Tent Lantern
Created by Timothy Reese

https://learn.adafruit.com/tent-lantern

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Overview

Camping is fun, especially at night. Moon overhead, twinkling stars, campfires, rotating bear watches.

But there aren't campfires in my tent. Sometimes, you just need light.

Introducing... the tent lantern.

When it's 3 AM and I don't want to disturb other campers, or reset my night-adjusted eyes, I need a gentle light. A headlamp is best suited for your head, and a flashlight is great for your hand. And both are too bright on their normal setting.

This 3D printed lantern features a 1200 mAh battery with charging circuit, two large LED backlights, and a hooked handle allowing you to hang on closed loops.

Things you'll need:

- 3D Printer
- Soldering Iron
- Pliers, specifically needle nose, regular/broad, and snipping
- Flush cutters
- #000 Screwdriver
- 2x 100 Ohm resistors
- 5x M2 10mm Pan head screws: McMaster [](http://McMaster.com)
- SPDT Slide Switch
- 1200 mAh LiPo Battery
- Heat gun and heatshrink, or a hot melt glue gun
- Takeout food box handle

What You'll Learn:

- How to improvise with hot glue instead of heat shrink
- How to widen a screw hole in a 3D print
- How to turn a takeout food box handle into a useful accessory
3D Printing

Click here to download the .STL files for the tent lantern

Only the tray requires supports, the rest can be printed without.

Code

If you're just going to have the LED ON all the time you can remove the Pro Trinket and just wire the LED directly to the battery through a switch, but we wanted to have the option to add more functionality later.

You can keep the Pro Trinket if you want to have the output PWM'd for lower brightness, or blink for alerts.

The code for this is extremely straightforward.

```c
/*
 * Tent Lantern project by Timothy Reese
 * https://www.learn.adafruit.com/tent-lantern
 */

void setup() {
    // initialize digital pin 12 as the output
    pinMode(12, OUTPUT);
}
```
void loop() {
  digitalWrite(12, HIGH);  //turn the LED Modules on
}

Assembly

Wiring Diagram

![Tent Lantern Wiring Diagram](image)

Never solder with a LiPo Battery attached

Soldering

Begin by tinning your wires.
Solder wires to the BAT, G, and 5V pins on the Pro Trinket.

This Pro Trinket was desoldered from its original backpack, so the pins look a little messy.

Connect these three wires to their designated pins on the Pro Trinket Backpack, and solder a bridge for the +500 mAh pin on the back (if using the 1200 mAh battery.)
Slice through the bridged track on top of the Backpack.

Solder in two wires for the switch.
You'll need to splice the G wire to accommodate the LEDs. Tinning the spliced wire is as simple as tinning a stripped wire.
If using any heatshrink, remember to put it on the wire before you solder.

Next, solder in the spliced wire for the first LED module.
I like to use the hook method for connecting two wires.
Then slide the heatshrink tubing down.

We’ll be connecting the (+) pin on the LED Modules to pin 12.
Connect a 100 Ohm resistor between the wire connected to Pin 12, and the (+) lead of the first LED Module.
Next, upload the sketch to test your circuit.

Splice in two more wires for the second LED Module, making sure to splice the (+) wire between Pin 12, and the resistor attached to LED Module 1.
Repeat the connection steps for LED Module 2. Then, test the circuit!

Heatshrink:

I'm a big fan of using a heat gun with heatshrink.

Do not apply too much heat to the LED Modules, or they'll become damaged.
A lighter also works, but I've found this to be both too dangerous to the project, and far too unpredictable.

If you need to use heatshrink on the spliced joints, use a slightly oversized diameter, and fold one wire backwards.

What If I Don't Have a Heat Gun?

Use hot melt glue!
Hot Glue Toothpick Trick!

If you need to apply a large blob to cover the connection, use a toothpick like a honey stick. Stick it into the hot glue, and twist it over itself to make something resembling rock candy. The natural attraction of the glue to itself will cause it to wrap around the stick evenly, and out of your project.

Starting Screws Trick!

If you are having trouble getting the M2 screws to thread into the holes, use the tip of the #000 screwdriver to spread the opening, like a chamfer.
Whoops.

At this point in the project, I discovered my tolerances had been incorrect. Since I was out of enough silver filament to finish the entire project, I had to make do with purple and white PLA, white Ninjaflex for the tray, and silver PLA for the cap.

While I quite like the white and purple mix, I do not recommend using Ninjaflex in this project.
Final Assembly

The side of the cap with the smaller holes goes touches the tray. The larger holes are countersunk for the pan head screws.

Tin the contacts for the switch.
Feed the button wires from the Backpack through the switch slot in the tray, and solder them to the switch.

Now attach the battery, and test the connection.
Use an M2 screw to affix the Backpack to the Tray. Push the Pro Trinket into its slot.

Push the LiPo battery into its pocket, and plug it into the Backpack.
Push the LED Modules on either side of the tray, like a sandwich, and slide the entire assembly into the tent lantern body.

The LED Modules only shine through one side, check the orientation before sliding it into place.

Push the switch into its space on the cap, and then attach the cap to the body using the 4x M2 screws.
Wire Hanger

Beginning with the humble takeout food box, remove the handle.

Use a pair of needle nose pliers to straighten the loops.
Using the needle nose pliers, put a single bend in the center of the wire.

Next, work an M shape into the wire, making sure to keep the segments shorter than the depth of the tent lantern body.
Put another bend on either side of the M, only this time make each bend half the length of the first two legs.

Straighten out the rest of the wire.
Using a pair of broad pliers, put a bend into the peaks and troughs of the M shape, so that the whole surface is curved like the beaks of birds.

Rebend the straightened wire to line up with the holes in top of the body.
Push the wire down until the M is relatively flush with the top of the body. Below you can see the curve in the M.

Using broad pliers, curl the wire back onto itself in the channels on the sides of the body, so that the M is able to sit flush against the body. The length of the wire left determines the length of the hanger.
Use snips to trim off the excess wire, leaving a single loop on either side.
The hanger is done!
Now with the hanger, you can put it through closed loops.