adafruit learning system

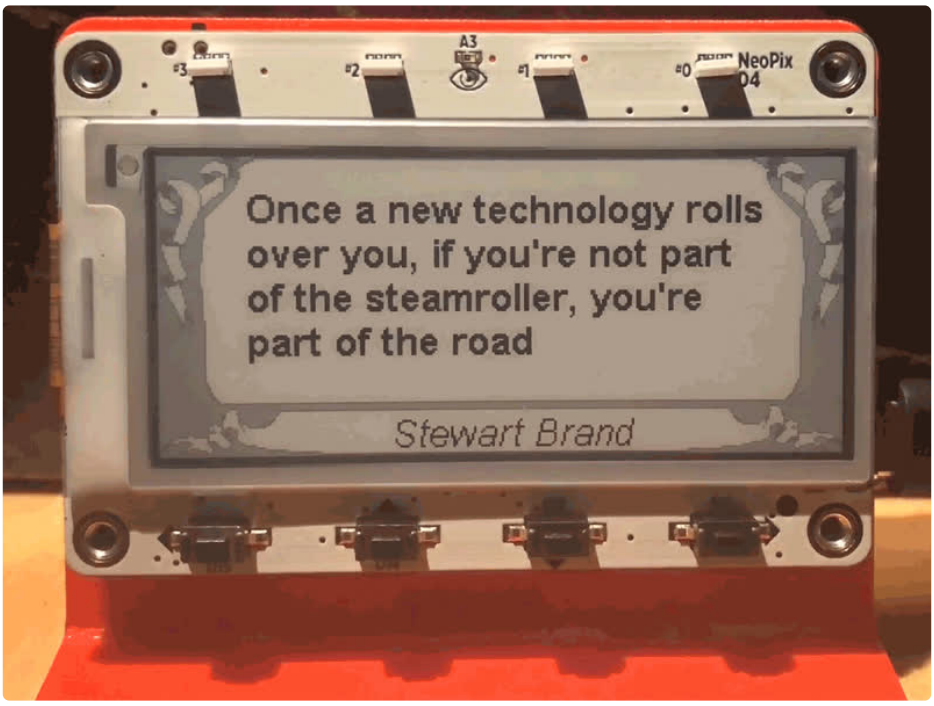
MagTag Showerthoughts and Quotes

Created by John Park

Last updated on 2021-05-19 05:20:24 PM EDT

Guide Contents

Overview



With the power of the MagTag's ESP32-S2 WiFi enabled processor, we can stream in a continuously updating list of quotes from Adafruit's quotes server. Or, go a bit more to the contemplative/NSFW side with the popular Reddit r/Showerthoughts (https://adafru.it/P9B) display!

By using the built-in deep sleep mode, a battery-powered MagTag can run for days or weeks on a single charge, just waking up every hour to grab a new quote. You can get about 100 refreshes on a battery, so space em out however you like.

Parts

Adafruit MagTag Starter Kit - 2.9" Grayscale E-Ink WiFi Display

The Adafruit MagTag combines the new ESP32-S2 wireless module and a 2.9" grayscale E-Ink display to make a low-power IoT display that can show data on its screen...

Out of Stock

Out of Stock

Adafruit MagTag - 2.9" Grayscale E-Ink WiFi Display

The Adafruit MagTag combines the new ESP32-S2 wireless module and a 2.9" grayscale E-Ink display to make a low-power IoT display that can show data on its screen even when power...

Out of Stock

Out of Stock

Mini Magnet Feet for RGB LED Matrices (Pack of 4)

Got a glorious RGB Matrix project you want to mount and display in your workspace or home? If you have one of the matrix panels listed below, you'll need a pack of these...

Out of Stock

Out of Stock

Lithium Ion Polymer Battery with Short Cable - 3.7V 420mAh

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 battery...

$6.95

In Stock

Add to Cart

Depending on which cables you already have on hand, you may also need one of the following items for coding and powering the MagTag.

Micro B USB to USB C Adapter

As technology changes and adapts, so does Adafruit, and speaking of adapting, this adapter has a Micro B USB jack and a USB C...

$1.25

In Stock

Add to Cart

USB Type A to Type C Cable - approx 1 meter / 3 ft long

As technology changes and adapts, so does Adafruit. This USB Type A to Type C cable will help you with the transition to USB C, even if you're still...

$4.95

In Stock

Add to Cart

Install CircuitPython

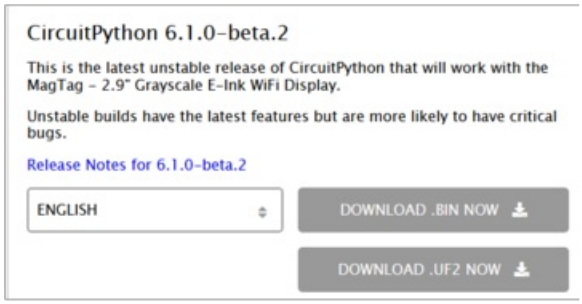
CircuitPython (https://adafru.it/tB7) is a derivative of MicroPython (https://adafru.it/BeZ) designed to simplify experimentation and education on low-cost microcontrollers. It makes it easier than ever to get prototyping by requiring no upfront desktop software downloads. Simply copy and edit files on the **CIRCUITPY** drive to iterate.

Set Up CircuitPython

Follow the steps to get CircuitPython installed on your MagTag.

https://adafru.it/OBd

https://adafru.it/OBd



Click the link above and download the latest .BIN and .UF2 file

(depending on how you program the ESP32S2 board you may need one or the other, might as well get both)

Download and save it to your desktop (or wherever is handy).

Plug your MagTag into your computer using a known-good USB cable.

A lot of people end up using charge-only USB cables and it is very frustrating! So make sure you have a USB cable you know is good for data sync.

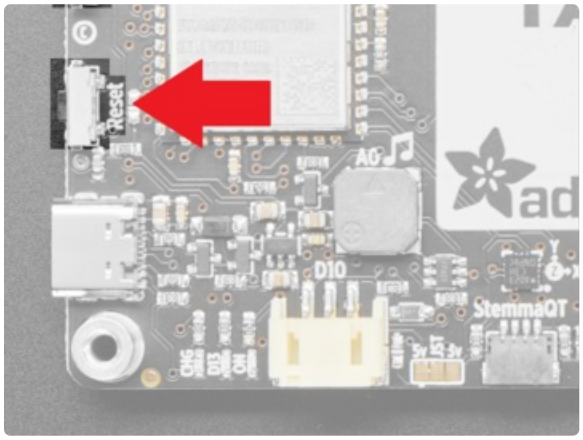
Option 1 - Load with UF2 Bootloader

This is by far the easiest way to load CircuitPython. **However it requires your board has the UF2 bootloader installed. Some early boards do not (we hadn't written UF2 yet!) - in which case you can load using the built in ROM bootloader.**

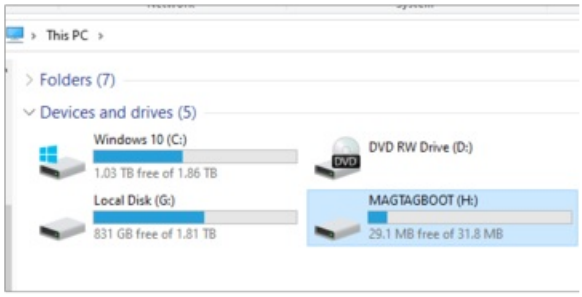
Still, try this first!

Try Launching UF2 Bootloader

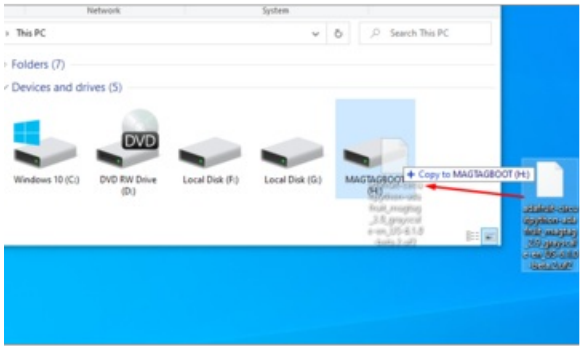
Loading CircuitPython by drag-n-drop UF2 bootloader is the easier way and we recommend it. If you have a MagTag where the front of the board is black, your MagTag came with UF2 already on it.



Launch UF2 by **double-clicking** the Reset button (the one next to the USB C port). You may have to try a few times to get the timing right.



If the UF2 bootloader is installed, you will see a new disk drive appear called **MAGTAGBOOT**



Copy the **UF2** file you downloaded at the first step of this tutorial onto the **MAGTAGBOOT** drive

If you're using Windows and you get an error at the end of the file copy that says **Error from the file copy, Error 0x800701B1: A device which does not exist was specified.** You can ignore this error, the bootloader sometimes disconnects without telling Windows, the install completed just fine and you can continue. If its really annoying, you can also upgrade the bootloader (the latest version of the UF2 bootloader fixes this warning) (https://adafru.it/Pfk)

Your board should auto-reset into CircuitPython, or you may need to press reset. A **CIRCUITPY** drive will appear. You're done! Go to the next pages.

Option 2 - Use esptool to load BIN file

If you have an original MagTag with while soldermask on the front, we didn't have UF2 written for the ESP32S2 yet so it will not come with the UF2 bootloader.

You can upload with **esptool** to the ROM (hardware) bootloader instead!

Follow the initial steps found in the Run esptool and check connection section of the ROM Bootloader page (https://adafru.it/OBc) to verify your environment is set up, your board is successfully connected, and which port it's using.

In the final command to write a binary file to the board, replace the port with your port, and replace "firmware.bin" with the the file you downloaded above.

The output should look something like the output in the image.

Press reset to exit the bootloader.

Your **CIRCUITPY** drive should appear!

You're all set! Go to the next pages.

Option 3 - Use Chrome Browser To Upload BIN file

If for some reason you cannot get esptool to run, you can always try using the Chrome-browser version of esptool we have written. This is handy if you don't have Python on your computer, or something is really weird with your setup that makes esptool not run (which happens sometimes and isn't worth debugging!) You can follow along on the Web Serial ESPTool (https://adafru.it/Pdq) page and either load the UF2 bootloader and then come back to Option 1 on this page, or you can download the CircuitPython BIN file directly using the tool in the same manner as the bootloader.

CircuitPython Internet Libraries

To use the internet-connectivity built into your ESP32-S2 with CircuitPython, you must first install a number of libraries. This page covers that process.

Adafruit CircuitPython Library Bundle

Download the Adafruit CircuitPython Bundle. You can find the latest release here:

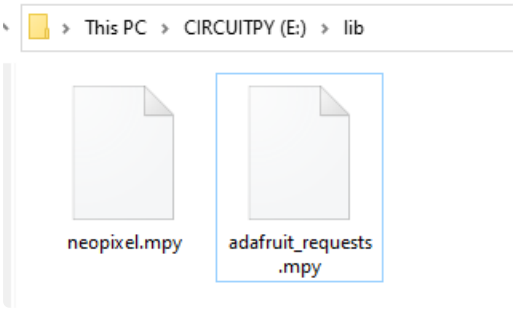
https://adafru.it/ENC

https://adafru.it/ENC

Download the **adafruit-circuitpython-bundle-version-mpy-*.zip** bundle zip file, and unzip a folder of the same name. Inside you'll find a **lib** folder. The entire collection of libraries is too large to fit on the **CIRCUITPY** drive. Instead, add each library as you need it, this will reduce the space usage but you'll need to put in a little more effort.

At a minimum we recommend the following libraries, in fact we more than recommend. They're basically required. So grab them and install them into **CIRCUITPY/lib** now!

- **adafruit_requests.mpy** - A requests-like library for HTTP commands.
- **neopixel.mpy** - Helper library to use NeoPixel LEDs, often built into the boards so they're great for quick feedback



Once you have added those files, please continue to the next page to set up and test Internet connectivity

CircuitPython Internet Test

Once you have CircuitPython installed and the minimum libraries installed we can get your board connected to the Internet.

To get connected, you will need to start by creating a **secrets.py** file.

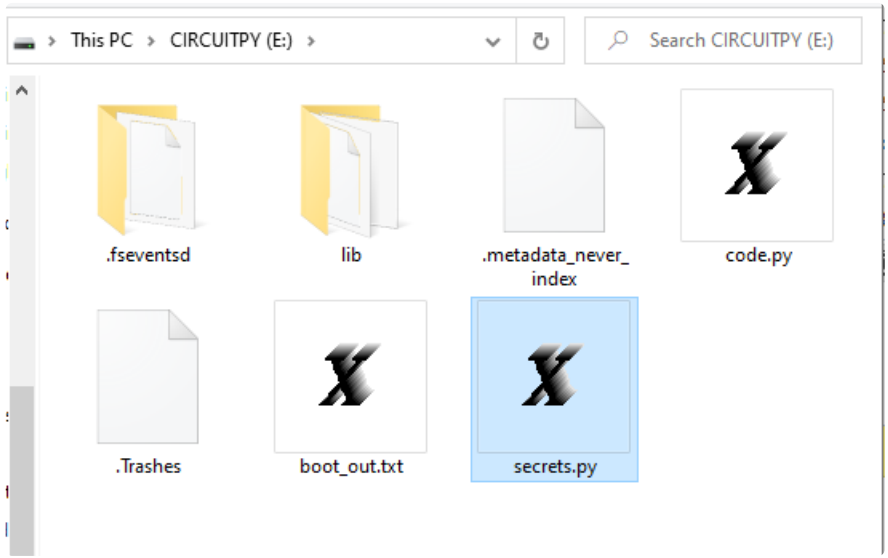
Secrets File

We expect people to share tons of projects as they build CircuitPython WiFi widgets. What we want to avoid is people accidentally sharing their passwords or secret tokens and API keys. So, we designed all our examples to use a **secrets.py** file, that is in your **CIRCUITPY** drive, to hold secret/private/custom data. That way you can share your main project without worrying about accidentally sharing private stuff.

Your **secrets.py** file should look like this:

```
# This file is where you keep secret settings, passwords, and tokens!
# If you put them in the code you risk committing that info or sharing it

secrets = {
    'ssid' : 'home_wifi_network',
    'password' : 'wifi_password',
    'aio_username' : 'my_adafruit_io_username',
    'aio_key' : 'my_adafruit_io_key',
    'timezone' : "America/New_York", # http://worldtimeapi.org/timezones
    }
```

Copy and paste that text/code into a file called **secrets.py** and save it to your **CIRCUITPY** folder like so:



Inside is a python dictionary named secrets with a line for each entry. Each entry has an entry name (say `'ssid'`) and then a colon to separate it from the entry key `'home ssid'` and finally a comma ,

At a minimum you'll need to adjust the `ssid` and `password` for your local WiFi setup so do that now!

As you make projects you may need more tokens and keys, just add them one line at a time. See for example other tokens such as one for accessing github or the hackaday API. Other non-secret data like your timezone can also go here, just cause its called secrets doesn't mean you can't have general customization data in there!

For the correct time zone string, look at http://worldtimeapi.org/timezones (https://adafru.it/EcP) and remember that if your city is not listed, look for a city in the same time zone, for example Boston, New York, Philadelphia, Washington DC, and Miami are all on the same time as New York.

Of course, don't share your **secrets.py** - keep that out of GitHub, Discord or other project-sharing sites.

Don't share your secrets.py file, it has your passwords and API keys in it!

Connect to WiFi

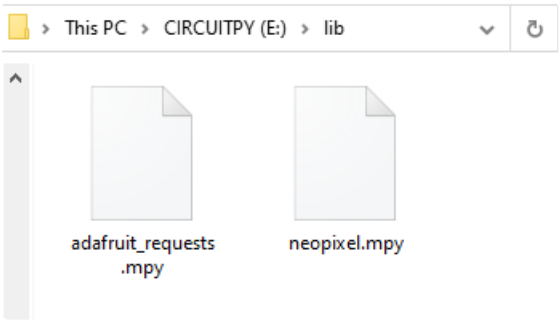
OK now you have your secrets setup - you can connect to the Internet using the Requests module.

First make sure you are running the latest version of Adafruit CircuitPython (https://adafru.it/Amd) for your board.

Next you'll need to install the necessary libraries to use the hardware--carefully follow the steps to find and install these libraries from Adafruit's CircuitPython library bundle (https://adafru.it/zdx). Our introduction guide has a great page on how to install the library bundle (https://adafru.it/ABU).

- **adafruit_requests**
- **neopixel**

Before continuing make sure your board's CIRCUITPY/lib folder or root filesystem has the above files copied over.



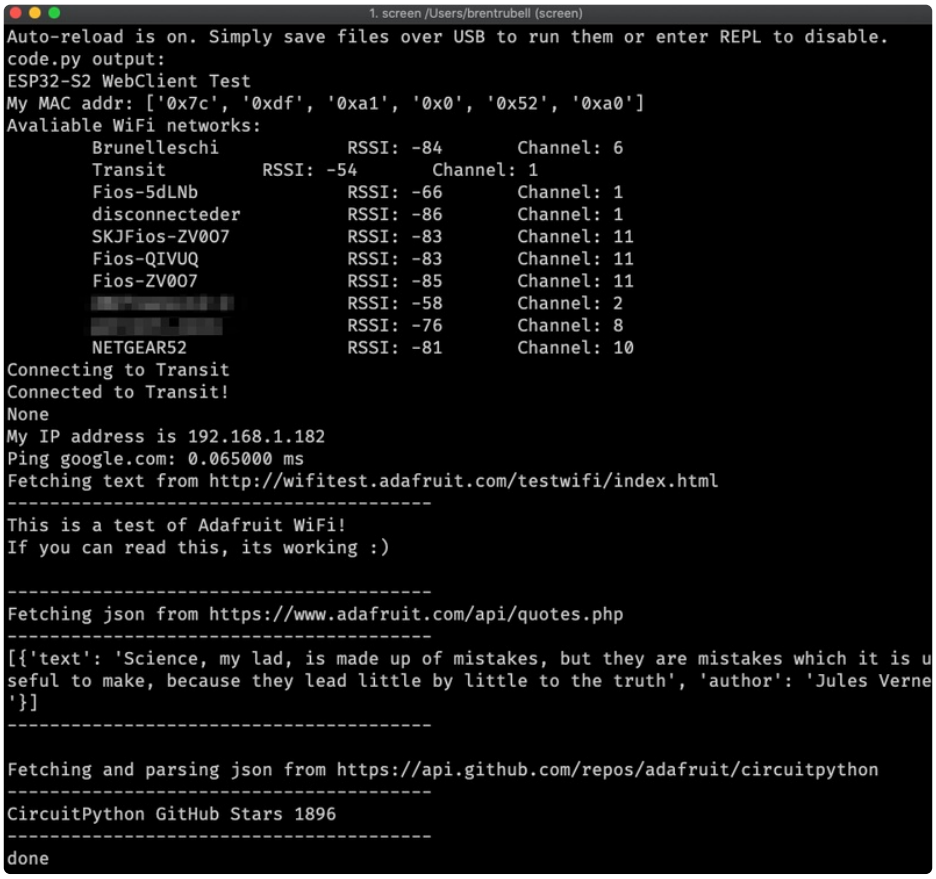
Once that's done, load up the following example using Mu or your favorite editor:

```
import ipaddress
import ssl
import wifi
import socketpool
import adafruit_requests

# URLs to fetch from
TEXT_URL = "http://wifitest.adafruit.com/testwifi/index.html"
JSON_QUOTES_URL = "https://www.adafruit.com/api/quotes.php"
JSON_STARS_URL = "https://api.github.com/repos/adafruit/circuitpython"

# Get wifi details and more from a secrets.py file
try:
    from secrets import secrets
except ImportError:
    print("WiFi secrets are kept in secrets.py, please add them there!")
    raise

print("ESP32-S2 WebClient Test")

print("My MAC addr:", [hex(i) for i in wifi.radio.mac_address])

print("Available WiFi networks:")
for network in wifi.radio.start_scanning_networks():
    print("\t%s\t\tRSSI: %d\tChannel: %d" % (str(network.ssid, "utf-8"),
            network.rssi, network.channel))
wifi.radio.stop_scanning_networks()

print("Connecting to %s"%secrets["ssid"])
wifi.radio.connect(secrets["ssid"], secrets["password"])
print("Connected to %s!"%secrets["ssid"])
print("My IP address is", wifi.radio.ipv4_address)

ipv4 = ipaddress.ip_address("8.8.4.4")
print("Ping google.com: %f ms" % (wifi.radio.ping(ipv4)*1000))

pool = socketpool.SocketPool(wifi.radio)
requests = adafruit_requests.Session(pool, ssl.create_default_context())

print("Fetching text from", TEXT_URL)
response = requests.get(TEXT_URL)
print("-" * 40)
print(response.text)
print("-" * 40)

print("Fetching json from", JSON_QUOTES_URL)
response = requests.get(JSON_QUOTES_URL)
print("-" * 40)
print(response.json())
print("-" * 40)

print()

print("Fetching and parsing json from", JSON_STARS_URL)
```

```
print("Fetching and parsing json from", JSON_STARS_URL)
response = requests.get(JSON_STARS_URL)
print("-" * 40)
print("CircuitPython GitHub Stars", response.json()["stargazers_count"])
print("-" * 40)

print("done")
```

And save it to your board. Make sure the file is named **code.py**.

Open up your REPL, you should see something like the following:



In order, the example code...

Checks the ESP32-S2's MAC address.

```
print("My MAC addr:", [hex(i) for i in wifi.radio.mac_address])
```

Performs a scan of all access points and prints out the access point's name (SSID), signal strength (RSSI), and channel.

```
print("Avaliable WiFi networks:")
for network in wifi.radio.start_scanning_networks():
    print("\t%s\t\tRSSI: %d\tChannel: %d" % (str(network.ssid, "utf-8"),
            network.rssi, network.channel))
wifi.radio.stop_scanning_networks()
```

Connects to the access point you defined in the **secrets.py** file, prints out its local IP address, and attempts to ping google.com to check its network connectivity.

```
print("Connecting to %s"%secrets["ssid"])
wifi.radio.connect(secrets["ssid"], secrets["password"])
print(print("Connected to %s!"%secrets["ssid"]))
print("My IP address is", wifi.radio.ipv4_address)

ipv4 = ipaddress.ip_address("8.8.4.4")
print("Ping google.com: %f ms" % wifi.radio.ping(ipv4))
```

The code creates a socketpool using the wifi radio's available sockets. This is performed so we don't need to re-use sockets. Then, it initializes a a new instance of the requests (https://adafru.it/E9o) interface - which makes getting data from the internet *really really easy.*

```
pool = socketpool.SocketPool(wifi.radio)
requests = adafruit_requests.Session(pool, ssl.create_default_context())
```

To read in plain-text from a web URL, call `requests.get` - you may pass in either a http, or a http **s** url for SSL connectivity.

```
print("Fetching text from", TEXT_URL)
response = requests.get(TEXT_URL)
print("-" * 40)
print(response.text)
print("-" * 40)
```

Requests can also display a JSON-formatted response from a web URL using a call to `requests.get`.

```
print("Fetching json from", JSON_QUOTES_URL)
response = requests.get(JSON_QUOTES_URL)
print("-" * 40)
print(response.json())
print("-" * 40)
```

Finally, you can fetch and parse a JSON URL using `requests.get`. This code snippet obtains the `stargazers_count` field from a call to the GitHub API.

```
print("Fetching and parsing json from", JSON_STARS_URL)
response = requests.get(JSON_STARS_URL)
print("-" * 40)
print("CircuitPython GitHub Stars", response.json()["stargazers_count"])
print("-" * 40)
```

OK you now have your ESP32-S2 board set up with a proper **secrets.py** file and can connect over the Internet. If not, check that your **secrets.py** file has the right ssid and password and retrace your steps until you get the Internet connectivity working!

MagTag-Specific CircuitPython Libraries

To use all the amazing features of your MagTag with CircuitPython, you must first install a number of libraries. This page covers that process.

Get Latest Adafruit CircuitPython Bundle

Download the Adafruit CircuitPython Library Bundle. You can find the latest release here:

https://adafru.it/ENC

https://adafru.it/ENC

Download the **adafruit-circuitpython-bundle-version-mpy-*.zip** bundle zip file, and unzip a folder of the same name. Inside you'll find a **lib** folder. The entire collection of libraries is too large to fit on the **CIRCUITPY** drive. Therefore, you'll need to copy the necessary libraries to your board individually.

At a minimum, the following libraries are required. Copy the following folders or .mpy files to the **lib** folder on your **CIRCUITPY** drive. **If the library is a folder, copy the entire folder** to the **lib** folder on your board.

Library folders (copy the whole folder over to lib):

- **adafruit_magtag** - This is a helper library designed for using all of the features of the MagTag, including networking, buttons, NeoPixels, etc.
- **adafruit_portalbase** - This library is the base library that adafruit_magtag is built on top of.
- **adafruit_bitmap_font** - There is fancy font support, and it's easy to make new fonts. This library reads and parses font files.
- **adafruit_display_text** - This library displays text on the screen.
- **adafruit_io** - This library helps connect the MagTag to our free data logging and viewing service

Library files:

- **adafruit_requests.mpy** - This library allows us to perform HTTP requests and get responses back from servers. GET/POST/PUT/PATCH - they're all in here!
- **adafruit_fakerequests.mpy** - This library allows you to create fake HTTP requests by using local files.
- **adafruit_miniqr.mpy** - QR creation library lets us add easy-to-scan 2D barcodes to the E-Ink display
- **neopixel.mpy** - This library is used to control the onboard NeoPixels.
- **simpleio.mpy** - This library is used for tone generation.

Secrets

Even if you aren't planning to go online with your MagTag, you'll need to have a **secrets.py** file in the root directory (top level) of your **CIRCUITPY** drive. If you do not intend to connect to wireless, it does not need to have valid data in it. Here's more info on the secrets.py file (https://adafru.it/P3b).

Code the MagTag Showerthoughts Viewer

Text Editor

Adafruit recommends using the Mu editor for editing your CircuitPython code. You can get more info in this guide (https://adafru.it/ANO).

Alternatively, you can use any text editor that saves simple text files.

Code

Click the Download: Project Zip File link below in the code window to get a zip file with all the files needed for the project. Copy **magtag_showerthoughts.py** from the zip file and place on the **CIRCUITPY** drive, then rename it to **code.py**.

Also copy the whole **/bmps** directory from the zip file and place and its contents it on the **CIRCUITYPY** drive. These are some sample images you can start with.

Copy the **/fonts** directory from the zip file and place and its contents it on the **CIRCUITYPY** drive.

Follow this guide (https://adafru.it/Pla) for info on getting your AIO credentials for the **secrets.py** file.

```
# MagTag Shower Thoughts
# Be sure to put WiFi access point info in secrets.py file to connect

import time
import random
from adafruit_magtag.magtag import MagTag


# Set up where we'll be fetching data from
DATA_SOURCE = "https://www.reddit.com/r/showerthoughts/hot.json?limit=10"
quote_num = random.randint(0, 9)  # we get 10 possibilities, pick one of them
QUOTE_LOCATION = ["data", "children", quote_num, "data", "title"]
AUTHOR_LOCATION = ["data", "children", quote_num, "data", "author"]

# in seconds, we can refresh about 100 times on a battery
TIME_BETWEEN_REFRESHES = 1 * 60 * 60  # one hour delay

magtag = MagTag(
    url=DATA_SOURCE,
    json_path=(QUOTE_LOCATION, AUTHOR_LOCATION),
)

magtag.graphics.set_background("/bmps/magtag_shower_bg.bmp")

# quote in bold text, with text wrapping
magtag.add_text(
    text_font="/fonts/Arial-Bold-12.pcf",
    text_wrap=28,
    text_maxlen=120,
    text_position=(
        (magtag.graphics.display.width // 2),
        (magtag.graphics.display.height // 2) - 10,
    ),
    line_spacing=0.75,
    text_anchor_point=(0.5, 0.5),  # center the text on x & y
)

# author in italic text, no wrapping
magtag.add_text(
    text_font="/fonts/Arial-Italic-12.bdf",
    text_position=(magtag.graphics.display.width // 2, 118),
    text_anchor_point=(0.5, 0.5),  # left justify this line
)

try:
    magtag.network.connect()
    value = magtag.fetch()
    print("Response is", value)
except (ValueError, RuntimeError) as e:
    magtag.set_text(e)
    print("Some error occured, retrying! -", e)

# wait 2 seconds for display to complete
time.sleep(2)
magtag.exit_and_deep_sleep(TIME_BETWEEN_REFRESHES)
```

How It Works

Libraries

We import a few libraries to take care of the heavy lifting, in this case:

```
import time
import random
from adafruit_magtag.magtag import MagTag
```

The `time` library allows us to do some pausing between steps.

We'll use the `random` library to randomize posts.

The `adafruit_magtag` library makes it very simple to set up the MagTag's display, get online via WiFi, and to request and parse .json files.

Showerthought Variables

We'll set up some variables for the sources of our data. This represent the Reddit URL as well as the .json traversal needed to grab the quote and author name.

```
DATA_SOURCE = "https://www.reddit.com/r/showerthoughts/hot.json?limit=10"
quote_num = random.randint(0, 9)  # we get 10 possibilities, pick one of them
QUOTE_LOCATION = ["data", "children", quote_num, "data", "title"]
AUTHOR_LOCATION = ["data", "children", quote_num, "data", "author"]
```

Sleepy Time

The MagTag uses a deep sleep mode to conserve battery power between updates. We'll set the quotes to refresh every hour, which means we can get days of use on a single charge of a LiPo battery!

```
TIME_BETWEEN_REFRESHES = 1 * 60 * 60  # one hour delay
```

Setup

There are a number of setup steps we'll take next. First, we create the `MagTag()` object named `magtag` (all lower-case is easier to type anyway!).

Then we'll set the background graphic to the on-disk bitmap file.

```
magtag = MagTag(
    url=DATA_SOURCE,
    json_path=(QUOTE_LOCATION, AUTHOR_LOCATION),
)

magtag.graphics.set_background("/bmps/magtag_shower_bg.bmp")
```

Text

Next up, we'll use the magtag library's text commands to create the two text objects, one for the quote and one for the author.

The `magtag.add_text()` command has arguments for the font, wrap width, maximum length of text glyphs, position, line spacing, and anchor point for the text.

```
magtag.add_text(
    text_font="/fonts/Arial-Bold-12.bdf",
    text_wrap=28,
    text_maxlen=120,
    text_position=(
        (magtag.graphics.display.width // 2),
        (magtag.graphics.display.height // 2) - 10,
    ),
    line_spacing=0.75,
    text_anchor_point=(0.5, 0.5),  # center the text on x & y
)

# author in italic text, no wrapping
magtag.add_text(
    text_font="/fonts/Arial-Italic-12.bdf",
    text_position=(magtag.graphics.display.width // 2, 118),
    text_anchor_point=(0.5, 0.5),  # left justify this line
)
```

Connect

Next we'll get online, using the authentication details in the **secrets.py** file to connect to the network.

Then, we'll use the `magtag.fetch()` command which will go to the specified `DATA_SOURCE` url, grab the .json file, and parse it for the `QUOTE_LOCATION` text and `AUTHOR_LOCATION` text. (We include some error checking just in case. That's Internet!)

Once retrieved and parsed, the text is displayed on the MagTag.

Next, the MagTag takes an hour long nap, then wakes up to do it all over again. This then repeats until the end of time, keeping you happy with fresh quotes!

```
try:
    magtag.network.connect()
    value = magtag.fetch()
    print("Response is", value)
except (ValueError, RuntimeError) as e:
    magtag.set_text(e)
    print("Some error occured, retrying! -", e)

# wait 2 seconds for display to complete
time.sleep(2)
magtag.exit_and_deep_sleep(TIME_BETWEEN_REFRESHES)
```

Code the MagTag Quotes Board

Libraries

First, make sure you've installed the fundamental MagTag libraries as shown on the MagTag CircuitPython Setup page.

Text Editor

Adafruit recommends using the Mu editor for editing your CircuitPython code. You can get more info in this guide (https://adafru.it/ANO).

Alternatively, you can use any text editor that saves simple text files.

Code

Click the Download: Project Zip File link below in the code window to get a zip file with all the files needed for the project. Copy **magtag_quote_board.py** from the zip file and place on the **CIRCUITPY** drive, then rename it to **code.py**.

Also copy the whole **/bmps** directory from the zip file and place and its contents it on the **CIRCUITYPY** drive. These are some sample images you can start with.

Copy the **/fonts** directory from the zip file and place and its contents it on the **CIRCUITYPY** drive.

```
# MagTag Quote Board
# Displays Quotes from the Adafruit quotes server
# Be sure to put WiFi access point info in secrets.py file to connect

import time
from adafruit_magtag.magtag import MagTag

# Set up where we'll be fetching data from
DATA_SOURCE = "https://www.adafruit.com/api/quotes.php"
QUOTE_LOCATION = [0, "text"]
AUTHOR_LOCATION = [0, "author"]
# in seconds, we can refresh about 100 times on a battery
TIME_BETWEEN_REFRESHES = 1 * 60 * 60  # one hour delay

magtag = MagTag(
    url=DATA_SOURCE,
    json_path=(QUOTE_LOCATION, AUTHOR_LOCATION),
)

magtag.graphics.set_background("/bmps/magtag_quotes_bg.bmp")

# quote in bold text, with text wrapping
magtag.add_text(
    text_font="/fonts/Arial-Bold-12.bdf",
    text_wrap=28,
    text_maxlen=120,
    text_position=(
        (magtag.graphics.display.width // 2),
        (magtag.graphics.display.height // 2) - 10,
    ),
    line_spacing=0.75,
    text_anchor_point=(0.5, 0.5),  # center the text on x & y
)

# author in italic text, no wrapping
magtag.add_text(
    text_font="/fonts/Arial-Italic-12.bdf",
    text_position=(magtag.graphics.display.width // 2, 118),
    text_anchor_point=(0.5, 0.5),  # center it in the nice scrolly thing
)

# OK now we're ready to connect to the network, fetch data and update screen!
try:
    magtag.network.connect()
    value = magtag.fetch()
    print("Response is", value)
except (ValueError, RuntimeError) as e:
    magtag.set_text(e)
    print("Some error occured, retrying later -", e)
# wait 2 seconds for display to complete
time.sleep(2)
magtag.exit_and_deep_sleep(TIME_BETWEEN_REFRESHES)
```

How It Works

Libraries

We import a few libraries to take care of the heavy lifting, in this case:

```
import time
from adafruit_magtag.magtag import MagTag
```

The `time` library allows us to do some pausing between steps.

The `adafruit_magtag` library makes it very simple to set up the MagTag's display, get online via WiFi, and to request and parse .json files.

Quote Variables

We'll set up some variables for the sources of our quote data.

```
DATA_SOURCE = "https://www.adafruit.com/api/quotes.php"
QUOTE_LOCATION = [0, "text"]
AUTHOR_LOCATION = [0, "author"]
```

Sleepy Time

The MagTag uses a deep sleep mode to conserve battery power between updates. We'll set the quotes to refresh every hour, which means we can get days of use on a single charge of a LiPo battery!

```
TIME_BETWEEN_REFRESHES = 1 * 60 * 60  # one hour delay
```

Setup

There are a number of setup steps we'll take next. First, we create the `MagTag()` object named `magtag` (all lower-case is easier to type anyway!).

Then we'll set the background graphic to the on-disk bitmap file.

```
magtag = MagTag(
    url=DATA_SOURCE,
    json_path=(QUOTE_LOCATION, AUTHOR_LOCATION),
)
magtag.graphics.set_background("/bmps/magtag_quotes_bg.bmp")
```

Text

Next up, we'll use the magtag library's text commands to create the two text objects, one for the quote and one for the author.

The `magtag.add_text()` command has arguments for the font, wrap width, maximum length of text glyphs, position, line spacing, and anchor point for the text.

```
magtag.add_text(
    text_font="/fonts/Arial-Bold-12.bdf",
    text_wrap=28,
    text_maxlen=120,
    text_position=(
        (magtag.graphics.display.width // 2),
        (magtag.graphics.display.height // 2) - 10,
    ),
    line_spacing=0.75,
    text_anchor_point=(0.5, 0.5),  # center the text on x & y
)

# author in italic text, no wrapping
magtag.add_text(
    text_font="/fonts/Arial-Italic-12.bdf",
    text_position=(magtag.graphics.display.width // 2, 118),
    text_anchor_point=(0.5, 0.5),  # center it in the nice scrolly thing
)
```

Connect

Next we'll get online, using the authentication details in the **secrets.py** file to connect to the network.

Then, we'll use the `magtag.fetch()` command which will go to the specified `DATA_SOURCE` url, grab the .json file, and parse it for the `QUOTE_LOCATION` text and `AUTHOR_LOCATION` text. (We include some error checking just in case. That's Internet!)

Once retrieved and parsed, the text is displayed on the MagTag.

Next, the MagTag takes an hour long nap, then wakes up to do it all over again. This then repeats until the end of time, keeping you happy with fresh quotes!

```
try:
    magtag.network.connect()
    value = magtag.fetch()
    print("Response is", value)
except (ValueError, RuntimeError) as e:
    magtag.set_text(e)
    print("Some error occured, retrying later -", e)
# wait 2 seconds for display to complete
time.sleep(2)
magtag.exit_and_deep_sleep(TIME_BETWEEN_REFRESHES)
```