Jellyfish Umbrella with easy WLED WiFi Control

Created by Erin St Blaine

https://learn.adafruit.com/jellyfish-umbrella-with-easy-wled-wifi-control

Last updated on 2023-09-18 08:47:07 PM EDT
Table of Contents

Overview 3
- Parts

WLED Software 6
- Driver Update
- Install WLED
- Setup & Preferences
- WiFi Setup
- LED Preferences

Wiring Diagram 9

Wiring 10

Jellyfish Build 14
- Inspiration

Use It 18
Overview

Make a jellyfish umbrella with animated lights, with no coding required. It looks beautiful in the evening! Make your jellyfish dance and flow with lights, tentacles, and iridescence.

This is an intermediate project that gives you advanced results. The software is simple to load and use. Hundreds of animations and color combinations are available right through your fingertips, using any web browser or the free WLED app on your phone.

The trickiest part of this tutorial is the wiring. There are a lot of connections to make and some challenging soldering to do, but the rest of the build is fairly easy.

This project would make a great camp "totem" for festivals, or a wonderful costume if it's built onto an umbrella hat. It's also easy to synch two or more jellyfish together over WiFi using WLED.
Parts

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

Adafruit NeoPixel Slim LED Dot Strand - 20 LEDs at 2" Pitch
We have all sorts of LED strips for a wide range of needs. Chonky strips? We got those!
https://www.adafruit.com/product/5225

Battery Power

There are a lot of options for powering your jellyfish. If you're making this for a kid or planning to use it in the rain, your best option is this AAA battery pack. It has its own on/off switch, and it's easy to find replacement batteries wherever you roam.

3 x AAA Battery Holder with On/Off Switch and 2-Pin JST
This battery holder connects 3 AAA batteries together in series for powering all kinds of projects. We spec’d these out because the box is slim, and 3 AAA's add up to about...
https://www.adafruit.com/product/727
If you're looking for a longer-lasting rechargeable solution and you know how to be careful with things, consider this Lithium Ion Polymer battery. This project can suck batteries dry fairly quickly, so a big beefy rechargeable battery will save you money and be greener in the long run. If you go this route, you'll also need an on/off switch and a battery charger.

![Lithium Ion Polymer Battery - 3.7v 2500mAh](image)

Lithium-ion polymer (also known as 'lipo' or 'lipoly') batteries are thin, light, and powerful. The output ranges from 4.2V when completely charged to 3.7V. This...

https://www.adafruit.com/product/328

1 x **Battery Charger**  
Adafruit Micro Lipo - USB Lilon/LiPoly charger - v2  
https://www.adafruit.com/product/1304

1 x **On/Off Switch**  
Tactile On/Off Switch with Leads  
https://www.adafruit.com/product/1092

Whatever type of power you use, you'll need a battery connector. It never hurts to pick up some heat shrink as well.

1 x **Battery Connector**  
JST PH 2-Pin Cable – Male Header 200mm  
https://www.adafruit.com/product/3814

1 x **Heat Shrink**  
Heat Shrink Pack  
https://www.adafruit.com/product/344

**Testing Hardware**

During the build of this project, I found it invaluable to have a Circuit Playground Express board with some alligator clips for testing the LED strips. The particular LED strips used in this project are not marked in any way, so testing the directionality is essential before soldering. The Circuit Playground Express makes this really easy to do. It's a great board to have on-hand for prototyping all kinds of projects.
Circuit Playground Express
Circuit Playground Express is the next step towards a perfect introduction to electronics and programming. We've taken the original Circuit Playground Classic and...
https://www.adafruit.com/product/3333

1 x Alligator Clips
Small Alligator Clip Test Lead (set of 6)
https://www.adafruit.com/product/4100

Additional Materials

- An Umbrella: I used this iridescent vinyl one from Amazon ()
- Tentacle fabric, ribbons, tubular crin, ruffles, etc
- Industrial Velcro for securing electronics and batteries
- E6000 glue ()

Tools

- Soldering iron & accessories
- Wire cutters & strippers
- Heat gun for the heat shrink

WLED Software

Driver Update

Some versions of the QT Py have a new serial chip which needs a driver installed before we can install WLED. Head over to the Adafruit How to Install Drivers for WCH USB to Serial Chips () tutorial, and download and install the new driver.

If you have an older 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://umbrella.local -- this is what I type into any web browser on my WiFi network in order to connect to my project.
LED Preferences
We need to change just a couple settings in the app to get the lights running correctly. Click the LED Preferences tab and scroll down to Hardware Setup. Enter the total number of LEDs in your strip under "Length". My strands have 20 each so I entered 20.

Our data pins will be connected to A0 (aka pin 26) and A1 (aka pin 25) on the QT Py, so make GPIO pin 26, then click the "+" button and add a second strand on pin 25.

WLED automatically sees the second strand as connected end-to-end with the first strand, so these lights will be numbered 21-40. We can change this later if desired.

Wiring Diagram
The four LED strips on the top of the jellyfish will all be wired in parallel, with data wire going to pin A0. The two light strips inside the tentacles will be wired in parallel to pin A1.

The power and ground wires from all 6 strips will connect together before connecting to the on/off switch and battery, and from there to the QT Py (power to 5v and ground to G).

With this configuration, all 4 of the top lights will mirror each other, acting as if they’re the same strip. The same will happen to the bottom 2 lights. WLED will automatically chain the two data pins, so the animation will run down the top of the umbrella and then continue down the tentacles.

---

**Wiring**

Grab your on/off switch and JST connector. Cut the red wire in half. Trim the switch leads a bit, if desired, and solder one side of the red wire to each leg of the switch. It doesn't matter which leg goes to which side. Heat-shrink tubing over the connections prevents electrical shorts... remember to slide this on the wire before soldering.
Cut the female connector off the end of one of your LED strands. Hook up the three wires to your tester. On my strands, the left most wire (with the resin bump on the LEDs facing you) is power, the middle wire is ground, and the one on the right is data.

It's very important to test these and make sure you have the connections right. These strips are not marked in any way, and we've gotten inconsistent wiring with different lots, so testing is essential. If you can't get the lights to come on, play around with different configurations or try connecting data to the other end.

Here is a guide showing how to set up your Circuit Playground Express as a tester using MakeCode.

Once you've established your wiring, it's a good idea to mark the wires with some heat shrink or tape so you keep them straight.

Strip a generous 1/4” of shielding from each wire. Do the same with your second strip and twist the wires together: power to power, ground to ground, and data to data.

Hook both wires back up to your tester and make sure they're both working.
Make two more twisted pairs of strands with your remaining four LED strips. Cut four short wires for the next connection: red for power, black for ground, and two colored data wires.

We're going for a set of two strands and a set of four strands. The two-strand set will become the tentacle lights, and the four strand set will become the lights on the top of the jellyfish.

Twist two of your twisted pairs together to form a quad. Solder a red, black, and colored wire to the power, ground, and data clusters. Cover the connections with heat shrink.

Do the same with the remaining twisted pair.
Let's keep consolidating wires! Twist the power and ground wires from your pair and your quad together and solder on another single red and black wire.

Leave the data wires separate.

Twist another short red wire and black wire onto the JST connector and power switch as shown. Solder the switch's red and black wires to the LED strand cluster's power and ground wires.

You should be left with a whole mess of wires that are soldered together, and four wires left unconnected: a power wire, a ground wire, and two data wires.
Finally, we'll wire up the QT Py. Red goes to 5v, black goes to G, the quad data wire goes to A0 and the pair data wire goes to A1.

If desired, trim the connectors off the other ends of the strips. You can seal them up with some heat shrink to keep them safe from moisture or shorting.

Or, you can plug in another strip to each one and make very long jellyfish tentacles! It's easy to add more lights with these strips. Just remember to change the strip length in your Config page on WLED.

Jellyfish Build

I added some industrial velcro around the post at the top of the umbrella and also stuck some to my battery. This will hold the battery in place so it doesn't flop around, but makes it easy to pull out for charging.

I placed the four quad strips right at the top center and wound them around every other spoke on the umbrella, and let them dangle off the ends.
Now it's time to decorate. I used E6000 glue to glue a strip of sequin fabric around the perimeter of the umbrella. I used a lot of strips of fabric, ribbons, and spiral-cut organza in the center of my umbrella.

For the top, I cut a large circle of organza and finished the edge on my serger. I draped it over the top of the umbrella and sewed it to the posts at the ends. I used some FrayCheck to keep it from unraveling around the holes.

I sewed tentacles to the four corners that have dangling lights. I used two strips of fabric and stitched the lights inside, so they're a bit diffused and also protected from the elements.
I added tentacles on the other four umbrella points (the ones without lights) as well. More is more, here. It's great to add different types of fabrics and textures. Ruffles work great.

- Large tentacles: sparkly iridescent sequin fabric
- Small tentacles: silver tubular crin

Inspiration

Here are a few examples of other builds I've run into in the wild, for inspiration!
Use It

Head to umbrella.local in your web browser on your computer or your phone.

We have two different light strands soldered to two different pins. By default, the tentacle lights act like an extension of the top lights. WLED treats the two pins like one continuous strand with 40 lights. You also have the option to treat them as two separate segments and run different animations on the two areas. If you want to do this, click “add segment” and create a separate segment for the tentacle lights. There’s a lot of documentation on how this works but it’s pretty user-friendly so play around with it and see what configurations you like.
Choose an effect and a color palette and watch your lights change. When you find a setting you like, you can save it as a preset.

Then, you can string all your presets together into a playlist. You have control over the order of presets, the length of time they play and the transition time.

Since I’m taking this out to a festival where there won’t be WiFi control, I’m going to set up my playlist to start automatically when I turn it on. Take note of the number assigned to your playlist. Click config and LED preferences and scroll down to Defaults. You can tell it which preset or playlist you’d like to start with by entering its number here. Now your project will still run your animations when you’re not near a WiFi controller.