Page 1 of 1
JAN
2014
04

Arduino – Controlling a WS2812 LED strand with NeoPixel or FastLED

-
  -

-
  - Arduino

96

The main reason why I bought my first Arduino board was to be able to play with LED strips with applications like BobLight and LightPack that offer colored backlighting to your TV comparable to what Philips offers with it’s beautiful AmbiLight TV’s.

I like really Philips, and I like Ambilight, so why not buy a Philips AmbiLight TV?
Well, pretty simple … first of all Philips does not carry 80″ AmbiLight enabled TV’s, smaller models are significantly more expensive than non-AmbiLight models, and it appears that these AmbiLight TV’s are hard to find in the US.

In this article we will be using an Arduino Uno connected to a strip of WS2812/WS2811 LEDs.

30

Difference between WS2801, WS2811 and WS2812

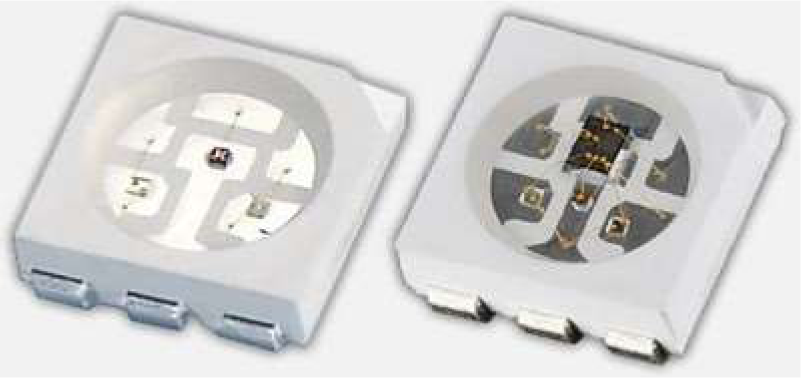
Before we start, we should probably identify the differences between the **WS2801**, **WS2811** and **WS2812** based strips (also called “strands”).
Most projects and descriptions out there discus these sometimes mixed, and for one who dives into LED strips for the first time, these models numbers might be confusing.

The model numbers WS2801, WS2811 and WS2812 actually refer to different “things”.

The WS2801 and WS2811 are LED driver IC’s (Integrated Circuits)**.**
These IC’s can control up to 3 LEDs, typically Red, Green and Blue. Positioned close together, so you as a viewer will see the mixed color result.
The WS2801 used to be quite popular but the WS2812/WS2811 appears to be taking over the reigns.

The WS2812 however is a WS2811 placed inside a 5050 LED package.
The 5050 LED is a very common 3 LED (Red, Green, Blue) package, in one 5mm x 5mm case.
A WS2812 is the same package but with an additional WS2811 LED driver IC on board.

In the illustration below you’ll see the difference:
On the left a 5050 RGB LED, on the right a WS2812 which combines a 5050 RGB LED with a WS2811 controller.
Note how the layout of the “silver” tracks are almost identical in both images, yet the black (IC) block and the tiny wires are different (right).



5050 RGB LED (left) and WS2812 (right)

Where the WS2801 strips needed 4 wires, the WS2811/WS2812 strips only needs 3 wires. The WS2801 uses a separate clock line, which can be seen as an advantage, whereas the WS2811/WS2812 does not. The WS2811/WS2812 depends on sending data matching a very tight timing. The advantage of the WS2812 though, is that production of these combo’s in strips is easier and therefor cheaper, and each RGB LED takes much less space on strips.

Your selection here depends on what type of microcontroller you’ll be using and which of these are supported by the application or library you intend to use.

For example, Arduino based projects work fine with any of these, since everything runs real-time.
When using a Raspberry Pi however, using a WS2811/WS2812 can be a little bit more challenging due to the strict timing needs. A Raspberry Pi typically runs Linux, which is **not** a so-called Real-time Operating System, where intended timing might be disrupted by other background activities.

In my little Arduino project I’ll be using the WS2812.

Specifications

I have made the spec sheets of the 5050 LED, WS2801, WS2811 and WS2812 available as PDF:

– WS2801 Spec Sheet
– WS2811 Spec Sheet
– WS2812 Spec Sheet
– 5050 LED Spec Sheet

These spec sheets can also be downloaded with all 4 PDF's bundled in a single ZIP file:

DOWNLOAD - LED Specification Sheets

Filename:	LED_Specification_sheets.zip
Size:	1.1 MiB
Date:	January 3, 2014

Download Now

LED strips Differences

Now that we know the difference between the model numbers, let's look at a few examples of LED strips.

There are 2 major types of LED strips that support multiple colors: **Analog strips** and **Digital strips**.
For our project we want DIGITAL RGB LED stripS … **not** the analog ones.

ANALOG LED STRIPS

These are NOT the kind of LED strips we use in this project!

In the illustration below we see first (top) a strip of single color LED's – typically white, but can be purchased in different colors. The one below that is a multicolor strip (RGB pins are a give away) which allows us to set the color for the entire strip.

On each of these strips you'll see (from left to right) first the LED as a white block, followed by an SMD resistor as a tiny back block.
The examples below require 12V to operate.

Analog LED strips – Single color (top), Multicolor (bottom)

DIGITAL RGB LED strips

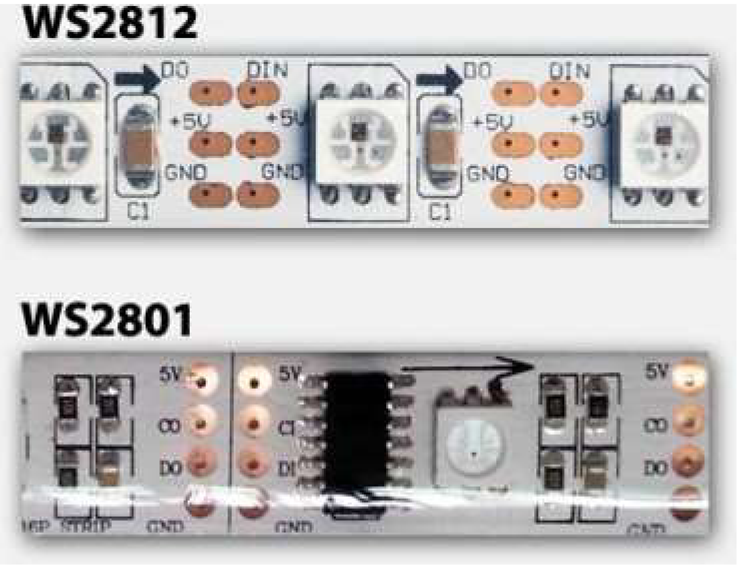
The digital strips are the ones we will use in this project.
In particular: we will use the WS2812 in our project.

The cool part of a digital strip is that you address each LED individually, making very cool effects easy. Obviously the kind we'd like to use in our projects.

In the illustration below you can see the physical differences between the WS2801 and the WS2811/WS2812 strips.
Unlike the analog strips: **Most Digital RGB strips operate on 5 Volts!**

Note:

- Not all strips of the same "model", look the same, but have typically a very similar layout.
- strips can be sold as a white or a black strip (background strip).
- Notice the arrows indicating Data direction.
- WS2801 has 4 pins, where as the WS2811/WS2812 only has 3 pins.
- There are digital strips that look like WS2801/WS2811/WS2812 strip, that are NOT based on any of these LED drivers.
- Strips can be had in waterproof (in plastic "tube") or for indoor use only.



Digital LED strip – WS2812 (top) and WS2801 (bottom)

WS2801 vs WS2812 pins

PIN	WS2801	WS2812
5V	Power (+5V)	Power (+5V)
CI	Clock signal Input	N/A
CO	Clock signal Output	N/A
DI	Data Input	Data Input
DO	Data Output	Data Output
GND	Ground or Common	Ground or Common

Data Flow

As you can see in the images above:
A 5050 RGB LED + LED Driver IC combo makes a single “unit”.
For the WS2801 this is an IC and a 5050, for the WS2812 this is a single component holding a 5050 LED and WS2811 combined.

These **units are chained** and each have an **input side** and an **output side**. The arrow printed on the strip indicates the data flow direction.
Each output of the previous unit is connected to the input of the following unit, and that’s why we see in the little table INPUT and OUTPUT designated pins.

It’s important to **pay attention to the arrow**, if you use your strip in the wrong “direction”, it will **not** work.

Note : Simply connecting +5V and GND will at best flash up your strip for a fraction of a second.
The LEDs need to be “told” to be ON, so without data feed your LEDs will remain OFF.

Time to order a WS2812 RGB LED Strip …

Now that we know the basics and the things to look for, you should be able to order the right strip. Keep in mind that often WS2812 strips are offered as WS2811 strips – different name, same thing. Some sellers mention WS2801 in their product name or advertisement – please make absolutely sure you're getting the WS2811/WS2812.

Both Amazon and eBay are good resources, and some report positive results with Alibaba … I've never ordered from Alibaba, and your milage may vary.
One of my favorite places is AdaFruit, which is not just any random shop, as they provide awesome information when it comes to Arduino projects and the likes.

Making the Arduino WS2812 connection

Now that we have a WS2812 strip, time to hook it up to our Arduino (I used an Arduino UNO for this).

Power

Caution

A strip of LED's will pull way too much power for your Arduino to handle, so **always consider an additional 5V power supply**.

Rule of thumb is : **each RGB LED unit pulls about 60 mA** (3x 20 mA, for Red, Green and Blue).

LED's, even though they're called power efficient, do need juice … and for each WS2812 we need up to 60 mA when the 3 LEDs inside are at maximum brightness at **5V**.

Power Supply

You can use an external power supply for this purpose and even though my 1 meter strip theoretically needs 3.6 A at max brightness, my little 2A power supply managed to handle it – your milage may vary! (1 meter with 60 LEDs/meter = 60 * 60 mA = 3600 mA = 3.6 A max.)

A **switching power supply is often ideal** and pretty cheap – you might even have one or the other laying around from your old cellphone, just make sure it's actually giving you 5 – 6V and not weird voltages like 12V or 16V or even more. Verification with a Voltage meter is recommended.

Batteries

You can consider using batteries, although I'm not a big fan of using them. With batteries please pay attention to the voltage sum.

Consider:
– **3 x Alkaline AA batteries** (4.5 V) or
– **4 x NiMH AA rechargeable batteries** (4.8 V)

About Amps and such

Like I mentioned before, each LED module takes a max of 60 mA, so you can calculate how many Amps your power source has to provide. Keep in mind that 1000 mA = 1 A.

Your power supply can have overcapacity when it comes to Amps, so if your project needs 3.6 A, and you only have a 10 A power supply, then this will work great.
Keep in mind though that the Voltage must be close to the 5V value. Higher voltages may damage your LEDs.

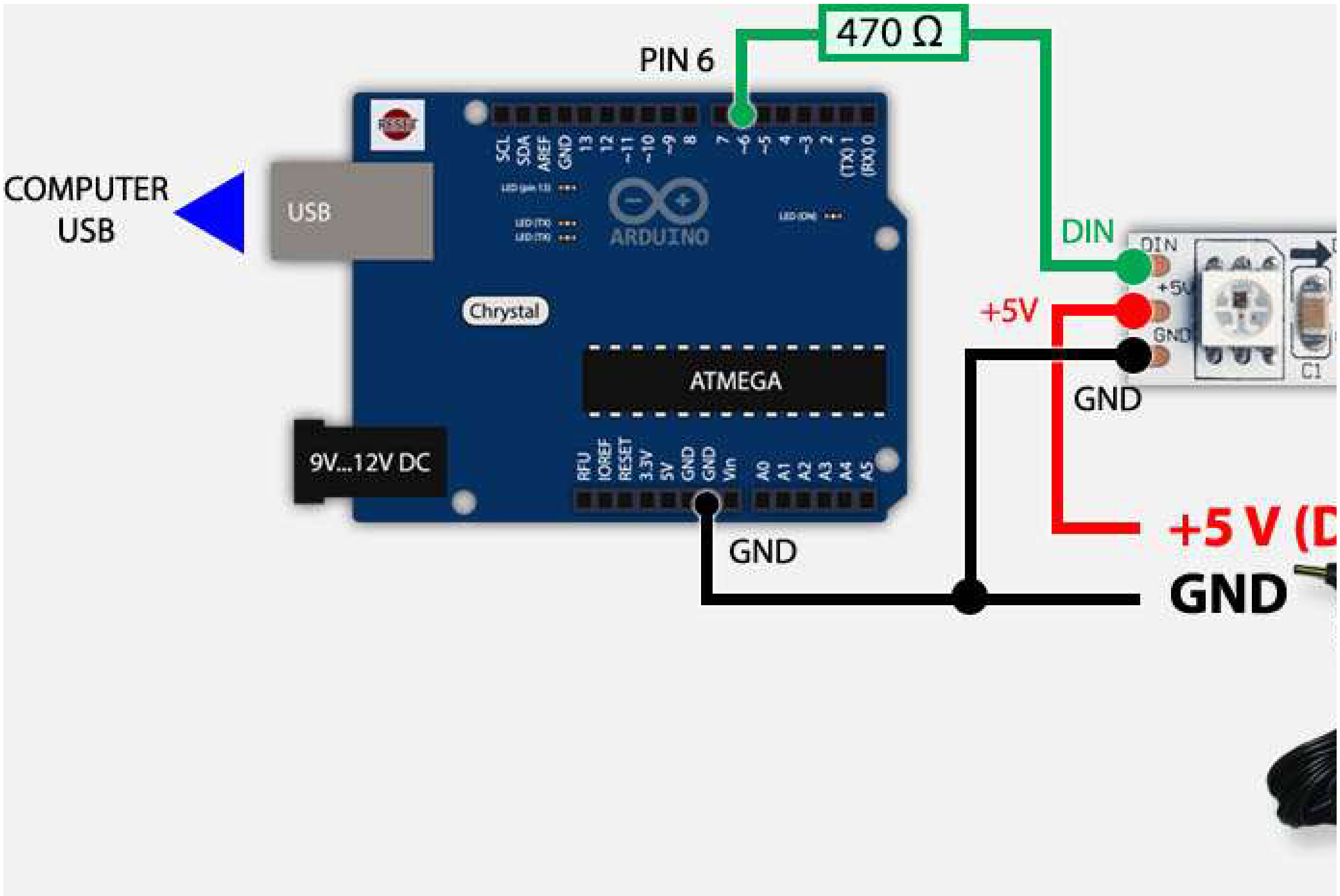
Connecting Arduino and WS2812 strip

The basic layout of power can be done in 2 ways – with computer or without …

Arduino Connected to your Computer

Commonly, during testing, your Arduino is connected to your computer via a USB cable where the USB cable does not only program the microcontroller but will also provide power for the Arduino.

The **DIN** (data input) pin of the LED strip goes **to Arduino PIN 6** with an optional 470Ω resistor in between.
+5V of the LED strip goes **to the +5V of extra power supply**.
GND of the LED strip **goes to GND of the extra power supply** and to **the GND of the Arduino**.
The **USB** of the Arduino is connected **to your computer**.



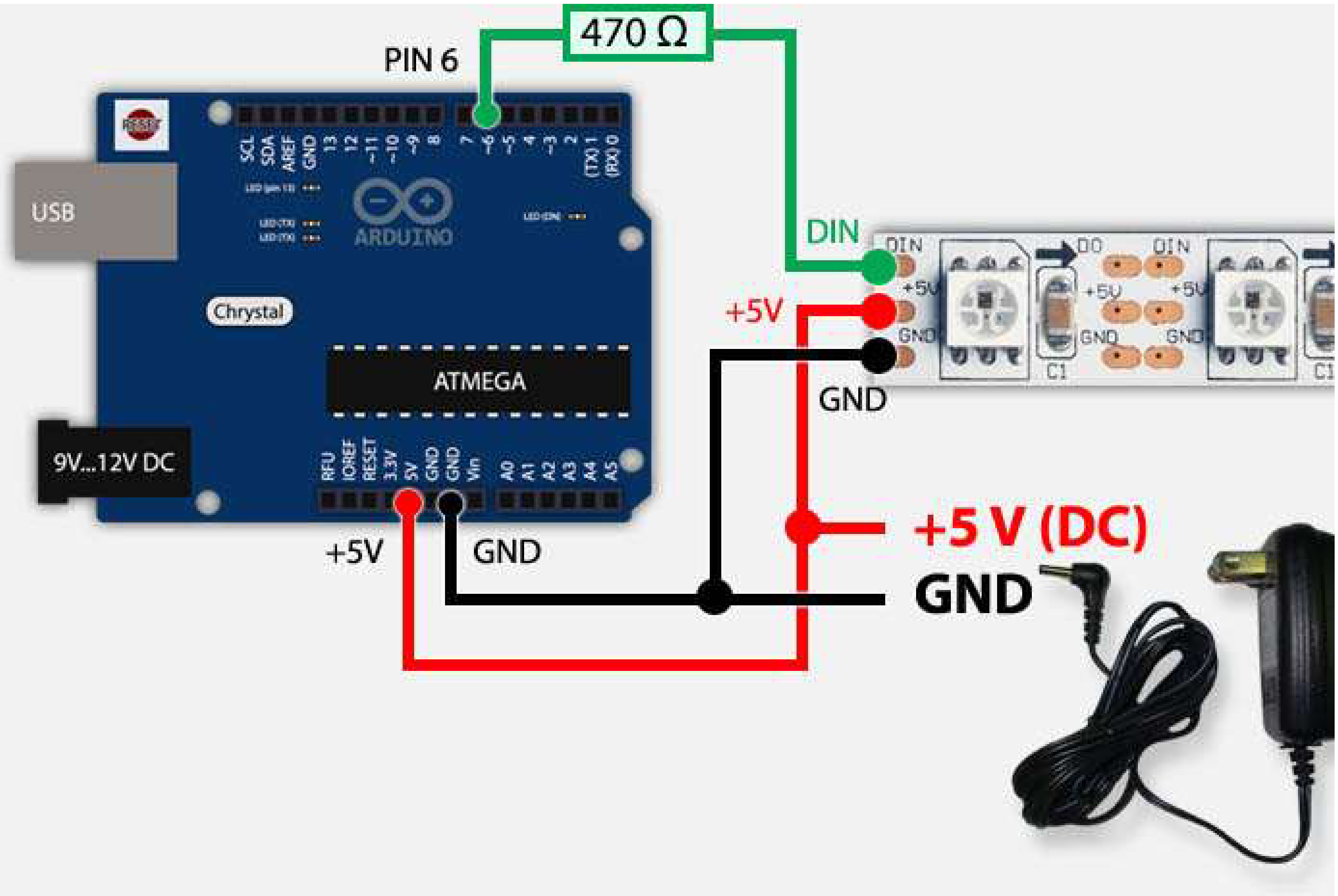
Arduino & WS2812 – USB and External Power

Arduino Not connected to your computer

Once you’ve completed your prototyping, you could still keep using your Arduino for controlling the LED strip.

In that case you’d typically have the Arduino in a very different location, and thus not connected to your computer. In that case the extra power supply for the LEDs could be used to feed the Arduino as well.

The **DIN** (data input) pin of the LED strip goes **to PIN 6** of the Arduino with an optional 470Ω resistor in between.
+5V of the LED strip goes **to the +5V of extra power supply** and **the +5V on your Arduino**.
GND of the LED strip **goes to GND of the extra power supply** and to **the GND of the Arduino**.



Arduino & WS2812 – Only running on external power supply

Programming the Arduino for WS2811/WS2812

Now that we know how to connect the strip to our Arduino, time to get some cool effects going.

We *could* of course dig into all the timing details of the WS2811/WS2812 but there are already very good libraries out there that do the difficult work for us.

The most used at this moment are **FastLED** (successor of FastSPI_LED and FastSPI_LED2) and **NeoPixel** (by AdaFruit). I've added some demo videos, and even though it might give you the impression that NeoPixel could be slower, rest assure, it's not.
Both Libraries are very good and very fast.

- AdaFruit NeoPixel
- FastLED (FastSPI_LED)

Note : If you haven't already installed the regular Arduino software, please consider looking at "My First Arduino Project" for details and downloads or download links.

AdaFruit NeoPixel

For no obvious reason, I started my first test with NeoPixel by AdaFruit.

The NeoPixel Library for Arduino can be downloaded from Github or through this direct link (zip file) or from Tweaking4All. As usual I HIGHLY recommend getting the files directly from the source as the version on Tweaking4All might be outdated and only serves as a backup.

DOWNLOAD - Adafruit NeoPixel

Filename:	Adafruit_NeoPixel.zip
Size:	26.6 KiB
Date:	January 3, 2014

Download Now

If you downloaded the Tweaking4All ZIP file, then in the Arduino Software simple choose "Sketch" "Import Library…" "Add Library…" and in the file dialog select the downloaded ZIP file. This will automatically install the library for you (requires Arduino 1.0.5 or newer).

If you however downloaded the official version and this trick did give you an error message, the copy then copy the files from the ZIP archive into a folder called "AdaFruit_NeoPixel" in your Arduino Library directory. More details can be found on the Arduino page concerning Libraries.

- Windows: `My Documents\Arduino\libraries\`
- MacOS X: `~/Documents/Arduino/libraries/`
- Linux: `~/Documents/Arduino/libraries/`

After installing the Library, close and restart the Arduino software so that the examples are not visible in the menu.

The first example I ran was of course striptest to see if my LED strips worked alright – choose from the menu "File" "Examples" "AdaFruit_NeoPixel" "striptest".

Before compiling and uploading the sketch to your Arduino, first verify some basic settings in the code.

– ***line 3*** : make sure `#define PIN 6` is actually matching the pin number you've used on your Arduino
– ***line 12*** : make sure the first parameter in `Adafruit_NeoPixel(60, ...` matches the number of LED's in your strip (here: **60**).

If you used the wiring schematics shown earlier then PIN 6 would be the right pin. Click the "Upload" button, wait a few seconds and see the magic at work.

Here a short video of the NeoPixel demo – I didn't do too much effort as you can see, but it gives you an idea ….

00:00
00:34

```
1  #include <Adafruit_NeoPixel.h>
2
3  #define PIN 6
4
5  // Parameter 1 = number of pixels in strip
6  // Parameter 2 = pin number (most are valid)
7  // Parameter 3 = pixel type flags, add together as needed:
8  //   NEO_KHZ800  800 KHz bitstream (most NeoPixel products w/WS2812 LEDs)
9  //   NEO_KHZ400  400 KHz (classic 'v1' (not v2) FLORA pixels, WS2811 drivers)
10//   NEO_GRB     Pixels are wired for GRB bitstream (most NeoPixel products)
11//   NEO_RGB     Pixels are wired for RGB bitstream (v1 FLORA pixels, not v2)
12Adafruit_NeoPixel strip = Adafruit_NeoPixel(60, PIN, NEO_GRB + NEO_KHZ800);
13
14...
```

I **highly** recommend snooping through the code of this example, make some changes, see what happens.
The full code can be found below.

Pay attention to these functions:

```
strip.begin();           // initialize strip
strip.show();            // Update all LEDs (= turn OFF, since none of them have been set
yet!)
...
```

```
c = strip.Color(255, 0, 0);  // define the variable c as RED (R,G,B)
strip.setPixelColor(10, c);  // set LED 10 to the color in variable c (red)
strip.show();                // Update all LEDs (= make LED 10 red)
```

It’s worth playing with for a bit to get familiar with how things are being called.

Note : To switch a LED off use the color BLACK (`strip.Color(0,0,0)`).

```
#include <Adafruit_NeoPixel.h>

#define PIN 6

// Parameter 1 = number of pixels in strip
// Parameter 2 = pin number (most are valid)
// Parameter 3 = pixel type flags, add together as needed:
//   NEO_KHZ800  800 KHz bitstream (most NeoPixel products w/WS2812 LEDs)
//   NEO_KHZ400  400 KHz (classic 'v1' (not v2) FLORA pixels, WS2811 drivers)
//   NEO_GRB     Pixels are wired for GRB bitstream (most NeoPixel products)
//   NEO_RGB     Pixels are wired for RGB bitstream (v1 FLORA pixels, not v2)
Adafruit_NeoPixel strip = Adafruit_NeoPixel(60, PIN, NEO_GRB + NEO_KHZ800);

void setup() {
  strip.begin();
  strip.show(); // Initialize all pixels to 'off'
}

void loop() {
  // Some example procedures showing how to display to the pixels:
  colorWipe(strip.Color(255, 0, 0), 50); // Red
  colorWipe(strip.Color(0, 255, 0), 50); // Green
  colorWipe(strip.Color(0, 0, 255), 50); // Blue

  // Send a theater pixel chase in...
  theaterChase(strip.Color(127, 127, 127), 50); // White
  theaterChase(strip.Color(127,   0,   0), 50); // Red
  theaterChase(strip.Color(  0,   0, 127), 50); // Blue

  rainbow(20);
  rainbowCycle(20);
  theaterChaseRainbow(50);
}

// Fill the dots one after the other with a color
void colorWipe(uint32_t c, uint8_t wait) {
  for(uint16_t i=0; i<strip.numPixels(); i++) {
      strip.setPixelColor(i, c);
      strip.show();
      delay(wait);
  }
}

void rainbow(uint8_t wait) {
  uint16_t i, j;

  for(j=0; j<256; j++) {
    for(i=0; i<strip.numPixels(); i++) {
      strip.setPixelColor(i, Wheel((i+j) & 255));
    }
    strip.show();
    delay(wait);
  }
}

// Slightly different, this makes the rainbow equally distributed throughout
void rainbowCycle(uint8_t wait) {
  uint16_t i, j;

  for(j=0; j<256*5; j++) { // 5 cycles of all colors on wheel
    for(i=0; i< strip.numPixels(); i++) {
      strip.setPixelColor(i, Wheel(((i * 256 / strip.numPixels()) + j) & 255));
    }
    strip.show();
    delay(wait);
  }
}

//Theatre-style crawling lights.
void theaterChase(uint32_t c, uint8_t wait) {
  for (int j=0; j<10; j++) {  //do 10 cycles of chasing
    for (int q=0; q < 3; q++) {
      for (int i=0; i < strip.numPixels(); i=i+3) {
        strip.setPixelColor(i+q, c);    //turn every third pixel on
      }
      strip.show();

      delay(wait);

      for (int i=0; i < strip.numPixels(); i=i+3) {
        strip.setPixelColor(i+q, 0);        //turn every third pixel off
      }
    }
  }
}

//Theatre-style crawling lights with rainbow effect
void theaterChaseRainbow(uint8_t wait) {
  for (int j=0; j < 256; j++) {     // cycle all 256 colors in the wheel
    for (int q=0; q < 3; q++) {
      for (int i=0; i < strip.numPixels(); i=i+3) {
        strip.setPixelColor(i+q, Wheel( (i+j) % 255));    //turn every third pixel on
      }
      strip.show();

      delay(wait);

      for (int i=0; i < strip.numPixels(); i=i+3) {
        strip.setPixelColor(i+q, 0);        //turn every third pixel off
      }
    }
  }
}

// Input a value 0 to 255 to get a color value.
// The colours are a transition r - g - b - back to r.
uint32_t Wheel(byte WheelPos) {
  if(WheelPos < 85) {
   return strip.Color(WheelPos * 3, 255 - WheelPos * 3, 0);
  } else if(WheelPos < 170) {
   WheelPos -= 85;
   return strip.Color(255 - WheelPos * 3, 0, WheelPos * 3);
  } else {
   WheelPos -= 170;
   return strip.Color(0, WheelPos * 3, 255 - WheelPos * 3);
  }
}
```

FastLED (FastSPI_LED)

FastLED is the successor of FastSPI_LED and FastSPI_LED2. According to it's maintainer(s) the name changed to FastLED since it's no longer just focussing in SPI LED strips like the one we're using in our project (WS2811/WS2812). Some older chipsets have been dropped so for older LED strips (non WS2801-WS2812) might want to resort to the older FastSPI_LED2 library.

To download the library you can either click the "Download ZIP" button on the FastLED GitHub page, click this link to directly download the ZIP file, or download a snapshot from Tweaking4All. As usual: we highly recommend getting the files from the source … the Tweaking4All version is only here as a backup and is most likely outdated.

DOWNLOAD - FastLED

Filename:	FastLED.zip
Size:	57.8 KiB
Date:	January 3, 2014

Download Now

If you downloaded the Tweaking4All ZIP file, then in the Arduino Software simple choose “Sketch” “Import Library…” “Add Library…” and in the file dialog select the downloaded ZIP file. This will automatically install the library for you (requires Arduino 1.0.5 or newer).

If you however downloaded the official version and this trick did give you an error message, then copy the files from the ZIP archive into a folder called “FastLED” in your Arduino Library directory. More details can be found on the Arduino page concerning Libraries.

- Windows: `My Documents\Arduino\libraries\`
- MacOS X: `~/Documents/Arduino/libraries/`
- Linux: `~/Documents/Arduino/libraries/`

After installing the Library, close and restart the Arduino software so that the examples are not visible in the menu.

The first example I tried was “testleds” only to find out that it was a left over from FastSPI_LED and did not run. So I updated the code to work with FastLED, you can copy and paste it into the Arduino editor.

Make sure to verify the following lines:
– ***line 3***: make sure you set the number of LEDs right in `#define NUM_LEDS 60`
– ***line 8***: make sure the correct PIN is set in `#define PIN 6`

Here you will see that the NeoPixel demo was maybe cooler, but the code for FastLED appears shorter. In the end both Libraries are solid, so pick which you prefer.

As with the NeoPixel code – I **highly** recommend snooping through the code, modify a few things and see what it does and such. It’s actually fun to do.

Here a video of what the demo does – I didn’t take too much effort to do a perfect video, and I didn’t record the entire test, heck I didn’t even take the LED strip out of the zip-lock bag … 😁

00:00
00:18

Addressing LEDs with FastLED works a little different but one could see it as much easier … personal preference … for a list of pre-defined colors see the list after the source code.

Note : to switch a LED Off, set the color to Black as such, before calling the show() function: `leds[10] = CRGB::Black;` .

```
leds[10] = CRGB::Red; // Set LED 10 to red
FastLED.show();       // Show changes

...

leds[10].r = 255;     // set red for LED 10 (Color = Red + Green + Blue)
```

```
leds[10].g = 125;     // set green for LED 10
leds[10].b = 0;       // set blue for LED 10
FastLED.show();       // Show changes
```

```
#include "FastLED.h"
// Number of RGB LEDs in the strand
#define NUM_LEDS 60

// Define the array of leds
CRGB leds[NUM_LEDS];
// Arduino pin used for Data
#define PIN 6

void setup()
{
  FastLED.addLeds<NEOPIXEL, PIN, RGB>(leds, NUM_LEDS);
}

void loop() {
  // one at a time
  for(int j = 0; j < 3; j++) {
    for(int i = 0 ; i < NUM_LEDS; i++ ) {
      memset(leds, 0, NUM_LEDS * 3);
      switch(j) {
        case 0: leds[i].r = 255; break;
        case 1: leds[i].g = 255; break;
        case 2: leds[i].b = 255; break;
      }
      FastLED.show();
      delay(10);
    }
  }

  // growing/receeding bars
  for(int j = 0; j < 3; j++) {
    memset(leds, 0, NUM_LEDS * 3);
    for(int i = 0 ; i < NUM_LEDS; i++ ) {
      switch(j) {
        case 0: leds[i].r = 255; break;
        case 1: leds[i].g = 255; break;
        case 2: leds[i].b = 255; break;
      }
      FastLED.show();
      delay(10);
    }
    for(int i = NUM_LEDS-1 ; i >= 0; i-- ) {
      switch(j) {
        case 0: leds[i].r = 0; break;
        case 1: leds[i].g = 0; break;
        case 2: leds[i].b = 0; break;
      }
      FastSPI_LED.show();
      delay(1);
    }
  }

  // Fade in/fade out
  for(int j = 0; j < 3; j++ ) {
    memset(leds, 0, NUM_LEDS * 3);
    for(int k = 0; k < 256; k++) {
      for(int i = 0; i < NUM_LEDS; i++ ) {
        switch(j) {
          case 0: leds[i].r = k; break;
          case 1: leds[i].g = k; break;
          case 2: leds[i].b = k; break;
        }
      }
      FastLED.show();
      delay(3);
    }
    for(int k = 255; k >= 0; k--) {
      for(int i = 0; i < NUM_LEDS; i++ ) {
        switch(j) {
          case 0: leds[i].r = k; break;
          case 1: leds[i].g = k; break;
          case 2: leds[i].b = k; break;
        }
      }
      FastLED.show();
      delay(3);
    }
  }
}
```

Predefined colors in FastLED:

```
AliceBlue = 0xF0F8FF
Amethyst = 0x9966CC
AntiqueWhite = 0xFAEBD7
Aqua = 0x00FFFF
Aquamarine = 0x7FFFD4
Azure = 0xF0FFFF
Beige = 0xF5F5DC
Bisque = 0xFFE4C4
Black = 0x000000
BlanchedAlmond = 0xFFEBCD
Blue = 0x0000FF
BlueViolet = 0x8A2BE2
Brown = 0xA52A2A
BurlyWood = 0xDEB887
```

```
CadetBlue = 0x5F9EA0
Chartreuse = 0x7FFF00
Chocolate = 0xD2691E
Coral = 0xFF7F50
CornflowerBlue = 0x6495ED
Cornsilk = 0xFFF8DC
Crimson = 0xDC143C
Cyan = 0x00FFFF
DarkBlue = 0x00008B
DarkCyan = 0x008B8B
DarkGoldenrod = 0xB8860B
DarkGray = 0xA9A9A9
DarkGreen = 0x006400
DarkKhaki = 0xBDB76B
DarkMagenta = 0x8B008B
DarkOliveGreen = 0x556B2F
DarkOrange = 0xFF8C00
DarkOrchid = 0x9932CC
DarkRed = 0x8B0000
DarkSalmon = 0xE9967A
DarkSeaGreen = 0x8FBC8F
DarkSlateBlue = 0x483D8B
DarkSlateGray = 0x2F4F4F
DarkTurquoise = 0x00CED1
DarkViolet = 0x9400D3
DeepPink = 0xFF1493
DeepSkyBlue = 0x00BFFF
DimGray = 0x696969
DodgerBlue = 0x1E90FF
FireBrick = 0xB22222
FloralWhite = 0xFFFAF0
ForestGreen = 0x228B22
Fuchsia = 0xFF00FF
Gainsboro = 0xDCDCDC
GhostWhite = 0xF8F8FF
Gold = 0xFFD700
Goldenrod = 0xDAA520
Gray = 0x808080
Green = 0x008000
GreenYellow = 0xADFF2F
Honeydew = 0xF0FFF0
HotPink = 0xFF69B4
IndianRed = 0xCD5C5C
Indigo = 0x4B0082
Ivory = 0xFFFFF0
Khaki = 0xF0E68C
Lavender = 0xE6E6FA
LavenderBlush = 0xFFF0F5
LawnGreen = 0x7CFC00
LemonChiffon = 0xFFFACD
LightBlue = 0xADD8E6
LightCoral = 0xF08080
LightCyan = 0xE0FFFF
LightGoldenrodYellow = 0xFAFAD2
LightGreen = 0x90EE90
LightGrey = 0xD3D3D3
LightPink = 0xFFB6C1
LightSalmon = 0xFFA07A
LightSeaGreen = 0x20B2AA
LightSkyBlue = 0x87CEFA
LightSlateGray = 0x778899
```

```
LightSteelBlue = 0xB0C4DE
LightYellow = 0xFFFFE0
Lime = 0x00FF00
LimeGreen = 0x32CD32
Linen = 0xFAF0E6
Magenta = 0xFF00FF
Maroon = 0x800000
MediumAquamarine = 0x66CDAA
MediumBlue = 0x0000CD
MediumOrchid = 0xBA55D3
MediumPurple = 0x9370DB
MediumSeaGreen = 0x3CB371
MediumSlateBlue = 0x7B68EE
MediumSpringGreen = 0x00FA9A
MediumTurquoise = 0x48D1CC
MediumVioletRed = 0xC71585
MidnightBlue = 0x191970
MintCream = 0xF5FFFA
MistyRose = 0xFFE4E1
Moccasin = 0xFFE4B5
NavajoWhite = 0xFFDEAD
Navy = 0x000080
OldLace = 0xFDF5E6
Olive = 0x808000
OliveDrab = 0x6B8E23
Orange = 0xFFA500
OrangeRed = 0xFF4500
Orchid = 0xDA70D6
PaleGoldenrod = 0xEEE8AA
PaleGreen = 0x98FB98
PaleTurquoise = 0xAFEEEE
PaleVioletRed = 0xDB7093
PapayaWhip = 0xFFEFD5
PeachPuff = 0xFFDAB9
Peru = 0xCD853F
Pink = 0xFFC0CB
Plaid = 0xCC5533
Plum = 0xDDA0DD
PowderBlue = 0xB0E0E6
Purple = 0x800080
Red = 0xFF0000
RosyBrown = 0xBC8F8F
RoyalBlue = 0x4169E1
SaddleBrown = 0x8B4513
Salmon = 0xFA8072
SandyBrown = 0xF4A460
SeaGreen = 0x2E8B57
Seashell = 0xFFF5EE
Sienna = 0xA0522D
Silver = 0xC0C0C0
SkyBlue = 0x87CEEB
SlateBlue = 0x6A5ACD
SlateGray = 0x708090
Snow = 0xFFFAFA
SpringGreen = 0x00FF7F
SteelBlue = 0x4682B4
Tan = 0xD2B48C
Teal = 0x008080
Thistle = 0xD8BFD8
Tomato = 0xFF6347
Turquoise = 0x40E0D0
```

```
Violet = 0xEE82EE
Wheat = 0xF5DEB3
White = 0xFFFFFF
WhiteSmoke = 0xF5F5F5
Yellow = 0xFFFF00
YellowGreen = 0x9ACD32
```

30

Related Articles

- **2014**
- 03.28 Boblight Config Maker – Update 1.3 available
- 03.27 Arduino Ethernet – Pushing data to a (PHP) server
- 03.25 Arduino Ethernet – Pulling data from your Arduino
- 03.24 Web-Enable your Arduino with an Arduino ENC28J60 Ethernet shield …
- 03.22 How to measure temperature with your Arduino and a DS18B20
- 03.16 AmbiLight with XBMC Boblight, OpenElec and WS2811/WS2812 LEDs
- 03.10 Boblight Config Maker for Windows, MacOS X and Linux
- 01.29 SainSmart 1.8″ TFT Arduino Color LCD Display
- 01.01 Arduino – Getting started with your first project
- **2013**
- 12.31 Hardware – What is a Breadboard and How to use it …

Donation options

Donations are very much appreciated, but not required. Donations will be used for web-hosting expenses, project hardware or a motivational boost (a drink or snack). Thank you very much for those have donated already! It's truly AwEsOmE to see that folks like our articles and small applications.

- Shop at Amazon
- BitCoin

Comments

There are **96** comments. You can read them below.
You can post your own comments by using the form below, or reply to existing comments by using the "Reply" button.