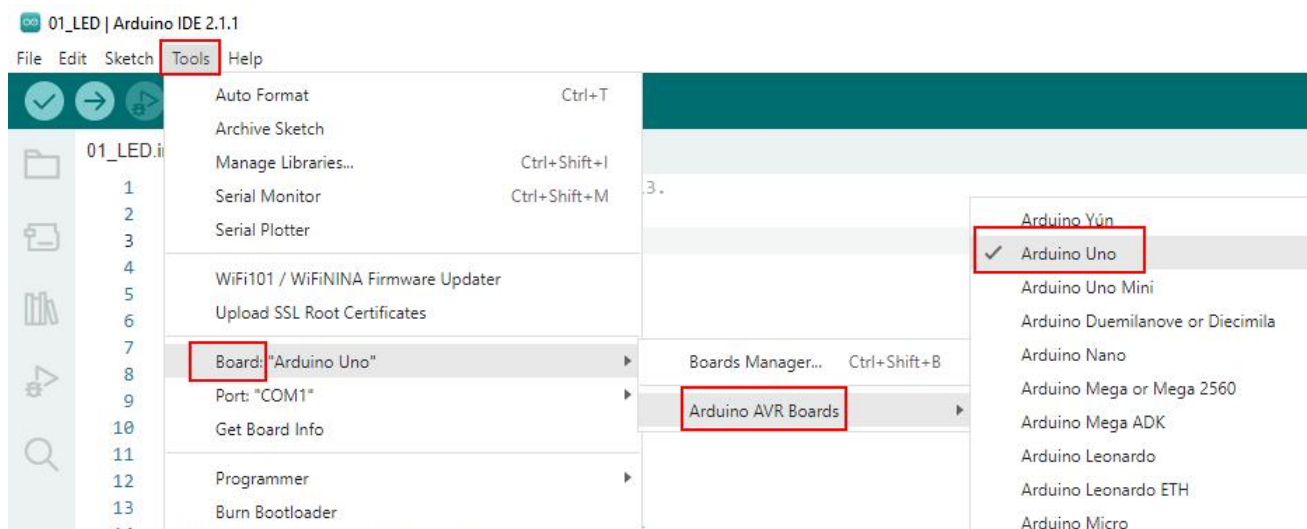
```

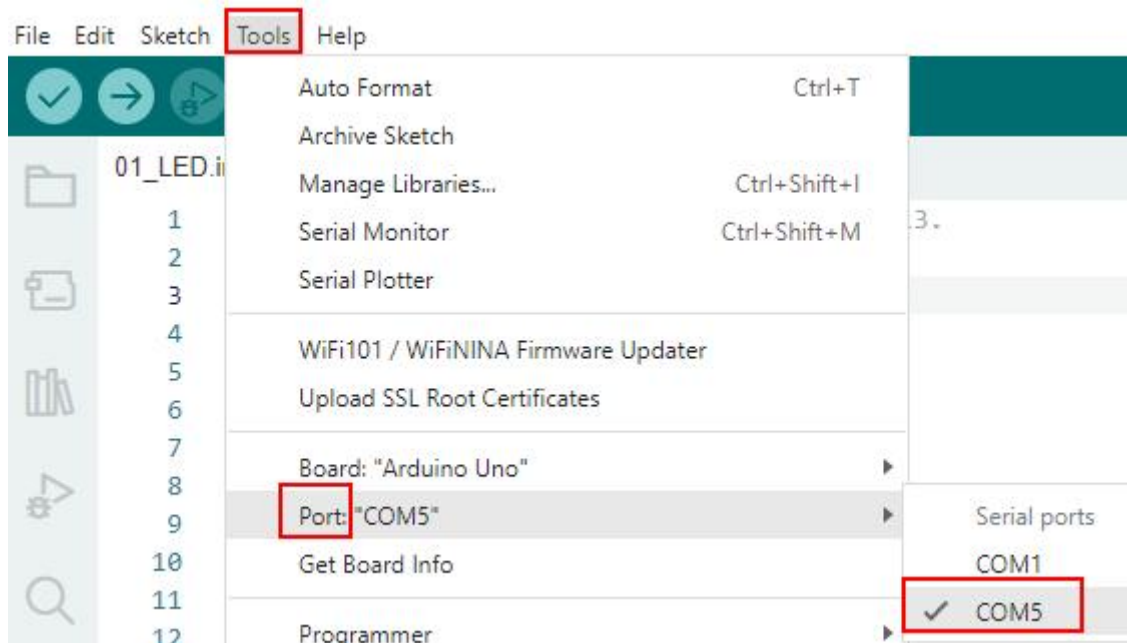
3. Select development board and serial port.


Board: **Tools**---->**Board**---->**Arduino AVR Boards**---->**Arduino Uno**

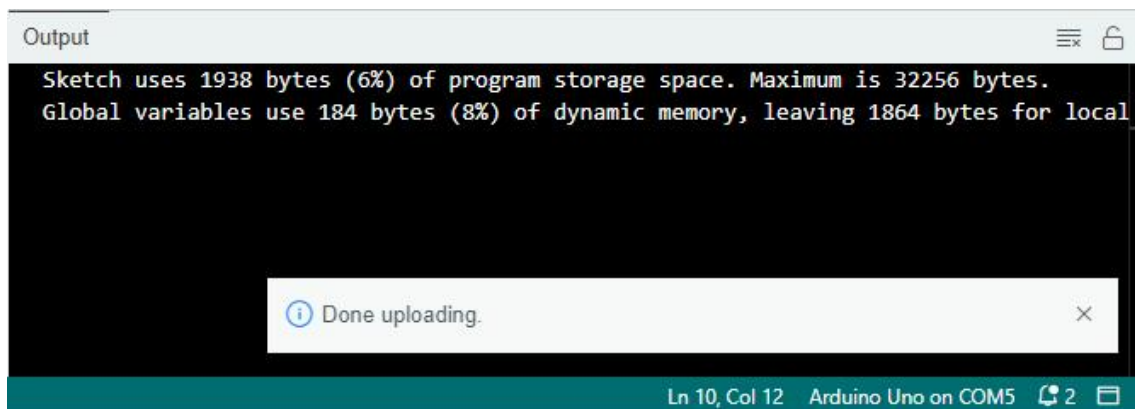
Port: **Tools** ---->**Port**---->**COMx**

Note: The port number will be different in different computers.





4. After opening, click  to upload the code program to the Arduino. If there is no error warning in the console below, it means that the Upload is successful.



5. After successfully running the program, You will see the first LED cycle through different colors.



## 5.5 Code

```
1. #include <Adafruit_NeoPixel.h>
2.
3. #define LED_PIN    A3          // WS2812 connect to pin A3 .
4. #define NUM_LEDS   7          // LED number.
5. Adafruit_NeoPixel pixels(NUM_LEDS, LED_PIN, NEO_GRB + NEO_KHZ800);
6.
7. void setup() {
8.     pixels.begin();           // Initialize the NeoPixel library.
9.     pixels.setBrightness(5); // Set WS2812 LED brightness.
10. }
11.
12. void loop() {
13.
14.     for(int i=0;i<=NUM_LEDS;i++){
15.         // for(int i=0;i<=7;i++){
16.             pixels.setPixelColor(i,pixels.Color(0,0,255)); // red
17.         }
18.     pixels.show(); // Send the command.
19.     delay(500); // delay 0.5s
20.
21.     pixels.clear(); // light off LED
22.     pixels.show(); // Send the command.
23.     delay(500);
24. }
25.
26.
27. void WS2812Color(int num, int R, int G, int B){
28.     pixels.setPixelColor(num,pixels.Color(R,G,B));
29.     pixels.show();
30. }
31.
32. void WS2812ColorAll(int R, int G, int B){
33.     for(int i=0; i<=NUM_LEDS; i++){
34.         pixels.setPixelColor(i,pixels.Color(0,0,255));
35.     }
36.     pixels.show();
37. }
```

Define the number of WS2812 LED lamp beads, there are 4 WS2812 LEDs on board. If one WS2812LED module is connected, it is 7 WS2812 LEDs.

```
#define LEDS_COUNT 7
```

`pixels.setPixelColor(num,pixels.Color(R,G,B))` Which light lights up a certain color. Each RGB value ranges from 0-255.

```
pixels.setPixelColor(i,pixels.Color(0,0,255)); // Red(red,green,blue) value:0-255
```

A function that controls all lights to be of the same color. (0, 0, 0) means that the values of the three colors of RGB are all 0, and the light is off at this time.

```
WS2812ColorAll(0,0,0);
```