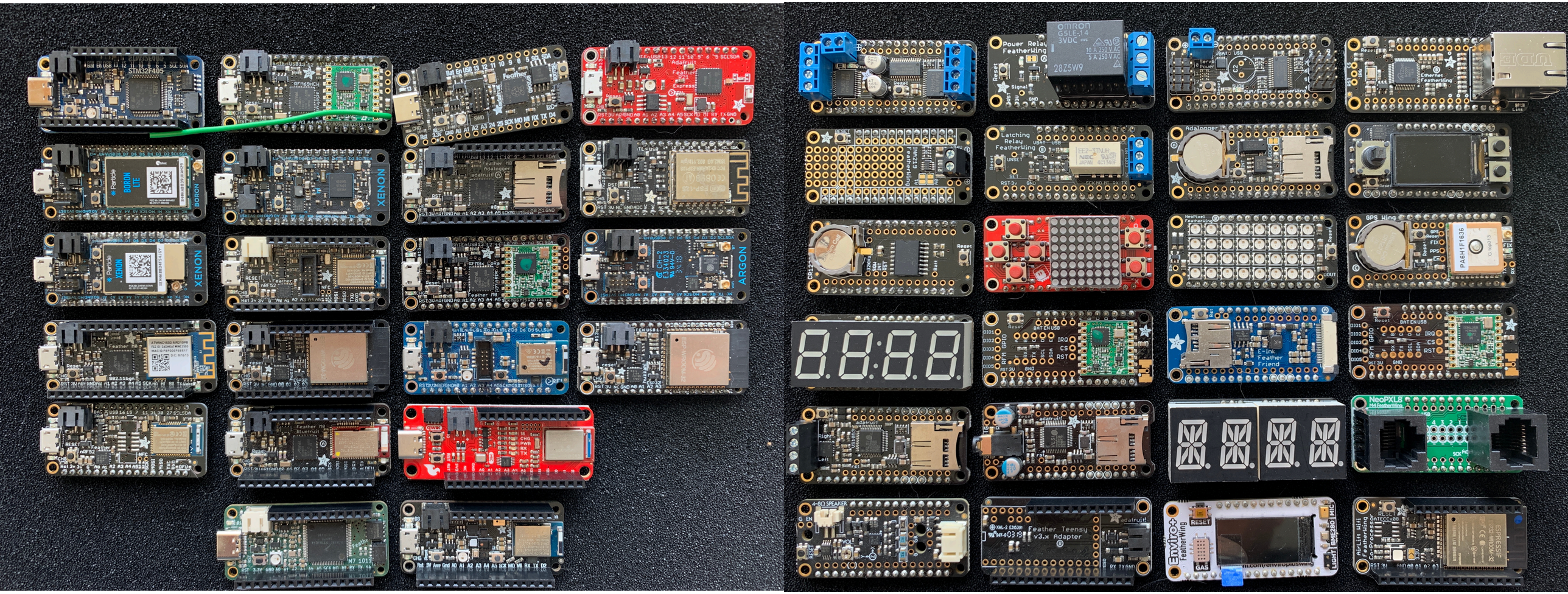
What. Not how.

Scott (@tannewt)

An *interface* is a boundary between two things

A *well designed* interface defines the *what* without revealing the *how*.

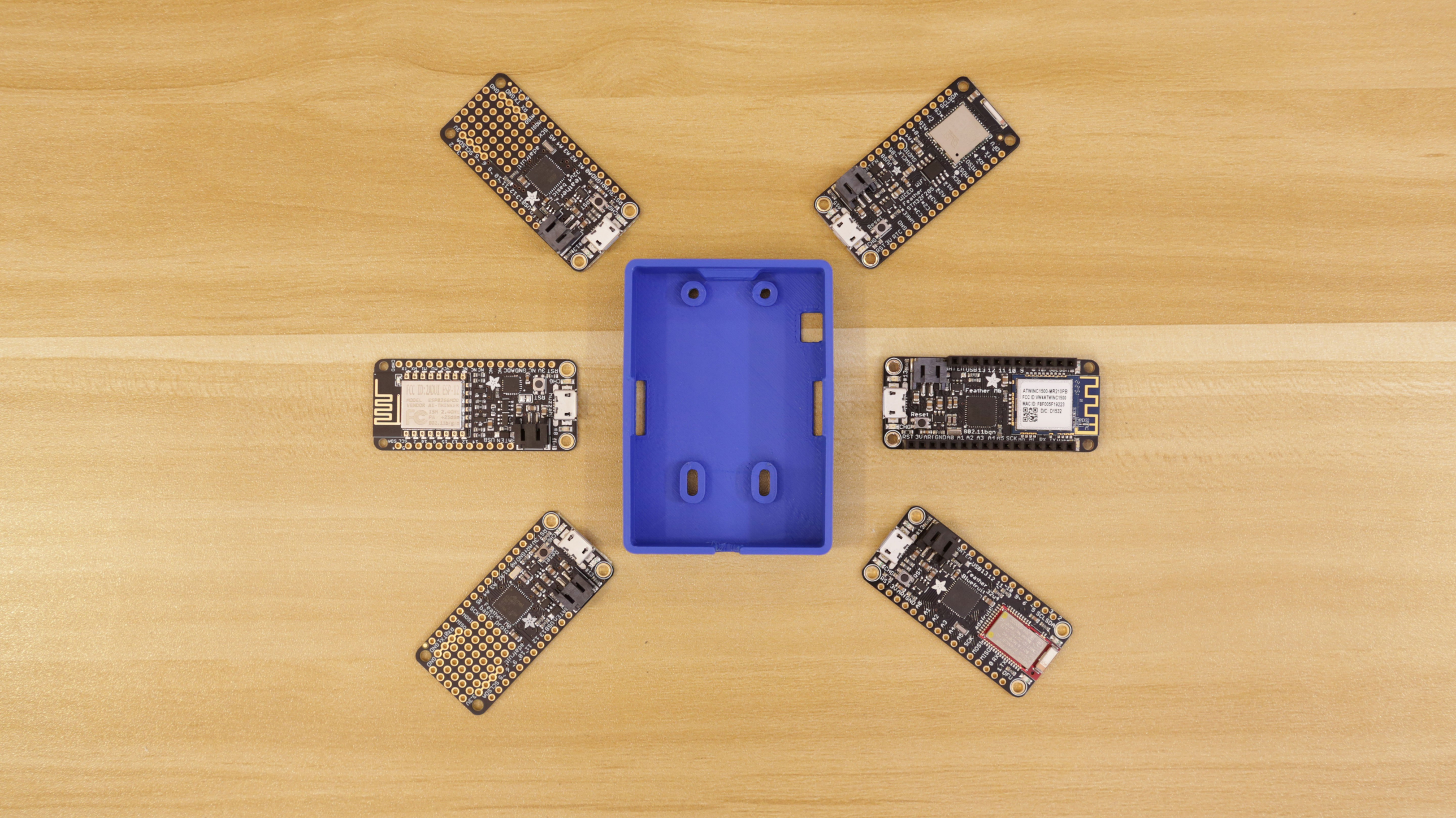
Abstraction of the *how* into *what* allows for reuse.


STM32F405
BORON
LITE
XENON
ARGON
Power Relay FeatherWing
Latching Relay FeatherWing
Adalogger
GPS Wing
NeoPixel FeatherWing
E-Ink Feather Friend
NeoPXL8
Feather Teensy v3.x Adapter
Enviro+ FeatherWing
AirLift Mini FeatherWing

https://github.com/adafruit/awesome-feather/

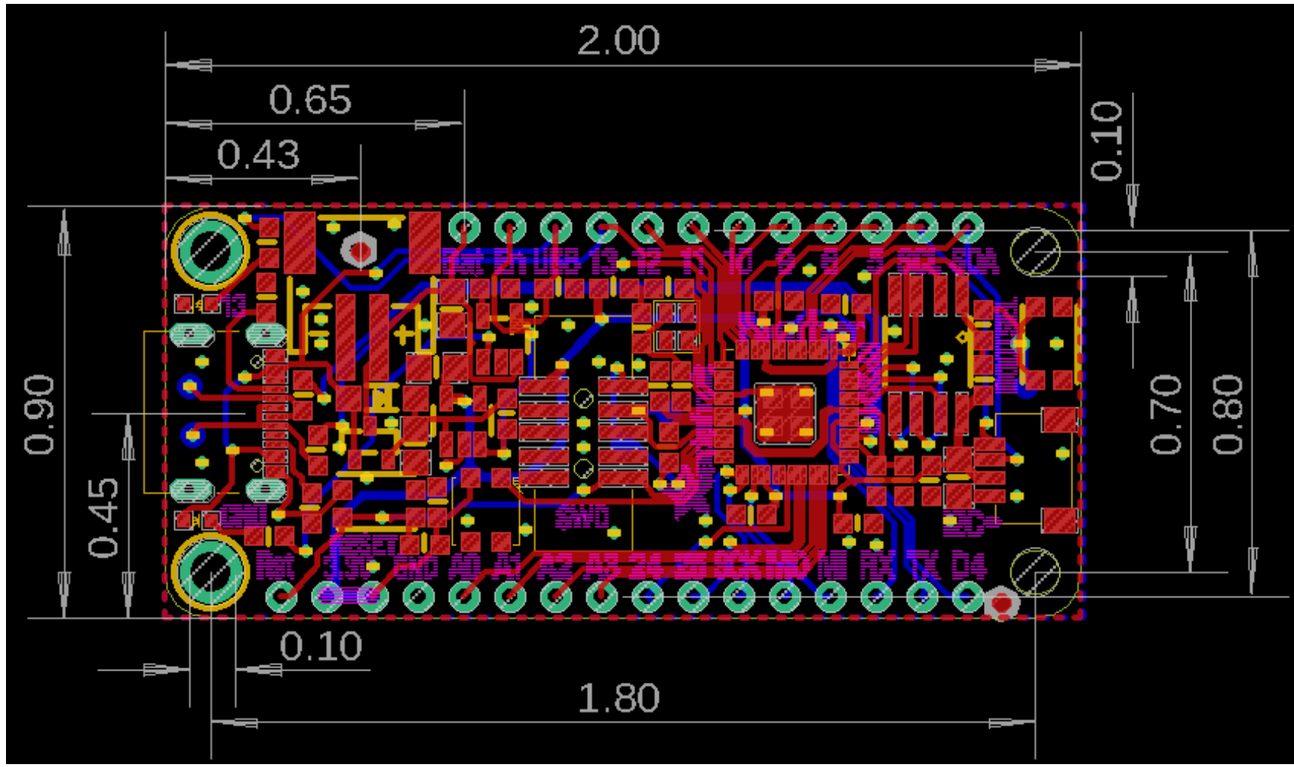
In open hardware there are three common category of interfaces:

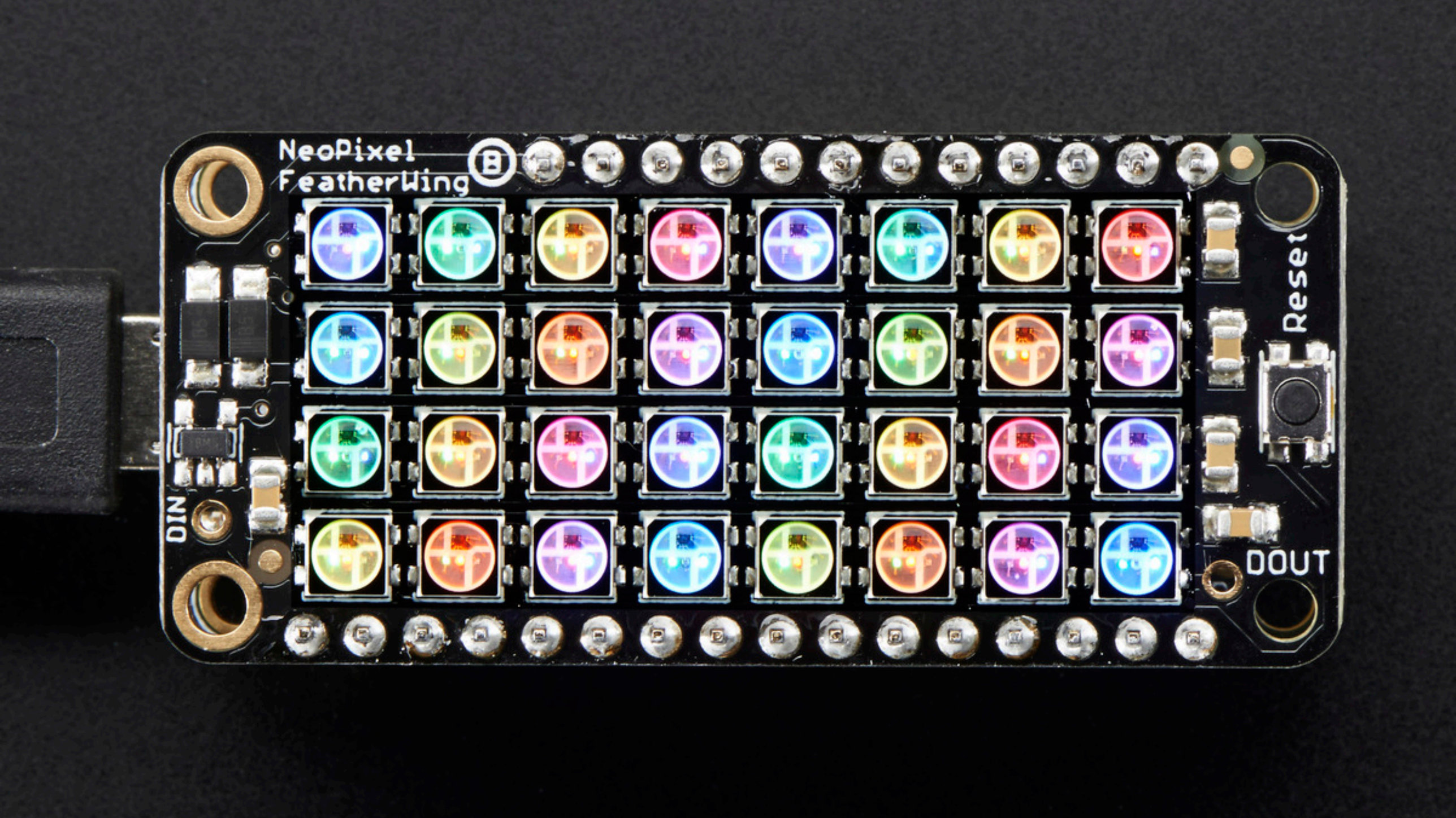
- Mechanical
- Electrical
- Software

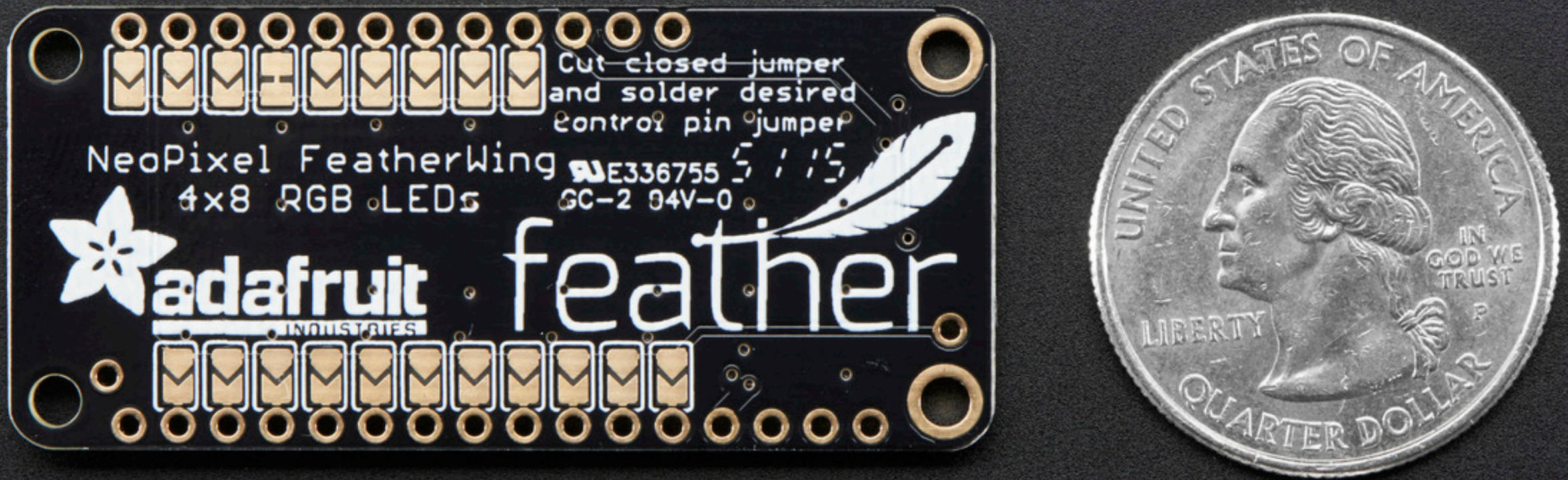

Feather M0
ATWINC1500-MR210PB
Feather M0 Bluefruit 32u4

Mechanical

- Board size
- Mounting holes
- Component size
- Electrical connection location

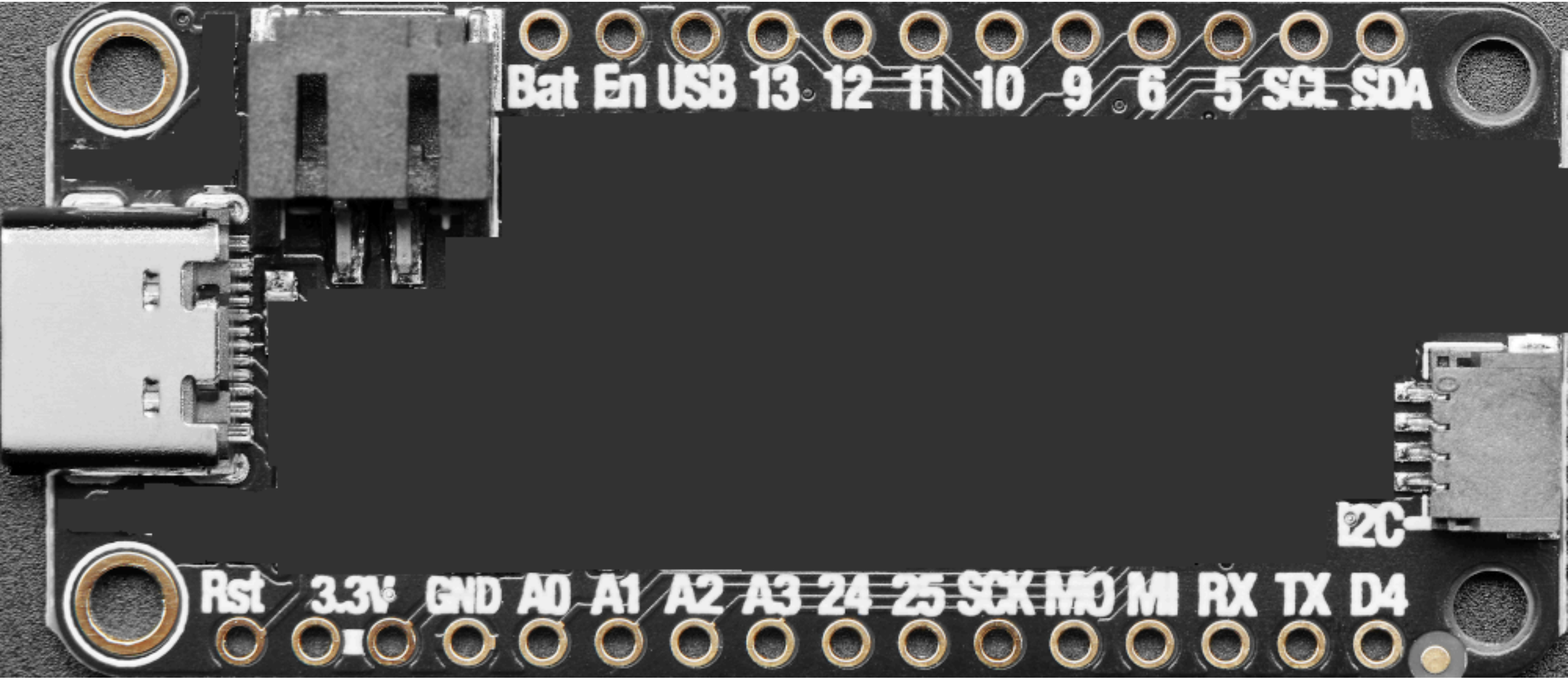


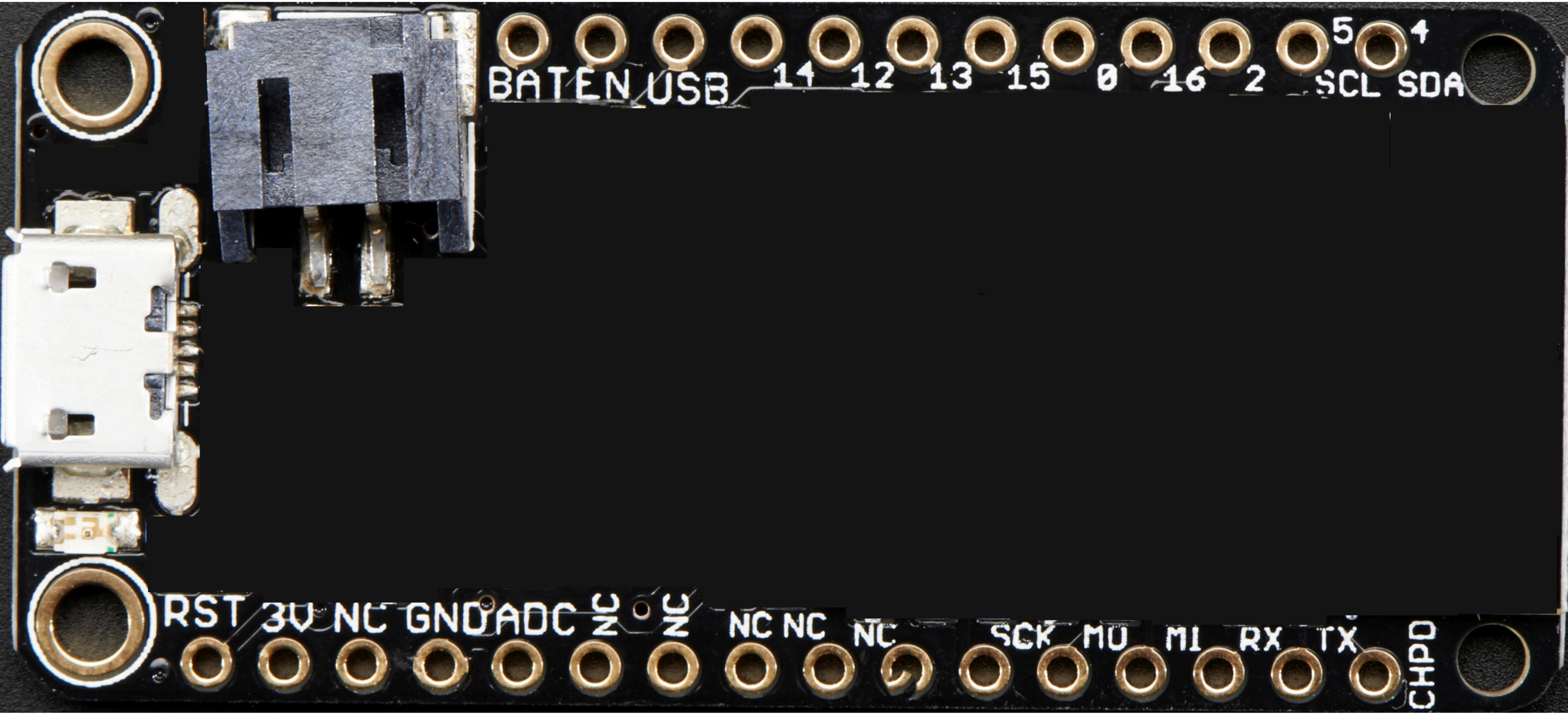

NeoPixel
FeatherWing
DIN
Reset
DOUT


Cut closed jumper
and solder desired
control pin jumper
NeoPixel FeatherWing
4x8 RGB LEDs
E336755
GC-2 94V-0
adafruit
INDUSTRIES
feather
UNITED STATES OF AMERICA
IN GOD WE TRUST
LIBERTY
QUARTER DOLLAR

Electrical

- Depends on *mechanical* interfaces through contact position
- Designated function(s)/protocol(s)
- Voltage levels
- Input/output

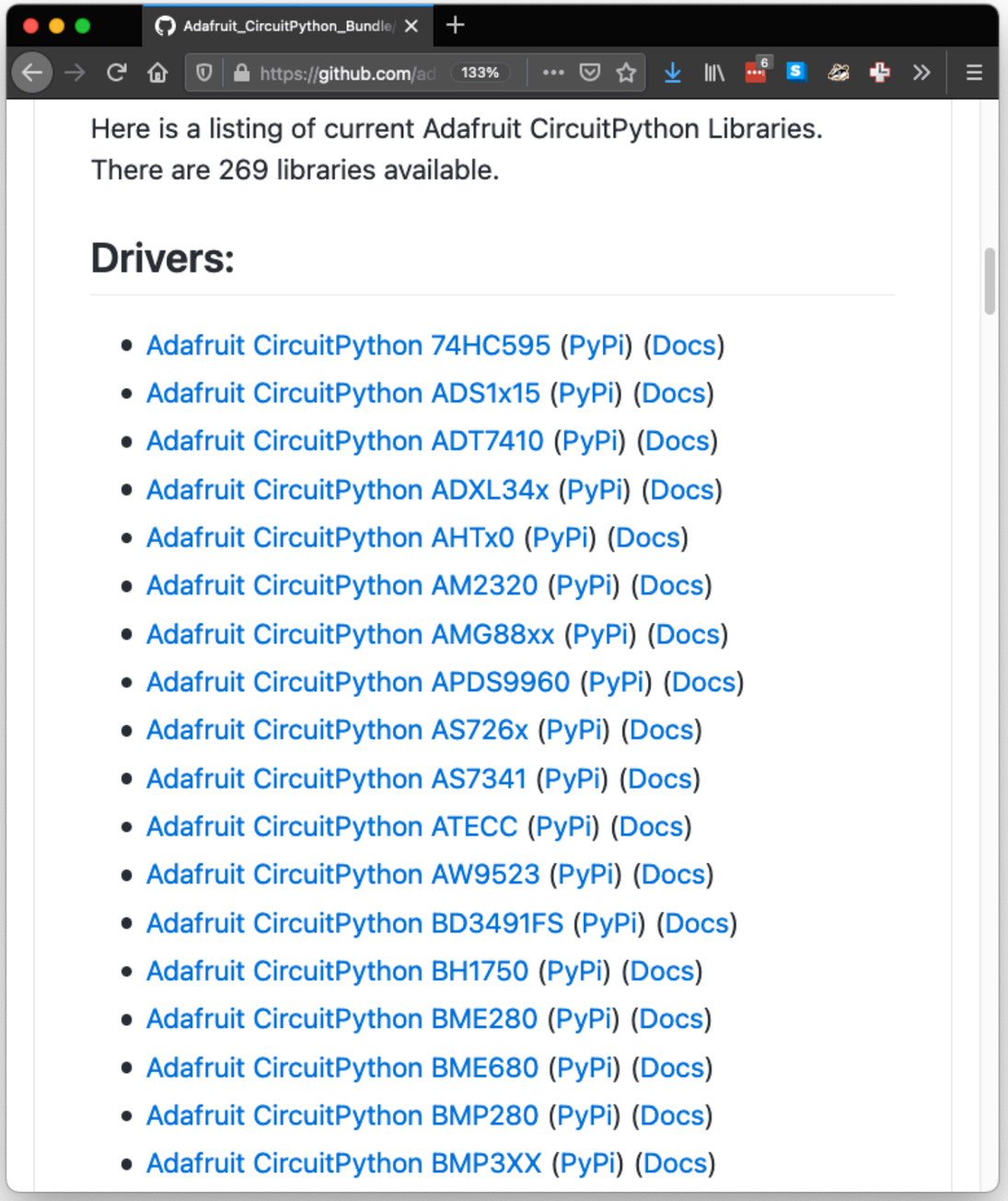

Bat En USB 13 12 11 10 9 6 5 SCL SDA
I2C
Rst 3.3V GND A0 A1 A2 A3 24 25 SCK MO MI RX TX D4


BAT EN USB
11 12 13 15 0 16 2 5 4
SCL SDA
RST 3V NC GND ADC NC NC NC NC NC
SCK MO MI RX TX
CHPD


Feather Specification | Introduc
Adafruit_CircuitPython_ESP32
https://github.com/ad
133%
# If you are using a board with pre-defined ESP32 Pins:
esp32_cs = DigitalInOut(board.ESP_CS)
esp32_ready = DigitalInOut(board.ESP_BUSY)
esp32_reset = DigitalInOut(board.ESP_RESET)
# If you have an AirLift Shield:
# esp32_cs = DigitalInOut(board.D10)
# esp32_ready = DigitalInOut(board.D7)
# esp32_reset = DigitalInOut(board.D5)
# If you have an AirLift Featherwing or ItsyBitsy Airlift:
# esp32_cs = DigitalInOut(board.D13)
# esp32_ready = DigitalInOut(board.D11)
# esp32_reset = DigitalInOut(board.D12)
# If you have an externally connected ESP32:
# NOTE: You may need to change the pins to reflect your wiring
# esp32_cs = DigitalInOut(board.D9)
# esp32_ready = DigitalInOut(board.D10)
# esp32_reset = DigitalInOut(board.D5)
spi = busio.SPI(board.SCK, board.MOSI, board.MISO)
esp = adafruit_esp32spi.ESP_SPIcontrol(spi, esp32_cs, esp32_ready
requests.set_socket(socket, esp)
if esp.status == adafruit_esp32spi.WL_IDLE_STATUS:
print("ESP32 found and in idle mode")
print("Firmware vers.", esp.firmware_version)
print("MAC addr:", [hex(i) for i in esp.MAC_address])

Software

- Names!
- Interaction
- Default software
- Bootloader



Here is a listing of current Adafruit CircuitPython Libraries.
There are 269 libraries available.

Drivers:

- Adafruit CircuitPython 74HC595 (PyPi) (Docs)
- Adafruit CircuitPython ADS1x15 (PyPi) (Docs)
- Adafruit CircuitPython ADT7410 (PyPi) (Docs)
- Adafruit CircuitPython ADXL34x (PyPi) (Docs)
- Adafruit CircuitPython AHTx0 (PyPi) (Docs)
- Adafruit CircuitPython AM2320 (PyPi) (Docs)
- Adafruit CircuitPython AMG88xx (PyPi) (Docs)
- Adafruit CircuitPython APDS9960 (PyPi) (Docs)
- Adafruit CircuitPython AS726x (PyPi) (Docs)
- Adafruit CircuitPython AS7341 (PyPi) (Docs)
- Adafruit CircuitPython ATECC (PyPi) (Docs)
- Adafruit CircuitPython AW9523 (PyPi) (Docs)
- Adafruit CircuitPython BD3491FS (PyPi) (Docs)
- Adafruit CircuitPython BH1750 (PyPi) (Docs)
- Adafruit CircuitPython BME280 (PyPi) (Docs)
- Adafruit CircuitPython BME680 (PyPi) (Docs)
- Adafruit CircuitPython BMP280 (PyPi) (Docs)
- Adafruit CircuitPython BMP3XX (PyPi) (Docs)

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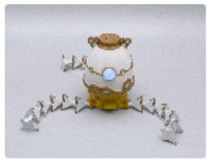
All Categories >

CircuitPython

LED Snowboard with Motion-Reactive Animation
By Erin St Blaine

♡ 1 | Intermediate



Zelda Guardian Robot Terrako Companion
By Ruiz Brothers

Intermediate

Quickstart - Raspberry Pi RP2040 with BLE and...
By Brent Rubell

♡ 1 | Beginner

Black Lives Matter Education & Workshop Kit
By lady ada

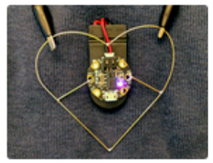
Beginner

Touch Deck: DIY Customizable TFT Control Pad
By John Park

♡ 9 | Beginner

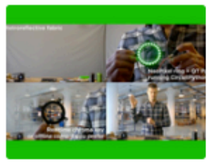
Adafruit MagTag COVID Vaccination Percent Tracker
By Dylan Herrada

♡ 5 | Beginner



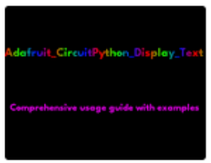
Your Very First Circuit Sculpture
By Jeff Epler

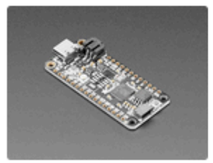
♡ 4 | Beginner



Retroreflective Greenscreen Light Ring QT Py...
By John Park

♡ 10 | Beginner





Think Outside In

HT_DS_SHTC3_D1.pdf

adafruit_shtc3 — Adafruit SHTC

https://media.digikey.com/pdf/Da

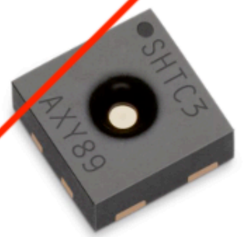
1 of 13 Automatic Zoom

SENSIRION
THE SENSOR COMPANY

Datasheet SHTC3

Humidity and Temperature Sensor IC

- Ultra-low power consumption
- Full battery supply voltage range (1.62 - 3.6 V)
- Small DFN package: 2 × 2 × 0.75 mm³
- Typical accuracy: ±2 %RH and ±0.2 °C
- Fully calibrated and reflow solderable
- Power-up and measurement within 1 ms



Product Summary

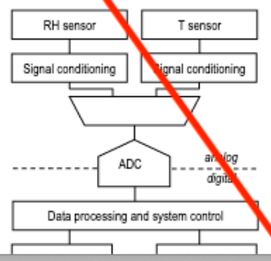
The SHTC3 is a digital humidity and temperature sensor designed especially for battery-driven high-volume consumer electronics applications. This sensor is specifically designed to overcome conventional limits for size, power consumption, and performance to price ratio in order to fulfill current and future requirements. Sensirion's CMOSens® technology offers a complete sensor system on a single chip, consisting of a capacitive humidity sensor, a bandgap temperature sensor, analog and digital signal processing, A/D converter, calibration data memory, and a digital communication interface supporting I²C Fast Mode Plus. The small 2 × 2 × 0.75 mm³ DFN package enables applications in even the most limited of spaces.

The sensor covers a humidity measurement range of 0 to 100 %RH and a temperature measurement range of - 40 °C to 125 °C with a typical accuracy of ±2 %RH and ±0.2°C. The broad supply voltage of 1.62 V to 3.6 V and an energy budget below 1 µJ per measurement make the SHTC3 suitable for mobile or wireless applications powered by batteries. With the industry-proven quality and reliability of Sensirion's humidity and temperature sensors and constant accuracy over a large measurement range, the SHTC3 offers best performance-to-price ratio. Tape and reel packaging together with suitability for standard SMD assembly processes make the SHTC3 predestined for high-volume applications.

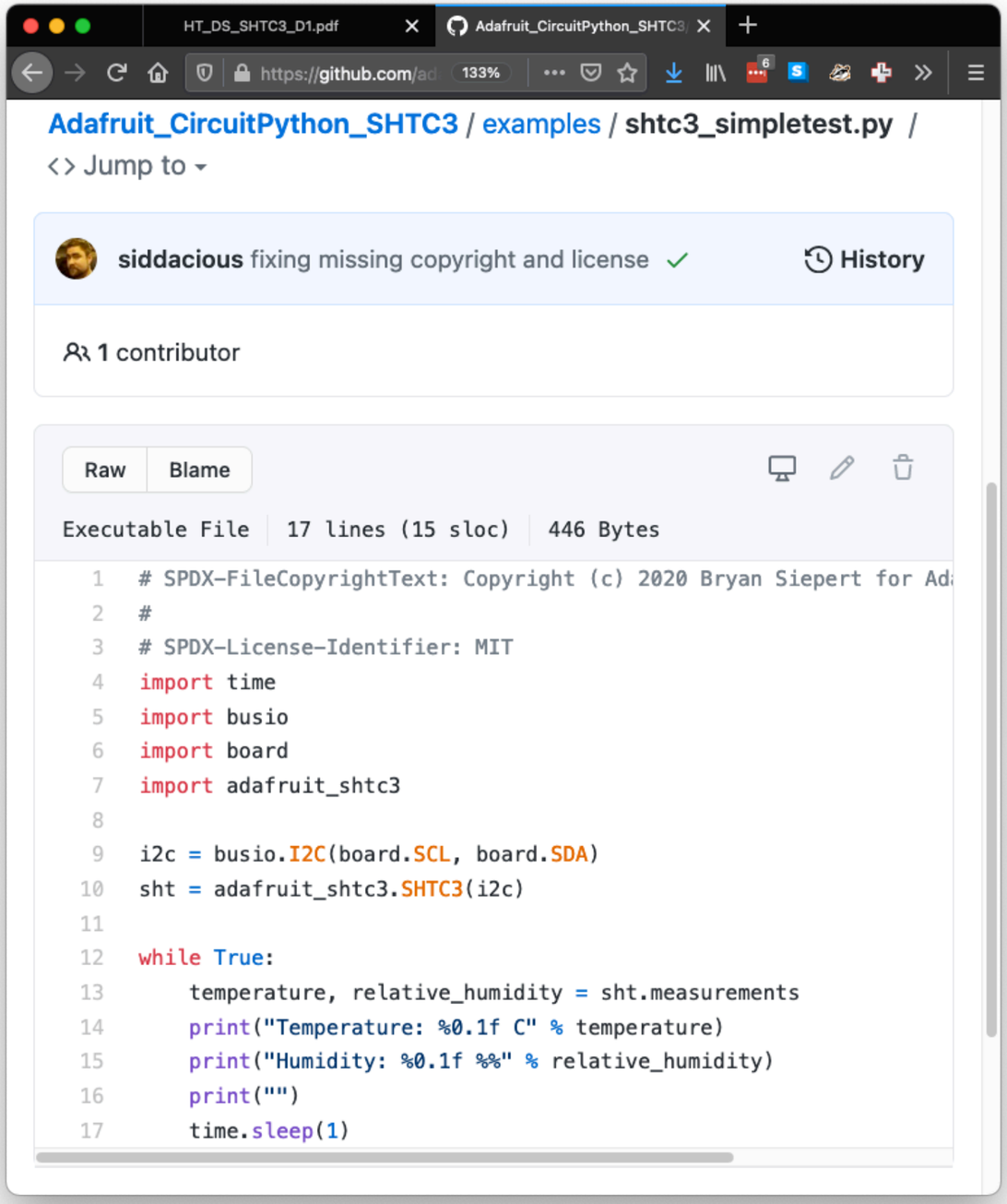
Benefits of Sensirion's CMOSens® Technology

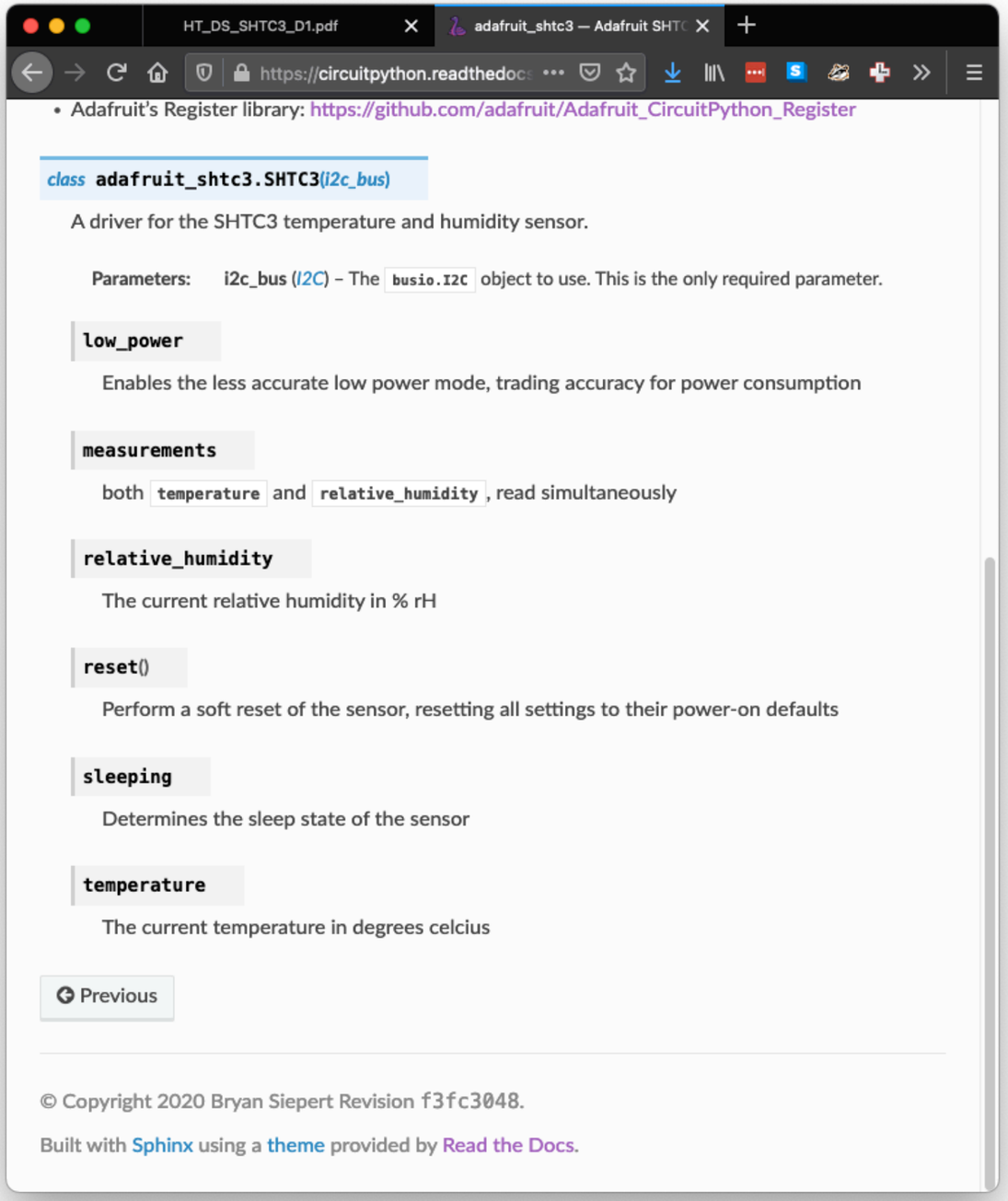
- High reliability and long-term stability
- Industry-proven technology with a track record of more than 15 years
- Designed for mass production
- Optimized for lowest cost
- High signal-to-noise ratio

Block diagram



Contents of this Data Sheet


HT_DS_SHTC3_D1.pdf
Adafruit_CircuitPython_SHTC3
https://github.com/ad
133%
Adafruit_CircuitPython_SHTC3 / examples / shtc3_simpletest.py /
Jump to
siddacious fixing missing copyright and license
History
1 contributor
Raw
Blame
Executable File
17 lines (15 sloc)
446 Bytes
1 # SPDX-FileCopyrightText: Copyright (c) 2020 Bryan Siepert for Ad
2 #
3 # SPDX-License-Identifier: MIT
4 import time
5 import busio
6 import board
7 import adafruit_shtc3
8
9 i2c = busio.I2C(board.SCL, board.SDA)
10 sht = adafruit_shtc3.SHTC3(i2c)
11
12 while True:
13 temperature, relative_humidity = sht.measurements
14 print("Temperature: %0.1f C" % temperature)
15 print("Humidity: %0.1f %%" % relative_humidity)
16 print("")
17 time.sleep(1)



- Adafruit's Register library: https://github.com/adafruit/Adafruit_CircuitPython_Register

class **adafruit_shtc3.SHTC3**(*i2c_bus*)

A driver for the SHTC3 temperature and humidity sensor.

Parameters: **i2c_bus** (*I2C*) – The `busio.I2C` object to use. This is the only required parameter.

low_power

Enables the less accurate low power mode, trading accuracy for power consumption

measurements

both `temperature` and `relative_humidity`, read simultaneously

relative_humidity

The current relative humidity in % rH

reset()

Perform a soft reset of the sensor, resetting all settings to their power-on defaults

sleeping

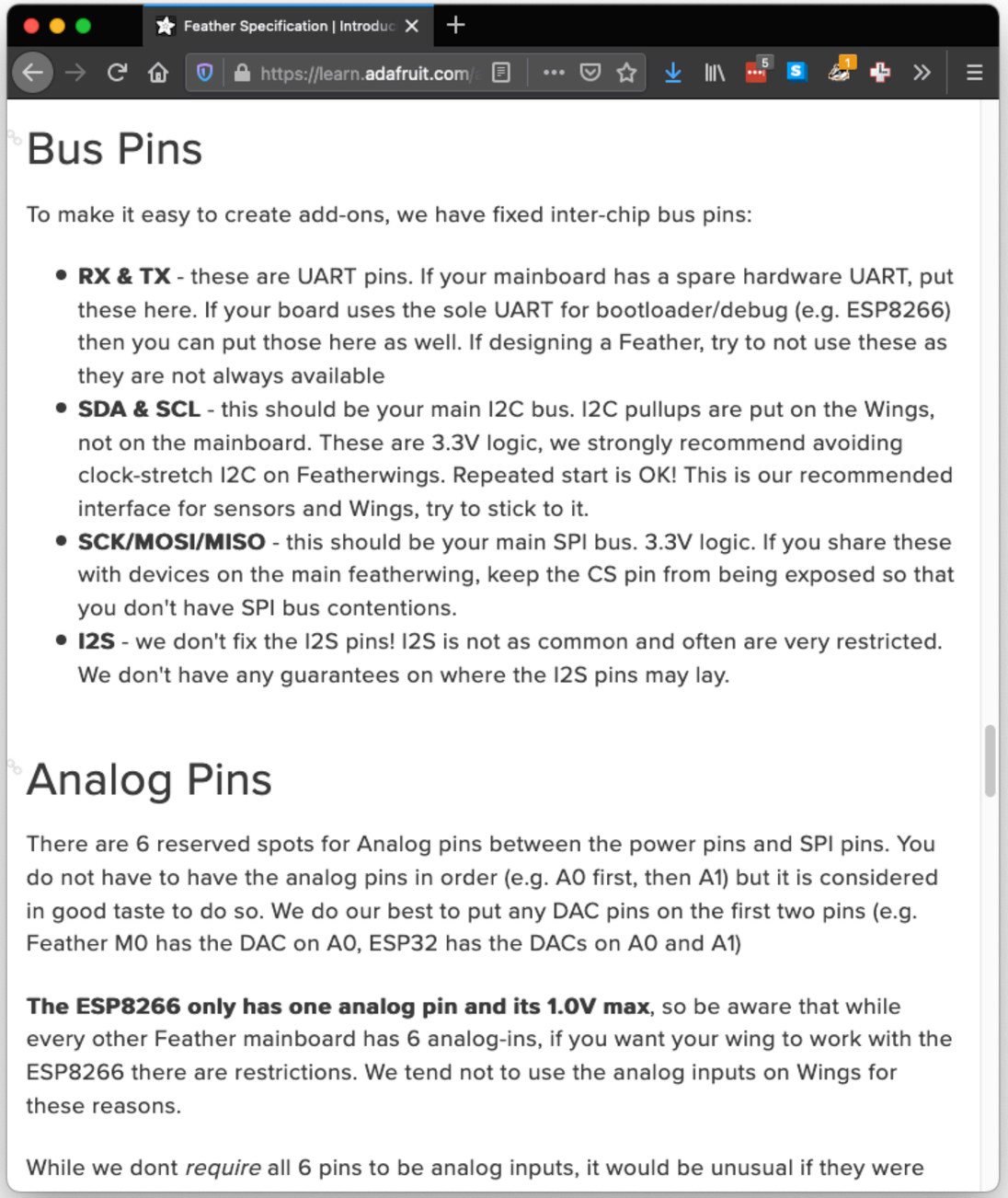
Determines the sleep state of the sensor

temperature

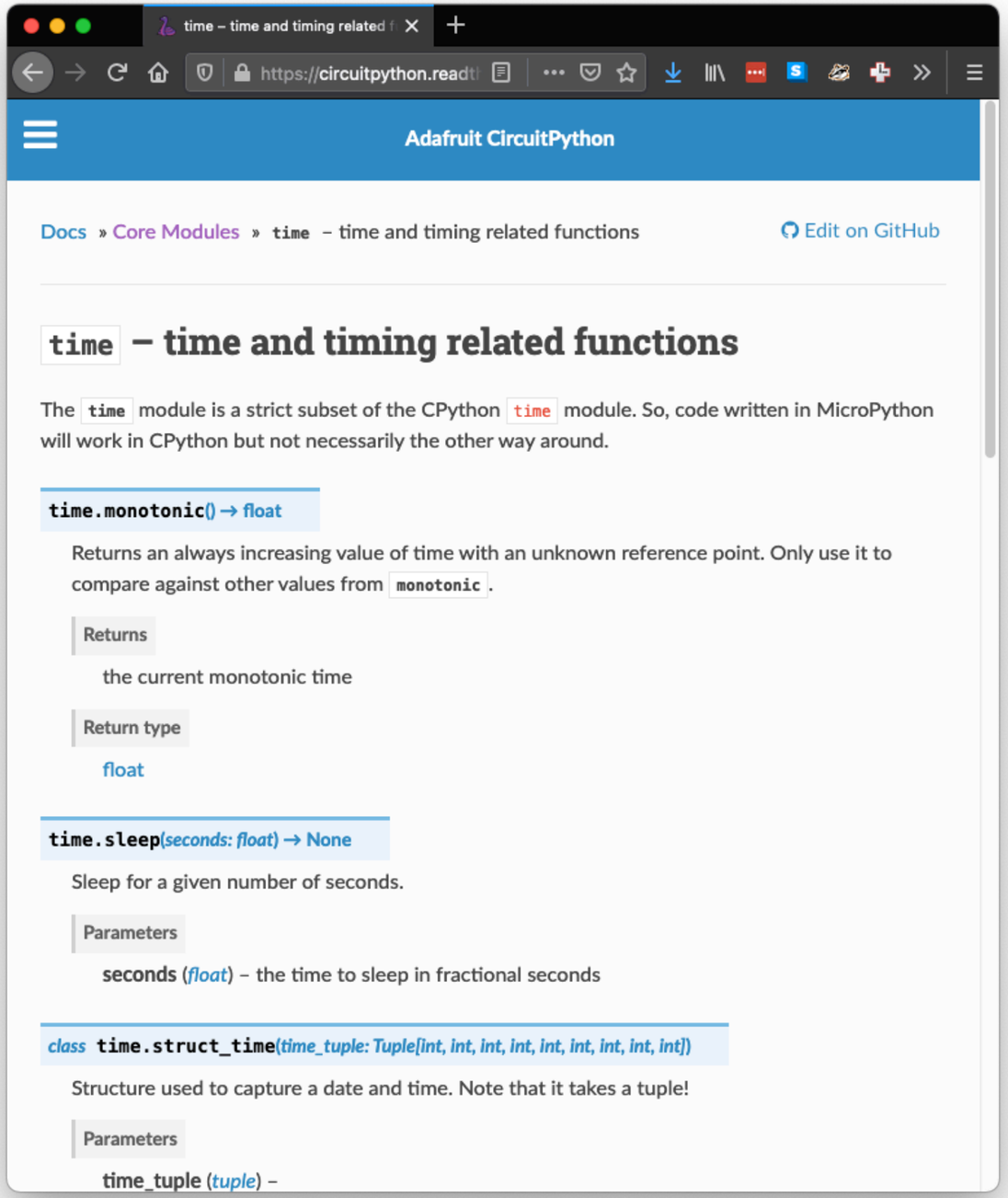
The current temperature in degrees celcius

Previous

Be Explicit


Feather Specification | Introduc
https://learn.adafruit.com/
Bus Pins
To make it easy to create add-ons, we have fixed inter-chip bus pins:
RX & TX - these are UART pins. If your mainboard has a spare hardware UART, put these here. If your board uses the sole UART for bootloader/debug (e.g. ESP8266) then you can put those here as well. If designing a Feather, try to not use these as they are not always available
SDA & SCL - this should be your main I2C bus. I2C pullups are put on the Wings, not on the mainboard. These are 3.3V logic, we strongly recommend avoiding clock-stretch I2C on Featherwings. Repeated start is OK! This is our recommended interface for sensors and Wings, try to stick to it.
SCK/MOSI/MISO - this should be your main SPI bus. 3.3V logic. If you share these with devices on the main featherwing, keep the CS pin from being exposed so that you don't have SPI bus contentions.
I2S - we don't fix the I2S pins! I2S is not as common and often are very restricted. We don't have any guarantees on where the I2S pins may lay.
Analog Pins
There are 6 reserved spots for Analog pins between the power pins and SPI pins. You do not have to have the analog pins in order (e.g. A0 first, then A1) but it is considered in good taste to do so. We do our best to put any DAC pins on the first two pins (e.g. Feather M0 has the DAC on A0, ESP32 has the DACs on A0 and A1)
The ESP8266 only has one analog pin and its 1.0V max, so be aware that while every other Feather mainboard has 6 analog-ins, if you want your wing to work with the ESP8266 there are restrictions. We tend not to use the analog inputs on Wings for these reasons.
While we dont require all 6 pins to be analog inputs, it would be unusual if they were

Be Strict


time – time and timing related f
https://circuitpython.readt
Adafruit CircuitPython
Docs » Core Modules » time – time and timing related functions
Edit on GitHub
time – time and timing related functions
The time module is a strict subset of the CPython time module. So, code written in MicroPython will work in CPython but not necessarily the other way around.
time.monotonic() → float
Returns an always increasing value of time with an unknown reference point. Only use it to compare against other values from monotonic.
Returns
the current monotonic time
Return type
float
time.sleep(seconds: float) → None
Sleep for a given number of seconds.
Parameters
seconds (float) – the time to sleep in fractional seconds
class time.struct_time(time_tuple: Tuple[int, int, int, int, int, int, int, int, int])
Structure used to capture a date and time. Note that it takes a tuple!
Parameters
time_tuple (tuple) –

Remember

Interfaces are:

* Mechanical
* Electrical
* Software

To design one well:

* Think outside in
* Be explicit when designing an interface
* Be strict when implementing an existing interface