Circuit Playground Gizmo Ornaments

Created by Ruiz Brothers

https://learn.adafruit.com/display-ornaments-with-circuit-playground

Last updated on 2023-08-29 04:20:41 PM EDT
# Table of Contents

## Overview
- Holiday Ornament with Displays
- TFT Gizmo Ornament
- E-Ink Gizmo Ornament
- Circuit Playground Ornaments
- Parts

## Software
- Install Latest Circuit Python
- Setup Circuit Playground Bluefruit / Express
- BLE Image Transfer with TFT Gizmo
- Display Bitmap Images on E-ink Gizmo
- Tri-Color Demo Bitmaps
- Circuit Playground Ornaments
- NeoPixel Christmas Tree Animations

## Circuit Diagram
- Circuit Diagram
- Adafruit Library for Fritzing
- On/Off Battery Switch
- Slide Switch JST Adapter

## 3D Printing
- E-Ink Gizmo Ornament Parts
- TFT Gizmo Ornament Parts
- Circuit Playground Ornament Parts
- Ornament Covers for Circuit Playground
- Snap Fit Ornaments
- Slice Parts
- Design Source Files

### eInk Gizmo Ornament
- eInk Gizmo Parts
- Install Battery
- Install Circuit Playground
- Install Mount
- USB Port
- Install Top
- Installed Top
- Battery Connection
- Install Cover
- eInk Gizmo Ornament

### TFT Gizmo Ornament
- Parts
- Install Battery
- Install Circuit Playground Bluefruit
- Install Mount
- Battery Connection
- Install Top
- Installed Top
- Install Cover
• USB Port
• TFT Gizmo Ornament

**CPB Ornament**

• Slide Switch JST Adapter
• Connecting The CP Bluefruit to the Switch
• Install Switch
• Installed Switch
• Install Battery
• Connect CPB
• Install Top Half
• Snap Fit CPB
• Snap Fit Case
• Installed Top Half
• USB Port
• Install Cover
• Ornament
Overview

Holiday Ornament with Displays
3D print your own ornaments with a display! Use the TFT Gizmo or E-ink Gizmo to display custom images with the Circuit Playground Bluefruit. The 3D printed ornament is designed to snap fit together for an easy assembly!

TFT Gizmo Ornament
The TFT Gizmo features an IPS 240x240 hi-res full color display that is perfect for displaying family photos, text and graphics. With the Circuit Playground Bluefruit, you can wirelessly send images from a mobile device using the Bluefruit LE Connect app for iOS and Android.
E-Ink Gizmo Ornament
The E-ink Gizmo features a tri-color e-ink/e-paper display. This is great for displaying images and graphics without a battery! Perfect for adorning your festive decor without having to worry about the a dead battery. With CircuitPython, you can easily display bitmap images on the crisp tri-color e-ink/e-paper display.

Circuit Playground Ornaments
The Circuit Playground Express and Bluefruit feature 10 NeoPixel RGB LEDs for lighting up 3D printed ornaments. With interchangeable covers, you can easily swap out the top for a different graphic. You can even add a photo to create a lithophane images.

Parts
Circuit Playground Bluefruit - Bluetooth Low Energy
Circuit Playground Bluefruit is our third board in the Circuit Playground series, another step towards a perfect introduction to electronics and programming. We've...
https://www.adafruit.com/product/4333
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

Circuit Playground 152x152 Tri-Color E-Ink Gizmo
Discontinued - you can grab Circuit Playground 200x200 Tri-Color E-Ink Gizmo instead! Extend and...
https://www.adafruit.com/product/4428

Lithium Ion Polymer Battery with Short Cable - 3.7V 350mAh
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/4237

Fully Reversible Pink/Purple USB A to micro B Cable - 1m long
This cable is not only super-fashionable, with a woven pink and purple Blinka-like pattern, it's also fully reversible! That's right, you will save seconds a day by...
https://www.adafruit.com/product/4111
Software

Install Latest Circuit Python

We'll need to get our board setup so we can run the project's CircuitPython code. Let's walk through these steps to get the latest version of CircuitPython onto your board.
Setup Circuit Playground Bluefruit / Express

Choose whether you'd like to use the Bluefruit or Express version of Circuit Playground. Ensure you have CircuitPython loaded per the linked instructions below. The main difference is the Bluefruit version features Bluetooth connectivity.

- Instructions for the Circuit Playground Express ()
- Instructions for the Circuit Playground Bluefruit ()

This project needs version 5.0.0-beta.0 or higher.

BLE Image Transfer with TFT Gizmo

Using the Circuit Playground Bluefruit and TFT Gizmo, you can wirelessly beam images from a mobile device. This is great if you’re looking to easily change the images on the TFT Gizmo. Follow the learn guide linked below to get the UF2 file. Walk through the learn guide if you're new to installing UF2 files onto the board.

Display Bitmap Images on E-ink Gizmo

Using the Circuit Playground Express/Bluefruit and E-ink Gizmo, you can display tri-color bitmap images. This is great for display artwork and graphics with text. The benefit of an E-ink display over a TFT LCD is the image will stay present without a power source!

Tri-Color Demo Bitmaps

We put together these festive bitmap images for you. Click the image to launch the asset page and download the original image to obtain the bitmap.

Follow the learn guide linked below and walk through the guide to get bitmap images loaded onto the E-ink Gizmo.'
Circuit Playground Ornaments

The Circuit Playground Express and Bluefruit feature 10 super-bright NeoPixel RGB LEDs. These can be animated or any color. Using the Circuit Playground Bluefruit and Bluefruit LE connect app, you can easily change the colors using the color picker.

BLE Color Picker on Circuit Playground Bluefruit Learn Guide

NeoPixel Christmas Tree Animations

If you'd like to use the Circuit Playground Express, try using the code from our Circuit Playground Christmas tree project linked below.

NeoPixel Christmas Tree Learn Guide

Circuit Diagram

The diagram below provides a visual reference for wiring of the components. This diagrams was created using the software package [Fritzing](https://fritzing.org/).
Adafruit Library for Fritzing

Use Adafruit's Fritzing parts library to create circuit diagrams for your projects. Download the library or just grab individual parts. Get the library and parts from [GitHub - Adafruit Fritzing Parts](https://github.com/Adafruit/Adafruit_FritzingParts).

---

**On/Off Battery Switch**

The battery is connected to a slide switch switch via a 2-pin JST cable. The voltage (red) wire is connected in-line with the slide switch. Use the middle pin and either the left or right pins. This allows the power to be turned on and off.

**Slide Switch JST Adapter**

A slide switch will allow the power to be turned on and off. A slide switch is wired in-line with a JST extension cable. For a detailed tutorial on wiring a slide switch JST adapter, check out our guide.

[Slide Switch JST Adapter](https://www.adafruit.com/datasheets/SlideSwitchJSTAdapter.pdf)
3D Printing

E-Ink Gizmo Ornament Parts
These parts are designed to house the E-Ink Gizmo and Circuit Playground (Express or Bluefruit). The parts snap fit together and secure the PCBs in place without the need for glue or screws.

gizor-eink-cover.stl
gizor-eink-bottom.stl
gizor-eink-top.stl

TFT Gizmo Ornament Parts
These parts are designed to house the TFT Gizmo and Circuit Playground Bluefruit. The parts snap fit together and secure the PCBs in place without the need for glue or screws.

gizor-tft-cover.stl
gizor-tft-bottom.stl
gizor-tft-top.stl

Circuit Playground Ornament Parts
These ornaments are designed to house a single Circuit Playground, battery and slide switch. Covers are designed to screw in and easily swapped. These covers can achieve great illumination if printed in a translucent material.

cp-orn-mount.stl
cp-orn-bottom.stl
cp-orn-cover-blank.stl
cp-orn-cover-photos.stl
Ornament Covers for Circuit Playground

From simple to more extravagant, snowflakes could be made by hand drawing, vinyl cutting, or 3d printing. Super gluing these details over the ornament covers create a masking effect that really brings out the patterns. Try printing them in a dark material to achieve a masking effect.

Snap Fit Ornaments

These ornaments do not feature any electronics. These snap fit together and feature an insert that spins freely (a la fidget spinner). We've included a number of different inserts to choose from and it's easy to swap them out.

orn-snap-top.stl
orn-snap-bot.stl

Download CAD Files

Slice Parts

STL files for 3D printing are oriented to print "as-is" on FDM style machines. Original design source may be downloaded using the links below.

The parts were sliced using CURA using the slice settings below. The parts were 3D printed using PETG filament.

PETG filament 250c extruder
0.2 layer height
10% gyroid infill
60mm/s print speed
60c heated bed
Design Source Files
The project assembly was designed in Fusion 360. This can be downloaded in different formats like STEP, SAT and more. Electronic components like Adafruit's board, displays, connectors and more can be downloaded from our Adafruit CAD parts GitHub Repo.

eInk Gizmo Ornament

eInk Gizmo Parts
The eInk Gizmo is designed to be bolted on top of the Circuit Playground (Express and Bluefruit versions). To make the ornaments portable, use a 350mah battery – It is small enough to fit in between the PCBs and should have enough power for several hours.

Install Battery
Place the 350mAh battery in the center of the PCB with the battery cable pointing towards the audio connector (opposite side of the USB label). The battery is small enough to fit in between the standoffs.
Install Circuit Playground
Place the Circuit Playground Express over the standoffs with the USB port lined up with the USB label. The PCBs are secured with M3 x 6mm machine screws (included with the E-Ink Gizmo). In order for the Gizmo and CPX to fit the 3D printed ornament, use only 10 screws. Reference the photo for the correct placement of screws.

Install Mount
Place the 3D printed mount over the PCBs. The edge of the CPX will snap fit into the sides of the mount. Press the mount into the CPX so it is flush with the PCB. Reference the photo for correct placement.

USB Port
The USB port on the CPX is accessible for programming. The 3D printed mount features a notch to accommodate USB cables.
Install Top
The top half of the 3D printed ornament is placed over the eInk Gizmo. Line up the hook loop with the USB port on the CPX. Fit the snaps of the top half with match one on the mount. Press the two halves together to snap them them. Start with one side first and work your way to all three.

Installed Top
The top half features open top and bottoms to allow for a modular design. The front cover can be easily swapped for a different color or updated design.

Battery Connection
The JST connector from the battery can be directly plugged into the battery port on the CPX. The battery cable is just long enough (25mm / 1in) to reach. It can be pulled out to cut power from the eInk Gizmo and CPX. The cable can also be tucked under the notch on the edge of the mount.
Install Cover
Place the top cover over the display. Orient the cover so it's lined up correctly with the screen. Press the edges to snap fit them together. Start with one side and work your way through all four.

eInk Gizmo Ornament
With your ornament setup, it's now ready for a festive celebration!

TFT Gizmo Ornament

Parts
The TFT Gizmo can be attached to the Circuit Playground (either Express or Bluefruit versions). For this particular project, we're using the Bluefruit version. This allows for image transfer from a mobile device via Bluetooth. Use a 350mAh battery with short cable to make it portable.
Install Battery
Place the battery in between the standoffs with the battery cable facing the audio connector (opposite side of the 12 o'clock label).

Install Circuit Playground Bluefruit
Place the Circuit Playground Bluefruit over the standoffs with the USB port lined up with the 12 o'clock label. Install the included screws to the pads on the Circuit Playground Bluefruit. This particular project only needs 10 of the 12 screws installed. Reference the photo for correct placement.

Install Mount
Fit the CPB and TFT Gizmo inside the 3D printed mount. Press the mounting tabs into the pads so the PCB sits flush.
Battery Connection
The battery can be plugged directly into the JST port on the CPB to make it portable. The battery cable is just long enough (25mm / 1in) to reach. It can be pulled out to cut power from the TFT Gizmo and CPB. The cable can also be tucked under the notch on the edge of the mount.

Install Top
The top half of the 3D printed ornament is placed over the TFT Gizmo. Line up the hook loop with the USB port on the CPB. Fit the snaps of the top half with match one on the mount. Press the two halves together to snap them. Start with one side first and work your way to all three.

Installed Top
The top half features open top and bottoms to allow for a modular design. The front cover can be easily swapped for a different color or updated design.
Install Cover
Place the top cover over the display. Orient the cover so it's lined up correctly with the screen. Press the edges to snap fit them together. Start with one side and work your way through all four.

USB Port
The USB port on the CPX is accessible for programming. The 3d printed mount features a notch to accommodate USB cables.

TFT Gizmo Ornament
With your ornament setup, it's now ready for a festive celebration!
CPB Ornament

Slide Switch JST Adapter
A slide switch will allow the power to be turned on and off. The switch is wired in-line with a JST extension cable. For a detailed tutorial on wiring a slide switch JST adapter, check out our guide.

Slide Switch Adapter Learn Guide

Connecting The CP Bluefruit to the Switch
Connect the female JST connector from the slide switch to the battery port on the CPB. Plug in the male JST connector from the switch to the battery cable. Use the slide switch to turn toggle the power from the battery on and off. Once tested, unplug the CPB and set it aside for now.

Install Switch
Fit the slide switch into the holder on the inside of the bottom half. Insert the body of the switch at an angle and press down to fit into place.
Installed Switch
The slide switch is accessible through the side of the bottom half. It features a flat surface to more easily turn the switch on and off.

Install Battery
Place the battery into the bottom half with the battery cable fitted inside. Arrange the battery and cable so it's full inside the bottom in a stationary position.

Connect CPB
Grab the CPB and connect the JST cable from the switch.
Install Top Half
Fit the CPB through the top half of the 3d printed ornament.

Snap Fit CPB
Orient the CPB so the USB port is lined up with the hook loop on the top half. Press to snap fit the CPB into the top half of the ornament.

Snap Fit Case
Fit the top half over the bottom half. Press halves together to snap fit shut. Start with one set of snaps and work your way through all four.
Installed Top Half
The top half of the ornament features a thread for screwing a cover on top. This allows for multiple cover designs so it's easy to swap them out.

USB Port
The USB port from the CPB is accessible through the opening on the side of the ornament. The hole is large enough to fit even the most chunkiest of USB cables.

Install Cover
Twist the cover inside the top half of the ornament and fasten tightly. Remember, righty tighty, lefty loosey.
Ornament
Flip the switch to turn on the Circuit Playground Bluefruit. Your ornament is now ready for adoring and celebrating.