WiFi Jellyfish Lantern with WLED

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https://learn.adafruit.com/wifi-jellyfish-lantern-with-wled

Last updated on 2023-08-29 04:51:24 PM EDT
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Overview

Our oceans are full of life, and few species are more fascinating than the jellyfish. Jellyfish are more than 600 million years old, having survived all five mass extinction events. Some are deadly, some have bioluminescence, and one species may be immortal.

This tutorial will show you how to create your own luminescent jellyfish out of iridescent vinyl and NeoPixel LEDs. Easily add endless light patterns with the free, and easy-to-use WLED software, with no coding required. You can even make multiple jellyfish and sync them up over your WiFi network.

Difficulty

This is a fairly easy project with no coding and just a little soldering. The end result is out of this world.

This guide will show how to use either our powerful Feather ESP32 V2 or our teeny tiny and affordable QT Py ESP32 Pico get your lights up and running in minutes.

Build two or more jellyfish and sync them together to run simultaneous animations through your swarm. Sounds tricky, but it's two clicks in WLED. This software is free, powerful, and so easy to use that it feels somehow like you're cheating. Get access to around 100 different LED animation patterns that can be paired with dozens of color
palettes. WLED gives you speed and intensity control as well. There is no end to the variations of patterns you can create with this amazing software.

Parts

Adafruit Mini Skinny NeoPixel Digital RGB LED Strip - 144 LED/m
So thin. So mini. So teeeeeeeny-tiny. It's the 'skinny' version of our classic NeoPixel strips! These NeoPixel strips have 144 digitally-addressable pixel Mini LEDs...
https://www.adafruit.com/product/2970

Adafruit ESP32 Feather V2 - 8MB Flash + 2 MB PSRAM
One of our star Feathers is the Adafruit HUZZAH32 ESP32 Feather - with the fabulous ESP32 WROOM module on there, it makes quick work...
https://www.adafruit.com/product/5400

Adafruit QT Py ESP32 Pico - WiFi Dev Board with STEMMA QT
This dev board is like when you're watching a super-hero movie and the protagonist shows up in a totally amazing costume in the third act and you're like 'OMG! That's...
https://www.adafruit.com/product/5395

Which Board Should I Use?

Other than size and price, distinguishing features are that the Feather has built-in charging for lithium-ion or lithium-polymer batteries, an "enable" pin for adding a
power switch, and mounting holes to firmly stay put. Battery charging can be added to QT Py with the “charger BFF” add-on.

There’s also a broader add-on ecosystem for Feather...including FeatherWing boards packed with NeoPixel () and DotStar () LEDs. Most other FeatherWings might not be useful with the core WLED firmware...but if you get into writing custom WLED usermods, there might be opportunities for combining lighting with things like relays and motor control.

<table>
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<th>Item</th>
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<th>URL</th>
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<td>USB C to USB A Cable</td>
<td><a href="https://www.adafruit.com/product/4474">https://www.adafruit.com/product/4474</a></td>
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For the Jellyfish

- Lantern tops: 30 gauge iridescent vinyl ()
- Large tentacles: sparkly iridescent sequin fabric ()
- Small tentacles: silver tubular crin ()
- Stability: 18g steel wire ()
- Clear packing tape
- Metal bowls () to use as a form

Tools & Accessories

- Heat Gun
- Hot Glue Gun
- Soldering iron & accessories
- Cable ties
We'll be powering the pixels directly through the board since we only have a few pixels in each lamp. For larger projects with more LEDs, you'll want to power the pixels directly from a 5V power supply.

For the Feather:

- USB to +5V
- 13 to DI
- GND to GND

For the QT Py:

- +5V to +5V
- A0 to DI -- This is also known as digital pin 26
- GND to GND
If you're using the QT Py, Adafruit also stocks the QT Py BFF "backpack" with a NeoPixel port. It attaches to the QT Py with headers, and allows you to just plug in your NeoPixel strip. Adafruit carries 0.5m, 60/m NeoPixel strips with the correct Stemma connector already in place, so if these strips work for your project, they can make your life a bit easier.

Electronics Assembly

I'm using super high-density 144/m NeoPixels, in the "mini skinny" variety. These are actually a bit easier to solder than the full-size strip. The smaller LEDs leave a little more room to reach the solder pads.

Carefully count out your pixels and cut your NeoPixel strip to length. I'm using 12 pixels in my strip.

Feather Huzzah ESP32 V2 Wiring
Red wire to USB
White wire to pin 13
Black wire to G

QT PY Wiring
Red wire to +5V
White Wire to A0 (aka GPIO 26)
Black wire to G
NeoPixel Wiring
The wiring for the NeoPixel strip is the same no matter which board you're using:

- Red wire to +
- White wire to DI
- Black wire to G

It's very important to make sure you are soldering to DI (in) and not DO (out). These NeoPixel strips are directional so be sure you're soldering to the correct end.

For more tips on how to solder to these teeny tiny pads, check out our guide on [How to Solder NeoPixels](#).

Plug in your board with a USB cable. If you've uploaded the software correctly, the lights will turn on. Success!

Troubleshooting
If the lights don't come on, here are a couple things to try:

1. Double check your wiring. Those pin numbers are tiny.
2. Open the WLED software and go to the LED Settings page. Make sure you have the correct pin (GPIO) entered here. For the Feather we've soldered to 13, and for the QT PY the pin should read 26, which is the digital pin number (A0 is the analog pin number. Find this in the [pinout diagram in the QT PY guide](#))
3. Be sure you've soldered to the IN end of the NeoPixel strip and not the OUT end.
4. If it's still not working, head over to the [NeoPixel Uberguide](#) and try uploading some basic code, just to see whether the problem is with your wiring or with the software. If you can get the lights to come on using Arduino or CircuitPython, the trouble is with the software -- try reinstalling.
Sealing the Strip
Slip a small piece of clear heat shrink over each end of the strip. Squeeze a little bit of hot glue inside the heat shrink, covering the ends of the wires. While the glue is still wet, use a heat gun to shrink the heat shrink down over the hot glue and wires.

When you're done, the wires will be potted in solid plastic, making them very unlikely to pull out or get disconnected.

WLED Software
Driver Update

The Feather ESP32 V2 has a new serial chip which needs a driver installed before we can install WLED. Head over to our How to Install Drivers for WCH USB to Serial Chips () tutorial, and download and install the new driver.
If you have an older Feather ESP32 or QT Py with CP2102 USB-to-Serial bridge, use SiLabs’ driver instead.

Install WLED

These next steps require a Web Serial-compatible browser. As of this writing, that means Google Chrome, Microsoft Edge or Opera “desktop” browsers. Other browsers (Safari, Firefox, Explorer and anything mobile) won’t work.

Visit https://install.wled.me/

Plug your microcontroller into your computer with a known good USB cable. Click "Install" and select the port for your board.

Depending on the USB-to-serial bridge chip on the board, you might see one or two serial ports. On Mac, for instance, there might be both “/dev/cu.usbmodem[number]” and “/dev/cu.wchusbserial[number]”. Use the “wchusbserial” one.

After successful installation, enter your WiFi network name and password when prompted. This must be a 2.4 GHz WiFi network; ESP32 does not support 5 GHz networks. If it can’t connect, then as a fallback WLED will create its own 2.4 GHz WiFi access point.
Setup & Preferences

WiFi Setup
It's a good idea to head to WiFi Setup screen and create a good URL so you can control your project from any web-enabled device. I called mine http://jellyfish.local -- this is what I type into any web browser on my WiFi network in order to connect to my jellyfish.

LED Preferences
We need to change just a couple settings in the app to get our lights running correctly. Click the LED Preferences tab and scroll down to Hardware Setup. We have 12 LEDs total, so I changed "Length" to 12. We soldered our data wire to pin 13 (on the Feather) or A0 (aka pin 26) on the QT PY, so make GPIO match the pin number.
Use It

Now you can use any computer or handheld device to control your LEDs.

Make sure your device is on the same WiFi network as your board. Navigate to your custom URL (jellyfish.local/ for me) in a web browser. You'll see a color picker above a whole bunch of color palette choices.

Choose a color, choose an effect, and watch your lights animate and glow!

You can save your favorite combinations as presets, create playlists, control the speed and intensity of the animations, and lots more. This web app is incredibly intuitive and easy to use.

Head over to the WLED wiki at https://kno.wled.ge/ to delve into all the particulars.

Jellyfish Build

Materials

- Lantern tops: 30 gauge iridescent vinyl
- Large tentacles: sparkly iridescent sequin fabric
- Small tentacles: silver tubular crin
- Stability: 18g steel wire
- Clear packing tape
- Metal bowls to use as a form
Choose a metal bowl that's about the size you want your jellyfish to end up. It's helpful to prop it up on top of something to give yourself more working space.

We'll place our iridescent vinyl on top of this bowl and use a heat gun to form its shape.

Measure up and over the back of your bowl to figure out the size to make your pattern. Add a couple inches to this measurement if you want more of a domed shape to your jellyfish.

My jellyfish are roughly between 16-24 inches across. I like having a variety of sizes since that makes it feel more like a swarm.

**Cutting**

Resize the pattern so the diameter matches up with your measurement, and trace it out on a big piece of paper to make your pattern.

Cut out two copies of the pattern in iridescent vinyl for each jellyfish. Cut a little slit at the point of the pattern to help the pieces lay flatter when we put them together.
Lay out the pattern pieces on top of some cardboard or another heat-resistant surface with the straight edges overlapping by about 1/4". Use a heat gun to gently melt the overlap and make a seam. The vinyl will fuse together. Press it down carefully with a cloth or tool. Be careful! The vinyl gets hot.

Turn the pieces around and match up the remaining straight edge, overlapping the slits you cut in the center to get it to lay as flat as possible. We're creating a dome shape here so the other side will be up in the air. It's helpful to prop this up on something, or have someone hold the other side while you make the second seam.

Melting vinyl will release fumes! It's best to do these next few steps outside, or in a very well ventilated area.
Place the vinyl on top of your metal bowl and get it as centered as possible. It may help to prop your bowl up on something if your jellyfish shape is deeper than the curve of your bowl. Let the sides dangle down.

Now it's time to sculpt your jellyfish using your heat gun. This vinyl is pretty thick, but it still acts like shrink-wrap if you're patient. Start in the center and work your way out to the sides. The idea is to get the vinyl to shrink and mold itself to the bowl.

This is very satisfying.

I spent about 15-20 minutes heat-sculpting each jellyfish. I kept my heat gun on high, and got the most interesting results when I was brave enough to get the vinyl hot enough that it got very close to the melting point. The hot vinyl shrinks and crinkles and the colors melt into each other, letting the rainbows out.
The vinyl will thicken up and hold its shape to a certain extent. For smaller jellies, heat-forming the vinyl was sufficient to get them to keep their shape. The larger ones need a little more structure to keep from collapsing and turning into jellyfish tacos under the weight of the vinyl.

To keep the jellyfish round, I added a circle of 18g steel wire to the top side of the jelly. Since these will be hanging from a high ceiling, the wire will not be visible or obvious if it's on the top side. If your jellies will be hanging at eye-level, you can put the wire on the underside.

I used clear packing tape to fix the wire to the smooth section of the jellyfish body.

Balance the jellyfish on the tip of your finger to find the exact center by weight, so it'll hang straight. Poke a hole in this spot with an awl for your hanging wire.
Tentacles

I'm using iridescent sequin fabric torn into strips of varying lengths, as well as silver tubular crin ribbon for my tentacles. The iridescent sequins catch the light beautifully and match very well with the iridescent vinyl tops.

Cut your tentacles to the desired length and set them aside. We'll add them during final assembly.

Final Assembly

Bend your NeoPixel strip into a ring with the pixels facing outwards. Use a cable tie to secure the ends together.
Use another cable tie to secure the pixels and wires to the board so that the ring dangles below. This is a little trickier with the QT PY since it's so small, but it's doable.

Be sure to catch the wires inside the cable tie. This will provide strain relief so the wires won't accidentally pull out of the board.
Now it's time to add your tentacles. The tentacles will diffuse the pixels for a nice soft reflective look.

I tied a couple pieces of tubular crin to the bottom of my pixel loop, then cut a small slit in the sequin fabric and slipped the microcontroller through, so the fabric hangs on both sides of the pixel strip, covering the lights completely.
Slip the end of your USB cable through the hole in the top of your jellyfish head. Plug it into your board. Add another cable tie around the board and cord so the weight of the jellyfish is NOT hanging from the USB port.

Add another cable tie on the outside of the jellyfish around the cord so the microcontroller stays in place.

Pull a bit on your cord and make sure that all the strain is taken by the cable and the cable ties, and that nothing is pulling unduly on the LEDs or the microcontroller.
Hang your lamp up to see the NeoPixel animations reflect and shift inside the iridescent hood.

Expansion

Making one jellyfish lamp is fun. Making multiple jellies and syncing them together is much more fun. This is really easy to do with WLED.

There are three methods for doing this:
1. Add more LED strips on the same controller

WLED will support up to 3 strips on the same controller, soldered to different pins. You can control the strips together or individually.

2. Add more pixels to the same strip

Alternatively, you can solder a wire to the D0 (data out) pin on your NeoPixel strip and run it to a second NeoPixel strip's DI (data in) pin. You'll need to connect power and ground as well. Think of it as one strip that's been cut into sections with wire running between them - it still acts as one strip, just with some extra space between the pixels.

I made 50 jellyfish and wired them all together as a large scale art installation.

3. Sync Multiple Controllers Together

WLED will find multiple controllers on the same network and sync them together. Using this method, you can place multiple jellyfish in different locations (as long as they're within around 400 feet of each other) and the jellyfish will "talk" to each other. Your WLED animations will run on all the controllers, without having to wire them together.

This type of thing used to be difficult to achieve, but it's really easy in WLED.