



# AdaBox 011

Created by John Park



<https://learn.adafruit.com/adabox011>

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# Introduction

Hi there!

[If you're looking to subscribe to AdaBox, click here! \(https://adafru.it/tNC\)](https://adafru.it/tNC)

Oh! Hello! If you're here, (and we suspect you are) it's because you were given the gift of electronics and Internet of Things (IoT) devices with an AdaBox! Perhaps you are a beginner who is getting started with your AdaBox. Or maybe you just want to relive what it's like being a beginner at electronics and coding again. But most of all, you want to learn how to build and make creative, awesome stuff with electronics and code! [\(If, rather than learn electronics and coding, you'd like to look at pictures of cats instead, please check https://www.adafruit.com/galleries/cats-of-engineering \(https://adafru.it/oAd\)](#) But if we're being honest, learning electronics and coding will inevitably lead to even more efficient, creative, and high-tech cat picture viewing. It's pretty much cats all the way down, people.)

Anyway, back to our story: You're in luck: there's never been a better time. Seriously. We're not just saying that. It's bananas how great a time this is for you to learn electronics and coding!

Gone are the days where you need thousands of dollars of equipment and lots physics/math background. If you have a dream of an interactive IoT device, you can build it! Want to wirelessly grab stats from the Internet to display? You can do it! How about an automatically updating, endless stream of cat pictures or Dune quotes right on your desk?

Oh, and animated cat GIFs! How could we forget about those adorable fuzzballs? The dream is yours to realize! Always wanted your own weather station, or IoT data logger? Why didn't you say so?! NOW is the time to build it with the Adafruit PyPortal and a bit of coding in CircuitPython or Arduino!

Thanks to the generous sponsorship and support from [Analog Devices \(https://adafru.it/DPF\)](https://adafru.it/DPF) and [Digi-Key \(https://adafru.it/BJr\)](https://adafru.it/BJr), we've even included a fancy precision temperature sensor! Each PyPortal comes with an [ADT7410 \(https://adafru.it/EaC\)](https://adafru.it/EaC) sensor built right in, so you can display the local temperature or use the PyPortal as a remote temperature logger and sensor that uploads data to our free [adafruit.io \(https://adafru.it/fJs\)](https://adafru.it/fJs) IoT service.

## Who is this for?

Anyone who's interested in open source, compact, wirelessly connected Internet of Things devices with high resolution touch screens, sensors, and more, that's who! If you want to learn how to code your own IoT widget, this is for you! Oh, and with access to a modern web browser. That's pretty much the minimum. Remember, this guide is specifically for people who have purchased or received an AdaBox subscription!

**You don't need to know a lot of physics or math**, and just like an Art Degree isn't required for making art and being creative, **you don't need to have a computer science or engineering degree**. It helps if you're comfortable using computers, but that's a skill most people pick up through life.

**If you know how to program already - great! If not, don't worry, we'll teach you enough to be dangerous, yet effective!**

## Who isn't this for?

While you can follow along without an AdaBox, it will not make as much sense unless you have all of the components and more which either came as a gift or purchased yourself - remember, the goal is helping beginners!

If you're an expert, please visit our hundreds other tutorials and jump right in at [learn.adafruit.com \(https://adafru.it/dlu\)](https://adafru.it/dlu)

## Who are you?

Great question. This is me:

I'm Ladyada, and I love to teach people how to build stuff and how they can be creative with technology.

So, are you ready?

Let's do this thing!

## Want to buy past AdaBoxes?



### [AdaBox001 - Welcome to the Feather Ecosystem](#)

Please note! This is NOT the subscription version of AdaBox! This is ONLY AdaBox001 that shipped out to AdaBox subscribers in September of 2016. This...

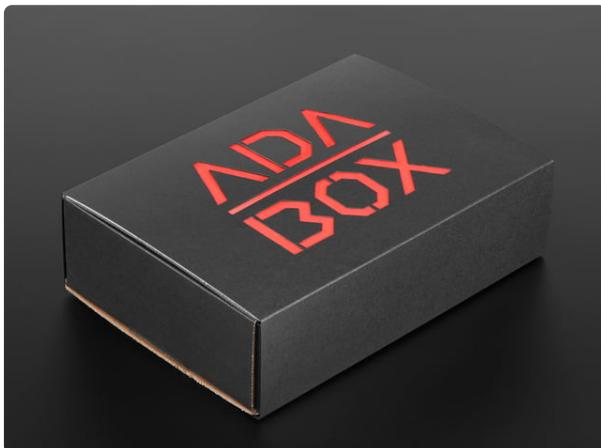
<https://www.adafruit.com/product/3193>



### [AdaBox002 – Making Things Move](#)

AdaBox002 - Making Things Move with our Feather Bluetooth LE Mini Robot Rover is the perfect gift for folks who are just getting started in the...

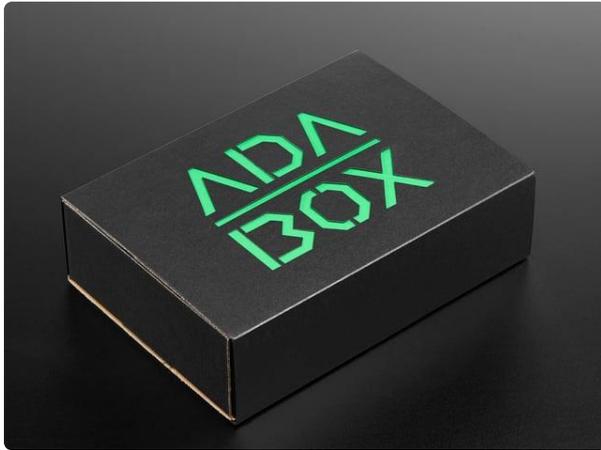
<https://www.adafruit.com/product/3235>



### [AdaBox003 – The World of IoT – Curated by Digi-Key](#)

AdaBox003 – The World of IoT (Curated by Digi-Key) is the perfect gift for folks who are just getting started in the world of DIY electronics. It's an...

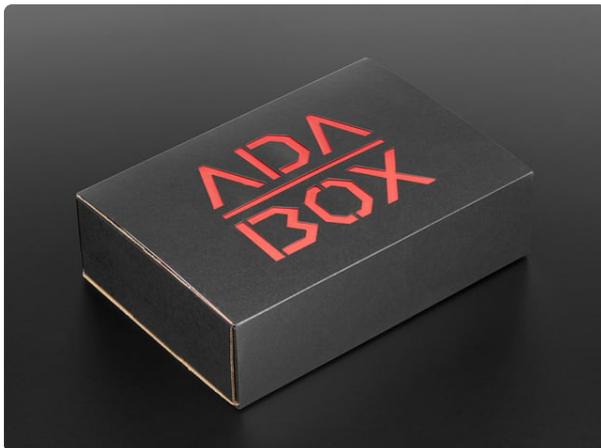
<https://www.adafruit.com/product/3268>



#### [AdaBox004 – Making Things Dance](#)

AdaBox004 – Making Things Dance is the perfect gift for folks who are just getting started in the world of DIY electronics. It's an excellent...

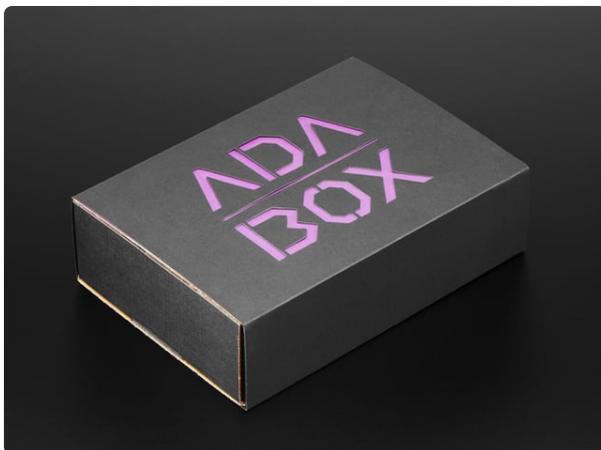
<https://www.adafruit.com/product/3370>



#### [AdaBox005 – Break for Pi](#)

AdaBox005 – Break for Pi is the perfect gift for folks who are just getting started in the world of DIY electronics. It's an excellent...

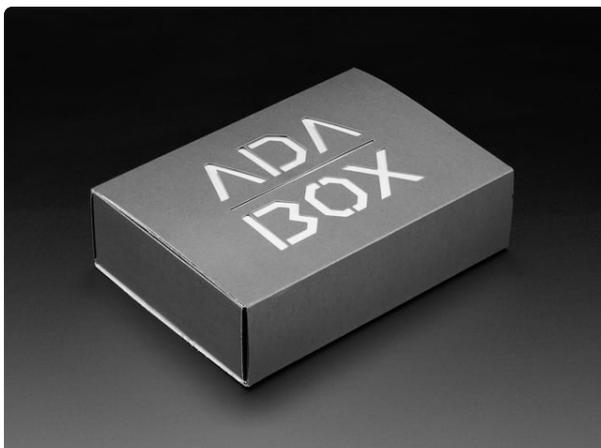
<https://www.adafruit.com/product/3644>



#### [AdaBox006 – CircuitPython](#)

AdaBox006 – CircuitPython is the perfect gift for folks who are just getting started in the world of DIY electronics. It's an excellent addition to our...

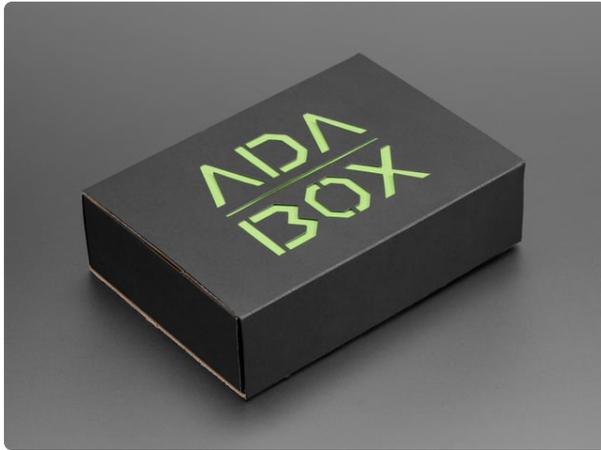
<https://www.adafruit.com/product/3697>



#### [AdaBox007 - SPY](#)

Discontinued - you can grab AdaBox...

<https://www.adafruit.com/product/3778>



### AdaBox008 - Octo Crickit

#MakeRobotFriend

Sometimes we wonder if robotics engineers ever watch movies. If they did, they'd know that making robots into servants always ends up in a robot rebellion. Why even go down that...

<https://www.adafruit.com/product/3906>



### AdaBox009 - HalloWing

Are you the kind of person who doesn't like taking down the skeletons and spiders until after January? Well, we've got the ADABOX for you. This is electronics at...

<https://www.adafruit.com/product/3863>



### AdaBox010 - Rainbow Trellis

This ADABOX is a multi-sensory feast - Lights! Sound! Squishy buttons! This box comes with a NeoTrellis M4. It's a grid of 4x8 silicone buttons, with a...

<https://www.adafruit.com/product/4018>

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# Unboxing Adabox 011

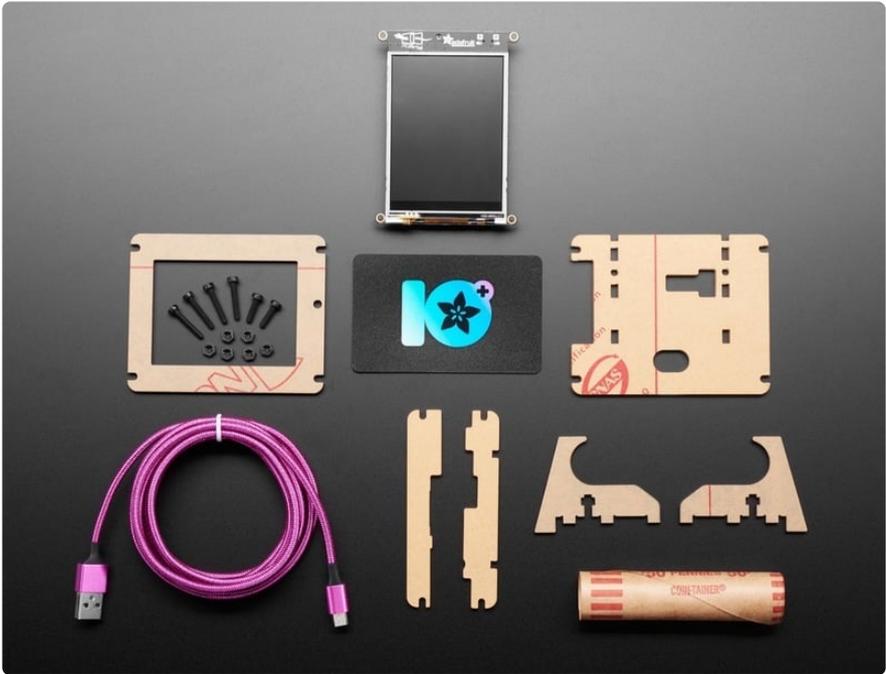


Reach out beyond your desk - to the stars and beyond, with **PyPortal!** This ADABOX features a new, easy-to-use **IoT** device that allows you to customize and create your very own "Internet of Things" portal. We take **CircuitPython** to the max, pairing a **SAMD51** chip with a **3.2" color TFT touchscreen** and secure Wi-Fi co-processor.

With the open-source Python-powered PyPortal, you can fetch and display anything in the world: inspirational quotes, weather forecasts, your social media followers, cat photos, and more - over Wi-Fi with the latest technologies. Create little pocket universes of joy that connect to something good. You can even rotate it 90 degrees, now it's a web-connected conference badge - and take #badgelifelife to the next level!

Thanks to the generous sponsorship and support from [Analog Devices \(https://adafruit.it/DPF\)](https://adafruit.it/DPF) and [Digi-Key \(https://adafruit.it/BJr\)](https://adafruit.it/BJr), we've even included a fancy precision temperature sensor! Each PyPortal comes with an [ADT7410 \(https://adafruit.it/EaC\)](https://adafruit.it/EaC) sensor built right in, so you can display the local temperature or use the PyPortal as a remote temperature logger and sensor that uploads data to our free [adafruit.io \(https://adafruit.it/fJs\)](https://adafruit.it/fJs) IoT service.

# AdaBox 011 Contents





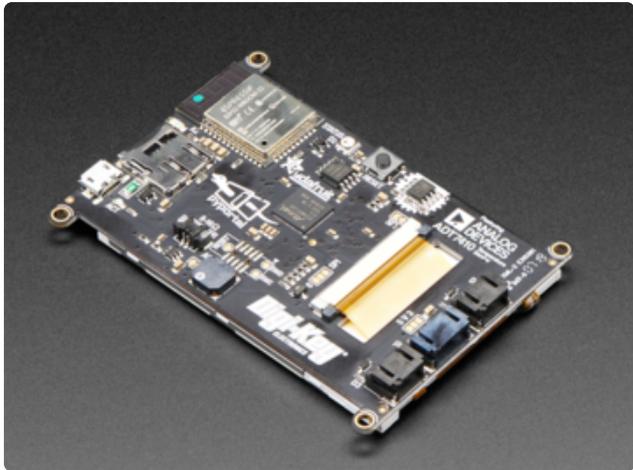
## Adafruit PyPortal - CircuitPython powered IoT Portal

The PyPortal uses an ATMEL (Microchip) ATSAM51J20, and an Espressif ESP32 Wi-Fi coprocessor with TLS/SSL support built-in.

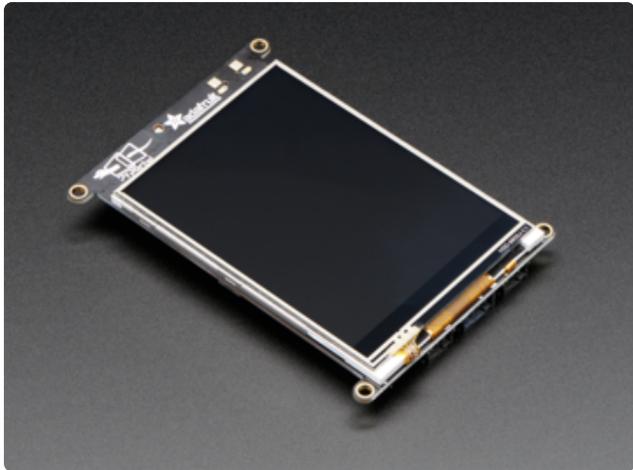


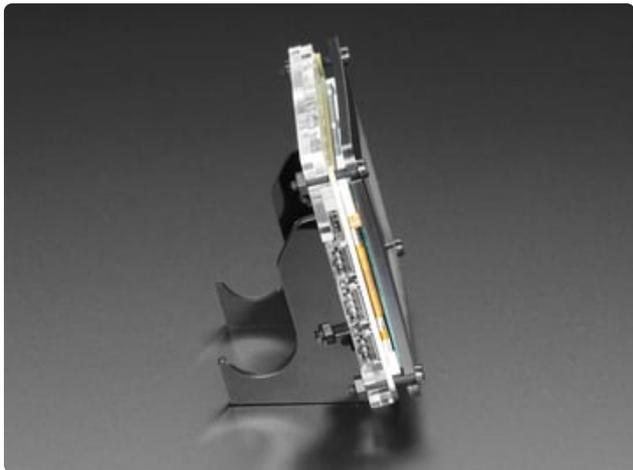
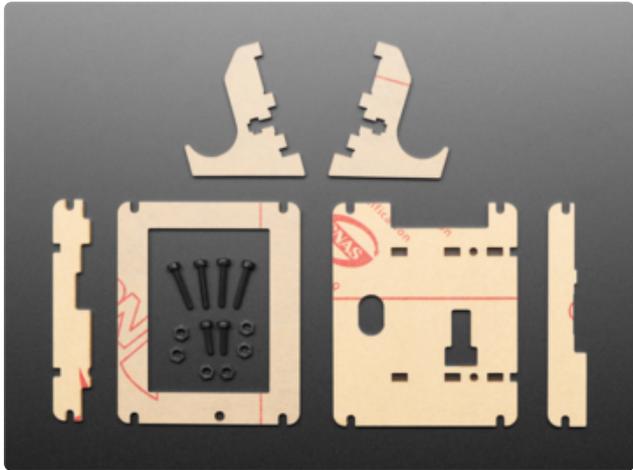
PyPortal has a **3.2" 320 x 240 color TFT** with resistive touch screen. PyPortal includes: speaker, light sensor, temperature sensor, NeoPixel, microSD card slot, 8MB flash, plug-in ports for I2C and 2 analog/digital pins.

3D files are available for custom enclosures and lanyard fastening. A number of free cases are available for 3D printing.



PyPortal is Open-source hardware, and it uses Open-Source software: both CircuitPython and Arduino. The device shows up as a USB drive and the code (Python) can be edited in any IDE, text editor, etc. The easiest code editing technique for microcontrollers.



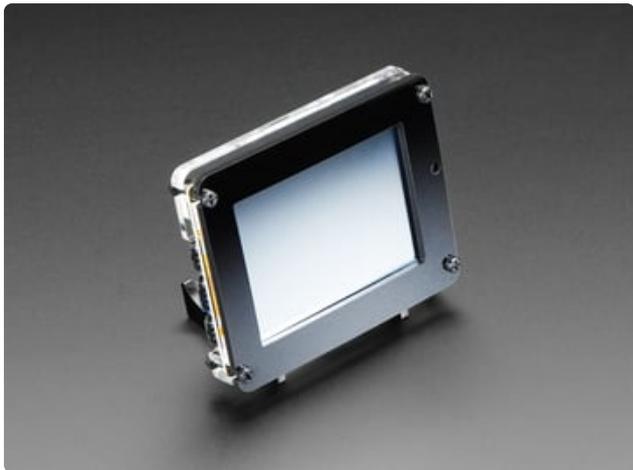


## Desktop Enclosure Kit

And now that you've made a cool internet-connected project with the Adafruit PyPortal, you will want to show it off. Instead of having it lie on a table or taped to a box, try this gracious and elegant enclosure.

Prevent inter-dimensional monsters and gremlins, or accidentally-spilled coffee from wrecking your IoT project with the **PyPortal Enclosure Kit**! Expertly crafted and laser-cut, this enclosure will give your PyPortal a minimalist and elegant look.

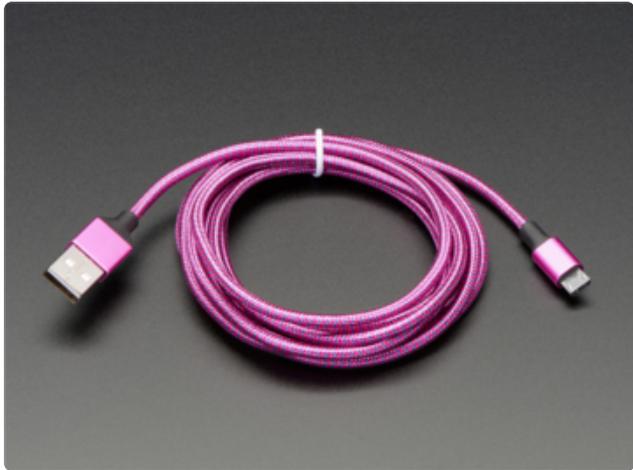
Laser cut acrylic with hardware.



## Coin Wrapper

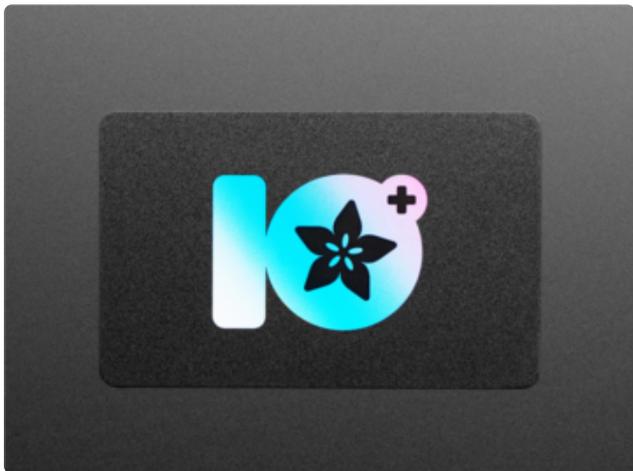
Look in your coin jar and find 50 pennies (or similar sized coins) to roll up. Then, use it as a ballast for the PyPortal enclosure to keep it steady on your desk.

If you don't have US pennies, any similar sized coin or metal disc (like a large washer) will work just fine, just stuff 'em in there!



## Two Meter Long 'Blinka Style' USB Cable

USB A to micro B cable for data and power. And look at that incredibly great color! Extra long cable, so you can place your PyPortal just about anywhere!



## Bonus Extra! 1 Year IO+ Pass for adafruit.io

Supercharge your PyPortal by connecting it to adafruit.io, our premiere cloud Internet of Things service for everyone. IO+ give you more feeds, more data, and more service tie-ins.

**For subscribers only!**

---

# Updating the PyPortal Demo Code

Your PyPortal may have come with older running firmware, libraries and software.

The files are the same for the PyPortal and the PyPortal Pynt.

**Before you start, you'll NEED to update your PyPortal!**

## Step 1 - Update the Bootloader

Follow the instructions [here \(https://adafru.it/10ey\)](https://adafru.it/10ey) to update the UF2 bootloader to a more recent version.

## Step 2 - Erase and Reformat CIRCUITPY

Connect to the REPL by following the instructions [here \(https://adafru.it/1ayl\)](https://adafru.it/1ayl). Also take a look at the two guide pages following that one. Then type the two CircuitPython statements below at the `>>>` prompt in the REPL. This will erase and reformat CIRCUITPY, and set it up for proper use of the SD card.

```
import storage
storage.erase_filesystem()
```

## Step 3 - Install the Latest CircuitPython

[Visit this page and follow the instructions to download and update the latest CircuitPython firmware. You will need to download the latest UF2 firmware file, double-click to enter the bootloader, then drag the UF2 over to the PORTALBOOT drive. \(https://adafru.it/EnM\)](https://adafru.it/EnM)

Your PyPortal will no longer run the example code once you do this - that's OK! We have to finish the other two steps

## Step 4 - Update Example Quotes Code to Latest

Your PyPortal may have come with an example Quotes demo, or perhaps it's blank. Either way, you can install the latest Quotes demo package by following the instructions in [this Guide \(https://adafru.it/EfD\)](https://adafru.it/EfD).

## If you are getting odd errors

If your filesystem somehow got corrupted, or you're getting unusual errors, [try erasing the filesystem to clear out any corrupt files \(https://adafru.it/Den\)](https://adafru.it/Den), by:

- [download the QSPI Eraser UF2 file \(https://adafru.it/Den\)](https://adafru.it/Den)
- load it onto the PyPortal by entering the bootloader and dragging it onto PORTALBOOT
- wait until the back LED goes from yellow to green
- Go to Step 2 to re-load the firmware and demo code!

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# Introducing PyPortal

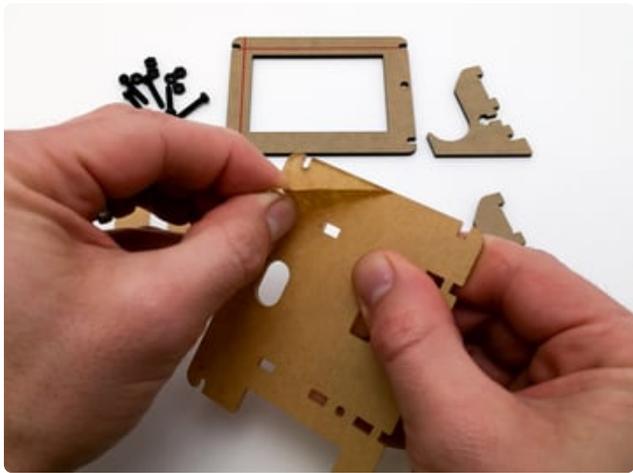
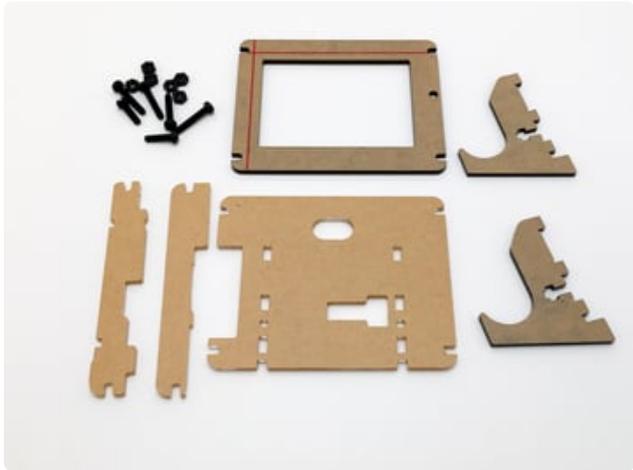
[Introducing PyPortal](https://adafru.it/Ecp) (<https://adafru.it/Ecp>)

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## Build the PyPortal Stand

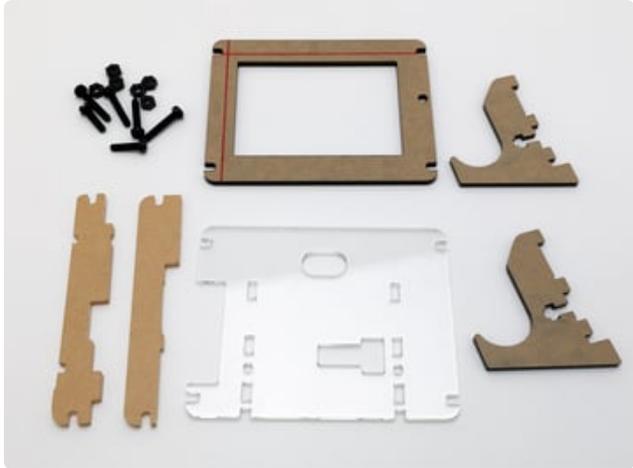


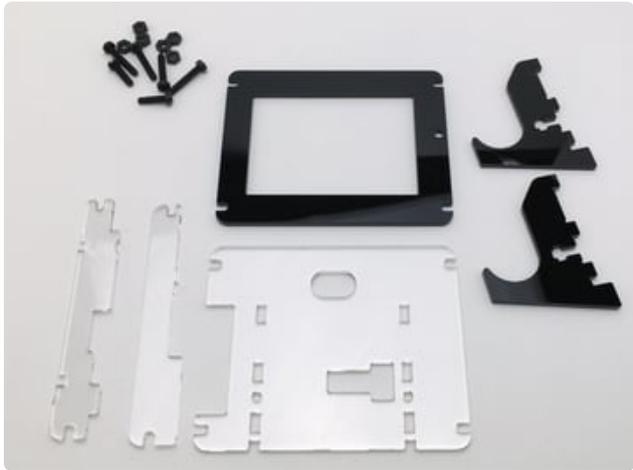
Here's how to assemble the laser cut acrylic stand for the PyPortal. The kit comes with six pieces of acrylic and six nylon screws and nuts.

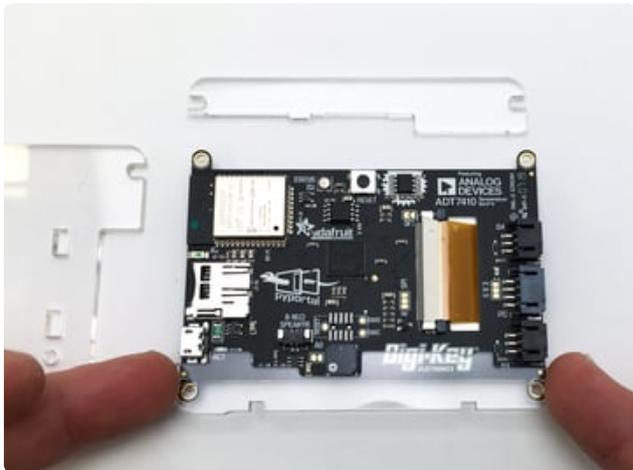
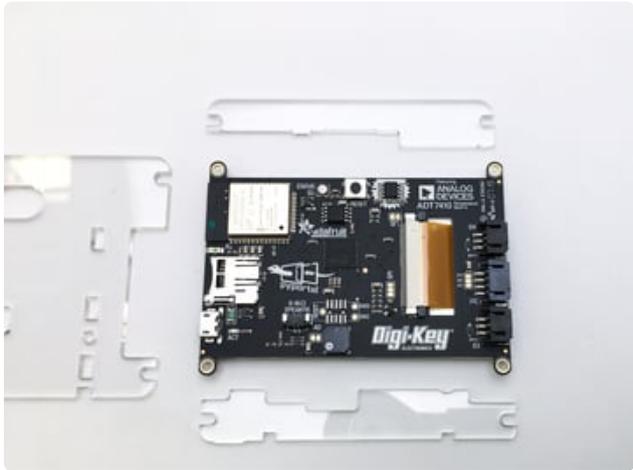


## Prep

First, remove the protective paper from all of the acrylic pieces.







## Sandwich

Next, do a dry fit of the three clear piece of acrylic on the back side of the PyPortal to get everything oriented properly.

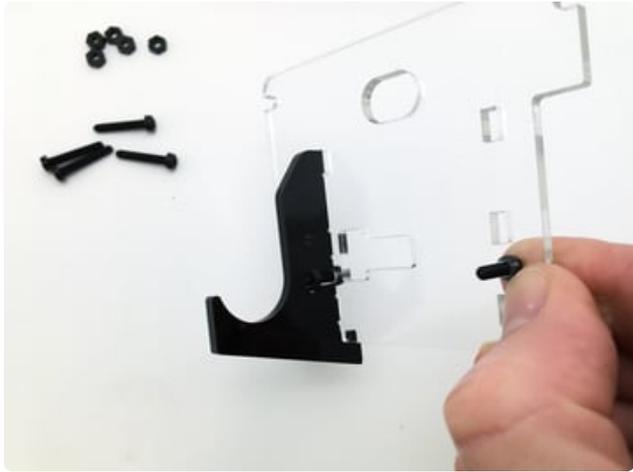
The two small pieces are used as spacers to allow clearance around some of the larger parts. Lay them onto the board first, as shown.

Then, place the large clear piece on top, making sure to align the hole for the reset and the cutout for the three JST ports.

Complete the sandwich by placing the stack on top of the black front bezel with the hole for the light sensor oriented as shown here.





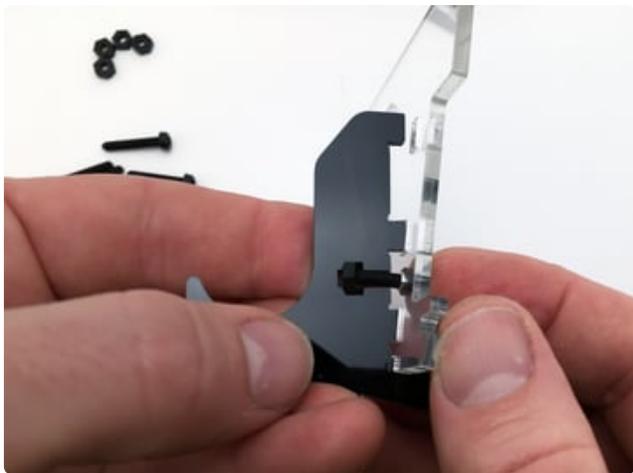
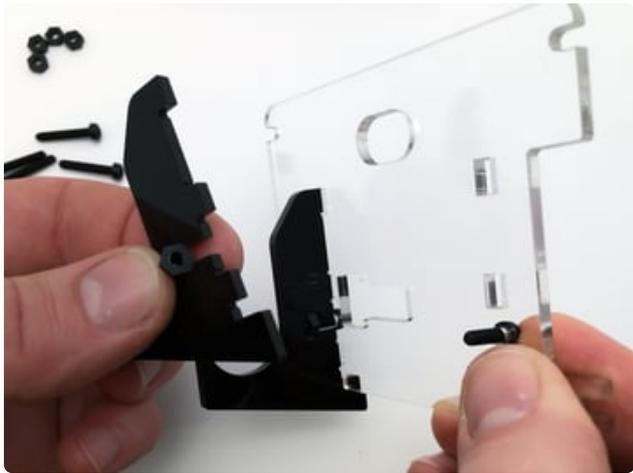


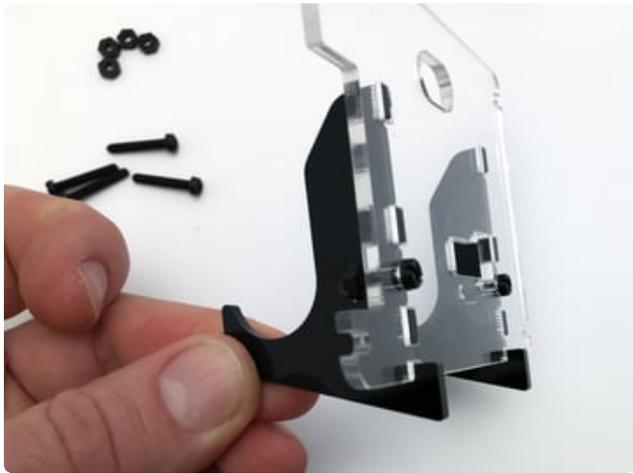
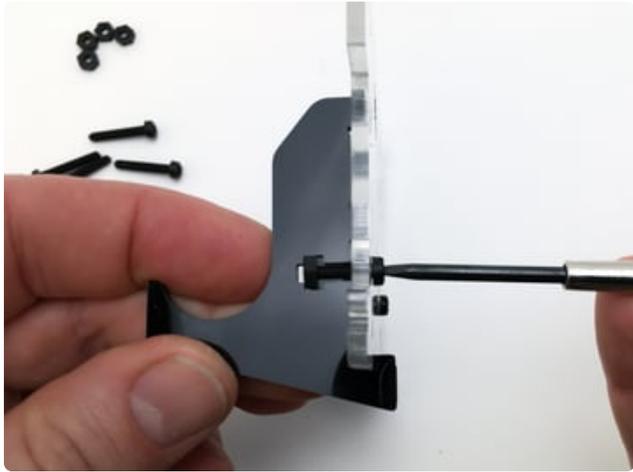
## Legs

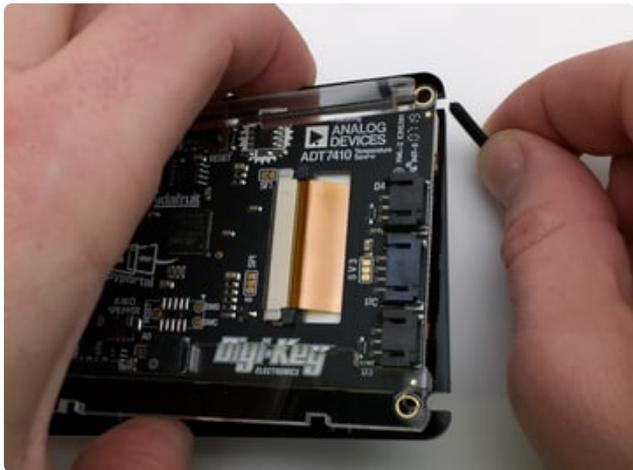
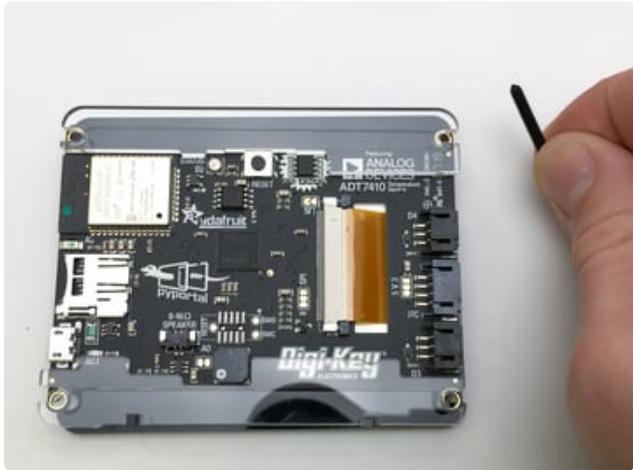
Now that the fit and orientation have been established, we'll install the legs.

The two legs are identical. Pick one and slot it into the case back as shown.

Place a nut into the captive slot of the leg and then feed a short screw through from the front of the clear acrylic case back. Fasten the screw (not too tight!) and then repeat for the second leg.



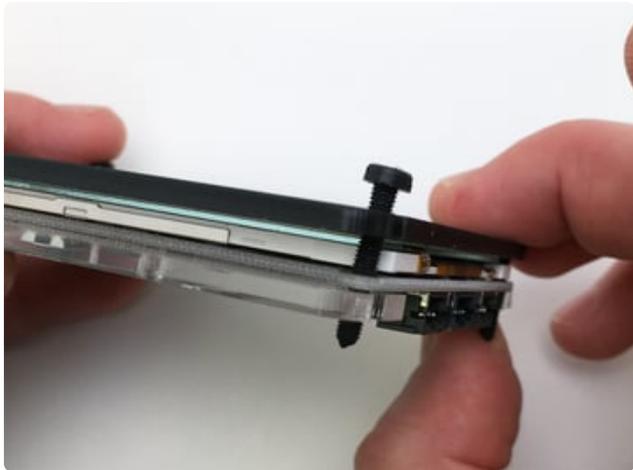
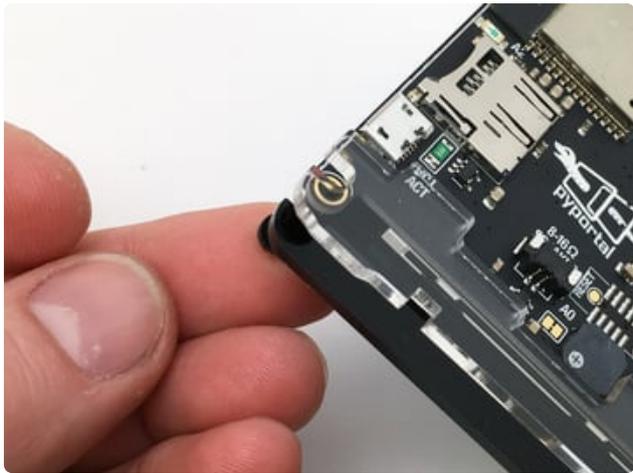




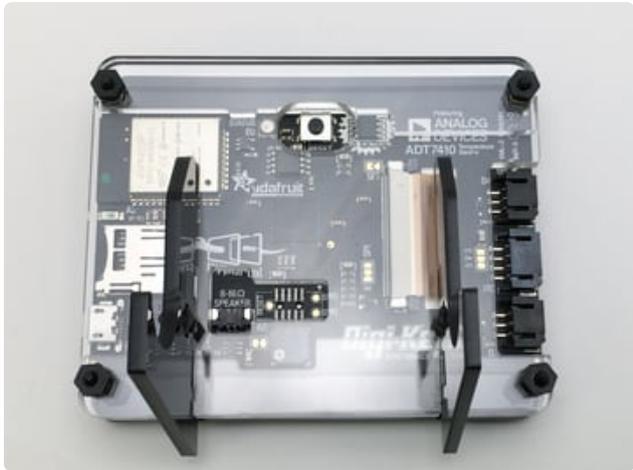
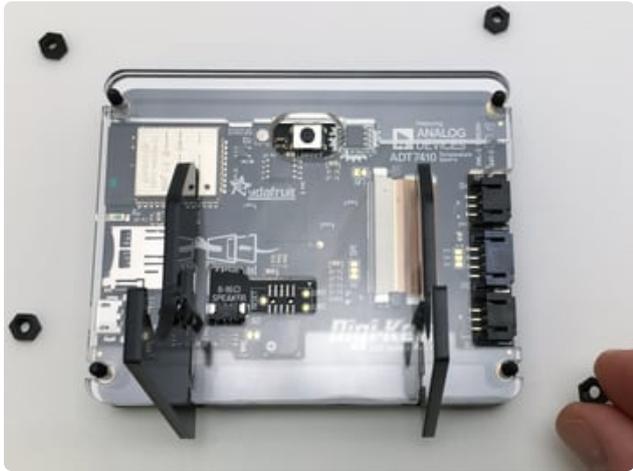
## Add Long Screws

To put it all together, we'll use the four long screws to secure the entire acrylic - PyPortal - acrylic - acrylic sandwich!

Run the four long screws from the front to the back, as shown.



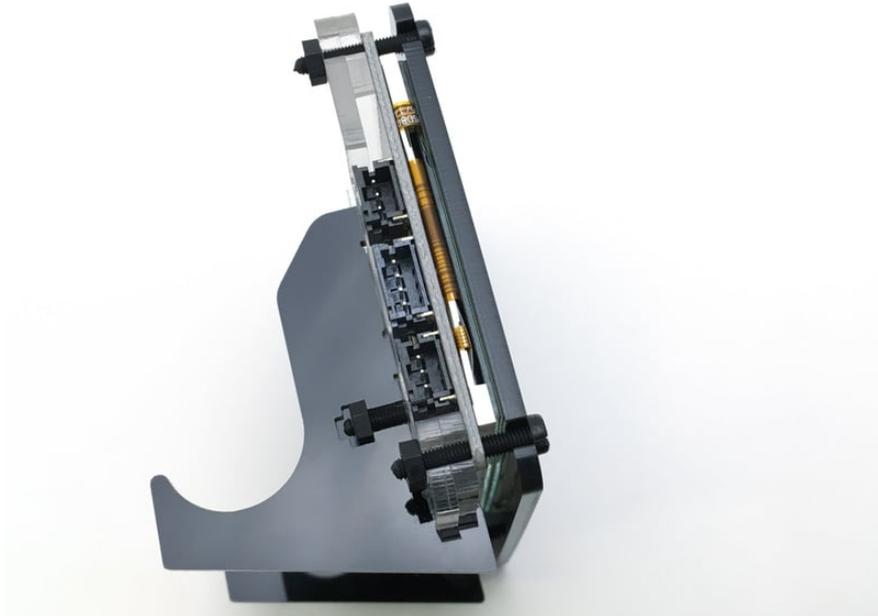




## Screw It All Together

Finally, add the case back and legs assemblage and then thread on the four nuts to secure it all in place.

Be **careful not to over-tighten** the screws. Doing so can potentially crack the Pyportal display!





## Bonus! Penny Roll Weight

If you'd like to give your PyPortal a bit of extra heft so it won't get pushed around on your desk, you can make a great weight for \$0.50. A roll of 50 pennies does the trick! The legs are designed to hold a roll of coins perfectly!





## Laser Cutter Files for PyPortal Stand

If you need to replace a piece or just want to make a spare for another PyPortal, here are the vector files for 1/8" (3mm) acrylic, in Adobe Illustrator format:

<https://adafru.it/EqN>

<https://adafru.it/EqO>

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## Twitter Follows Trophy

[Twitter Follows Trophy \(https://adafru.it/EfA\)](https://adafru.it/EfA)

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## GitHub Stars Trophy

[GitHub Stars Trophy \(https://adafru.it/EfB\)](https://adafru.it/EfB)

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## Reddit Stats Trophy

[Reddit Stats Trophy \(https://adafru.it/EfC\)](https://adafru.it/EfC)

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## Adafruit Quote Book

[Adafruit Quote Book \(https://adafru.it/EfD\)](https://adafru.it/EfD)

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## Oblique Strategies

[Oblique Strategies \(https://adafru.it/Eup\)](https://adafru.it/Eup)

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## Event Countdown Clock

[Event Countdown Clock \(https://adafru.it/EhN\)](https://adafru.it/EhN)

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## Weekly Countdown Clock

[Weekly Countdown Clock \(https://adafru.it/EhO\)](https://adafru.it/EhO)

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## Event Count-Up Clock

[Event Count-Up Clock \(https://adafru.it/EhP\)](https://adafru.it/EhP)

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## Weather Station Display

[Weather Station Display \(https://adafru.it/EhQ\)](https://adafru.it/EhQ)

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## Air Quality Index Display

[Air Quality Index Display \(https://adafru.it/EhR\)](https://adafru.it/EhR)

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## YouTube Views and Subscribers Display

[YouTube Views and Subscribers Display \(https://adafru.it/Eid\)](https://adafru.it/Eid)

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## Animated GIF Display

[Animated GIF Display \(https://adafru.it/EkO\)](https://adafru.it/EkO)

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## View Master

[View Master \(https://adafru.it/Euq\)](https://adafru.it/Euq)

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## PyPortal Case

[PyPortal Case \(https://adafru.it/Eel\)](https://adafru.it/Eel)

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## Portable PyPortal

[Portable PyPortal \(https://adafru.it/Eco\)](https://adafru.it/Eco)

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## PyPortal Wall Mount

[PyPortal Wall Mount \(https://adafru.it/Ek0\)](https://adafru.it/Ek0)

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## Custom Fonts for CircuitPython Displays

[Custom Fonts for CircuitPython Displays \(https://adafru.it/E7E\)](https://adafru.it/E7E)

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## NeoPixel Color Picker

[NeoPixel Color Picker \(https://adafru.it/Eur\)](https://adafru.it/Eur)

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# NASA Image of the Day Viewer

[NASA Image of the Day Viewer \(https://adafru.it/Eus\)](https://adafru.it/Eus)

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# IoT Data Logger with Analog Devices ADT7410, Adafruit IO, and CircuitPython

[IoT Data Logger with Analog Devices ADT7410, Adafruit IO, and CircuitPython \(https://adafru.it/EfE\)](https://adafru.it/EfE)

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# IoT Weather Station

[IoT Weather Station \(https://adafru.it/Eut\)](https://adafru.it/Eut)

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# Data Logging IoT Weight Scale

[Data Logging IoT Weight Scale \(https://adafru.it/Euu\)](https://adafru.it/Euu)

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# Discord Online Counter

[Discord Online Counter \(https://adafru.it/Euv\)](https://adafru.it/Euv)

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# Astronauts in Space

[Astronauts in Space \(https://adafru.it/Euw\)](https://adafru.it/Euw)

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# Alarm Clock

[Alarm Clock \(https://adafru.it/Eux\)](https://adafru.it/Eux)

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## Bitcoin Display

[Bitcoin Display \(https://adafru.it/Euy\)](https://adafru.it/Euy)

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## Smart Thermometer with Analog Devices ADT7410, Adafruit IO and CircuitPython

[Smart Thermometer with Analog Devices ADT7410, Adafruit IO and CircuitPython \(https://adafru.it/Euz\)](https://adafru.it/Euz)

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## Email Display with Zapier and Adafruit IO

[Email Display with Zapier and Adafruit IO \(https://adafru.it/EuA\)](https://adafru.it/EuA)

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## Need Help? Questions?

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