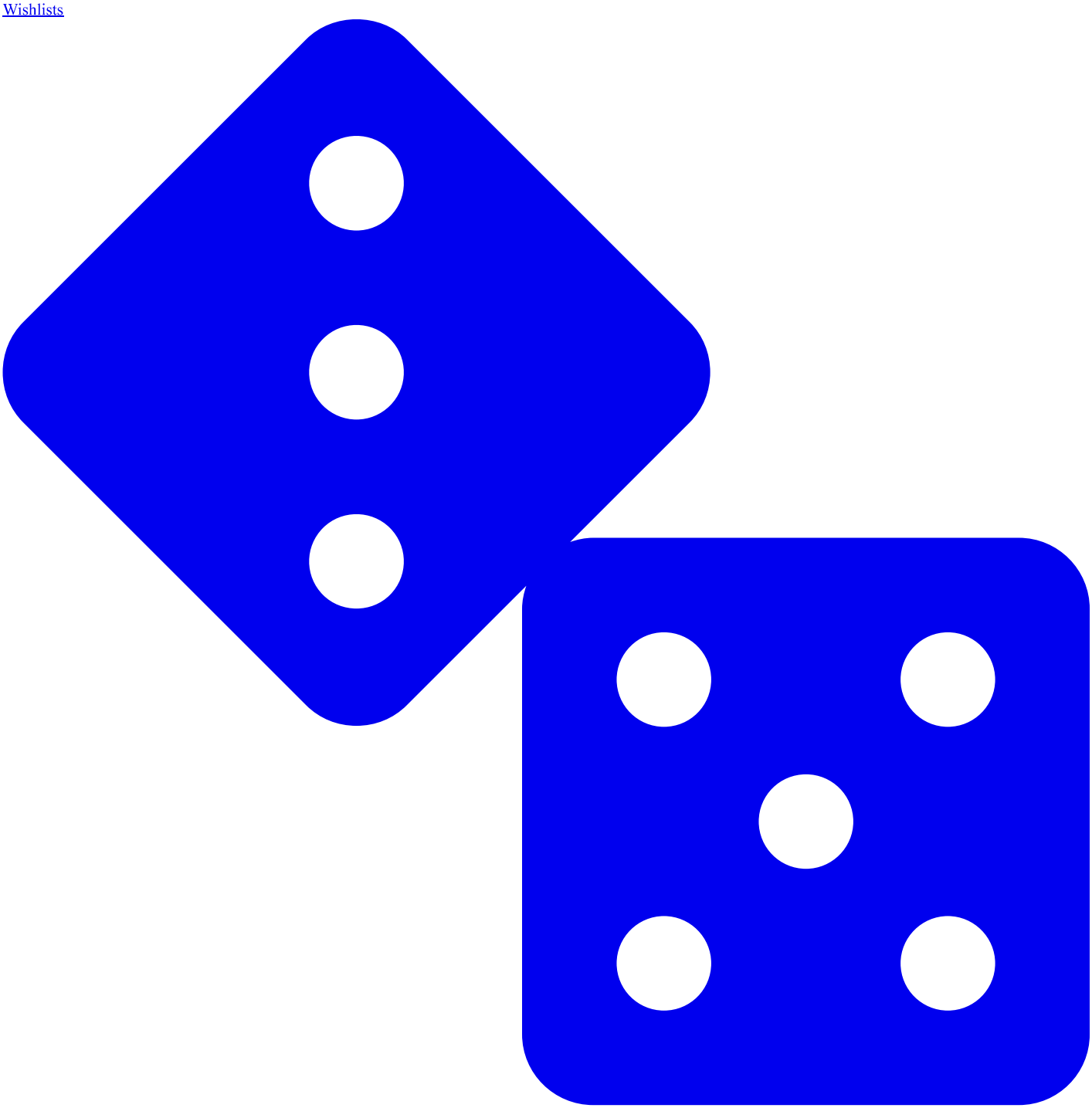

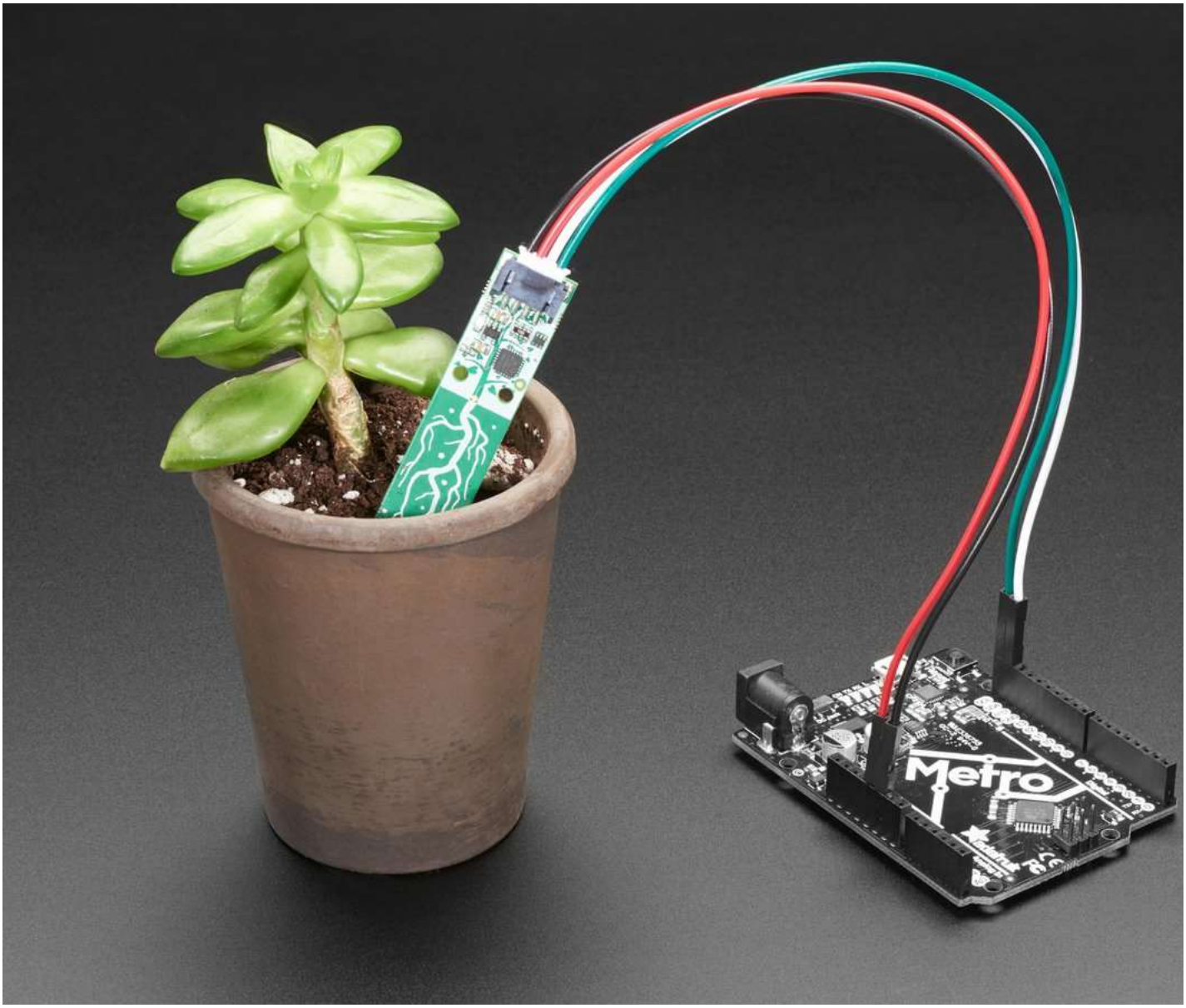


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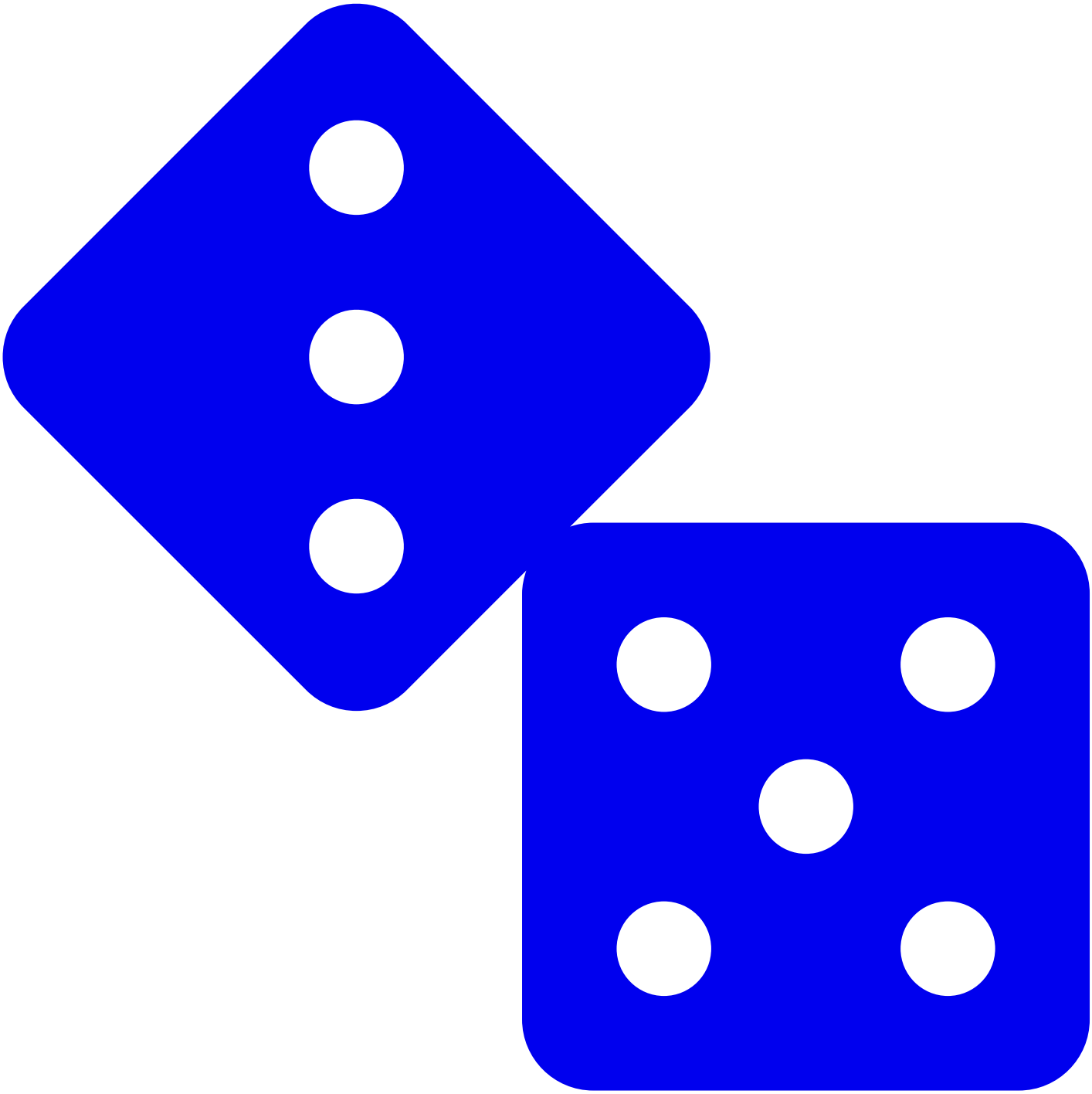

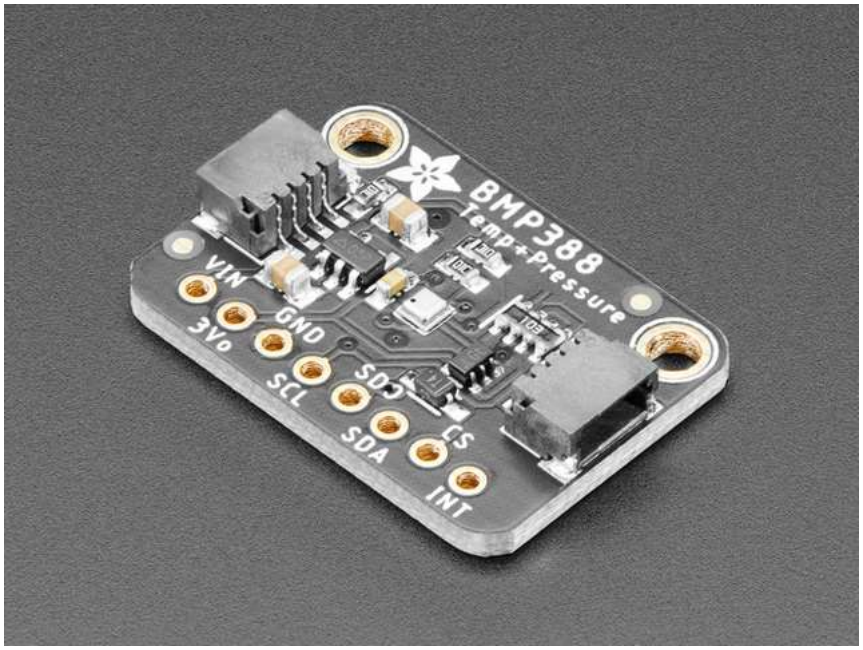


### Adafruit BMP388 and BMP390 - Precision Barometric Pressure and Altimeter

By Kattni Rembor
The BMP3xx has better precision than ever, which makes it excellent for environmental sensing or as a precision altimeter. It can be used in either I2C and SPI configurations.



Feedback? Corrections?

## Python & CircuitPython

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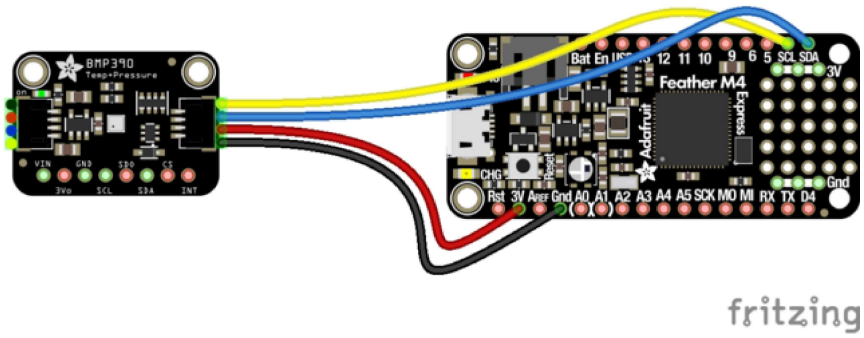
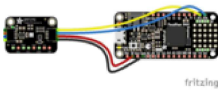
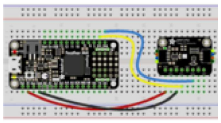
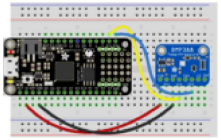
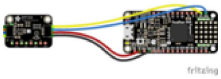
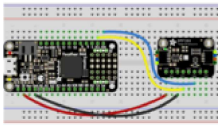
It's easy to use the BMP388 sensor with CircuitPython and the Adafruit CircuitPython BMP3XX module.  This module allows you to easily write Python code that reads the barometric pressure, temperature and more from the sensor.

You can use this sensor with any CircuitPython microcontroller board or with a computer that has GPIO and Python thanks to Adafruit_Blinka, our CircuitPython-for-Python compatibility library.

## CircuitPython Microcontroller Wiring

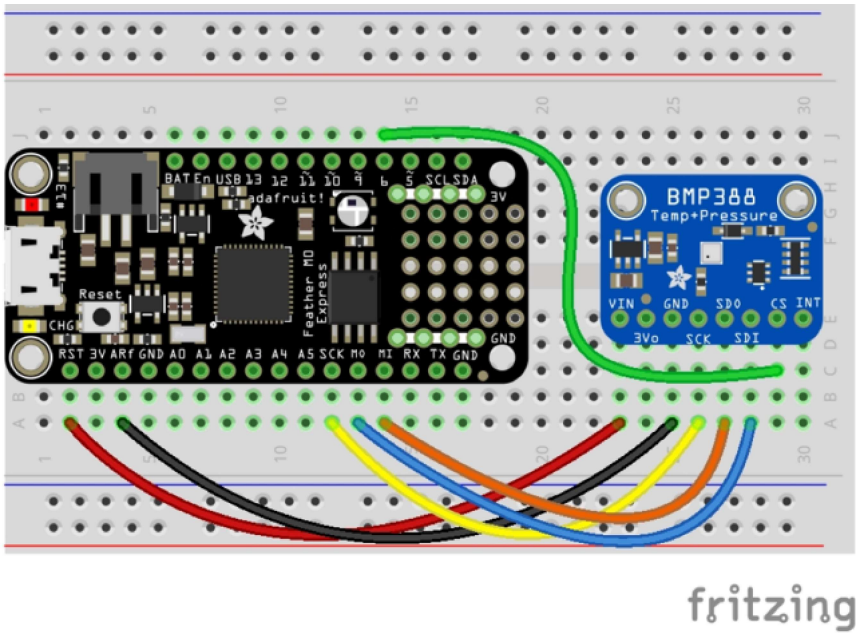
First wire up a BMP3xx to your board as shown below.  You can use either I2C or SPI wiring, although it's recommended to use I2C for simplicity.  Here's an example of wiring a Feather to the sensor with I2C:

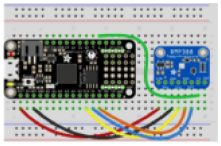
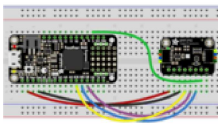
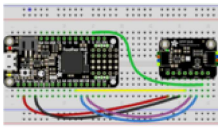



- 
- 
- 
- 
- 
- 

- **Board 3V** to **sensor VIN (red wire on STEMMA QT version)**
- **Board GND** to **sensor GND (black wire on STEMMA QT version)**
- **Board SCL** to **sensor SCK/SCL (yellow wire on STEMMA QT version)**
- **Board SDA** to **sensor SDI/SDA (blue wire on STEMMA QT version)**

And an example of a Feather wired with hardware SPI:



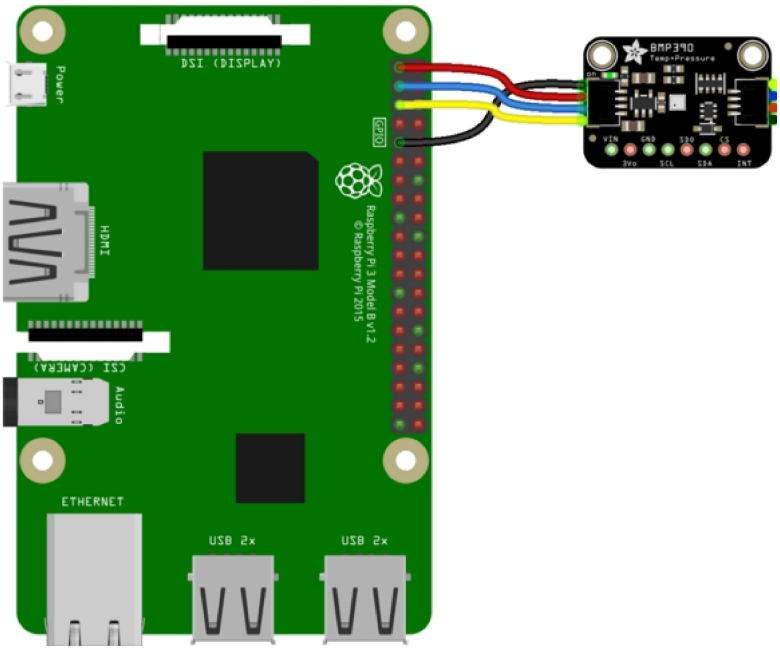

- 
- 
- 

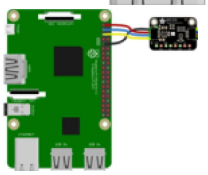
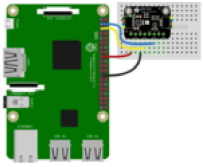
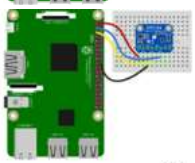
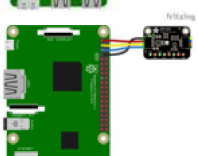
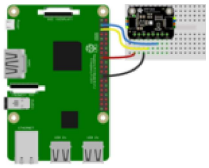
- **Board 3V** to **sensor VIN**
- **Board GND** to **sensor GND**
- **Board SCK** to **sensor SCK/SCL**
- **Board MOSI** to **sensor SDI/SDA**
- **Board MISO** to **sensor SDO**
- **Board D5** to **sensor CS** (or use any other free digital I/O pin)

## Python Computer Wiring

Since there's *dozens* of Linux computers/boards you can use, we will show wiring for Raspberry Pi. For other platforms, please visit the guide for CircuitPython on Linux to see whether your platform is supported.

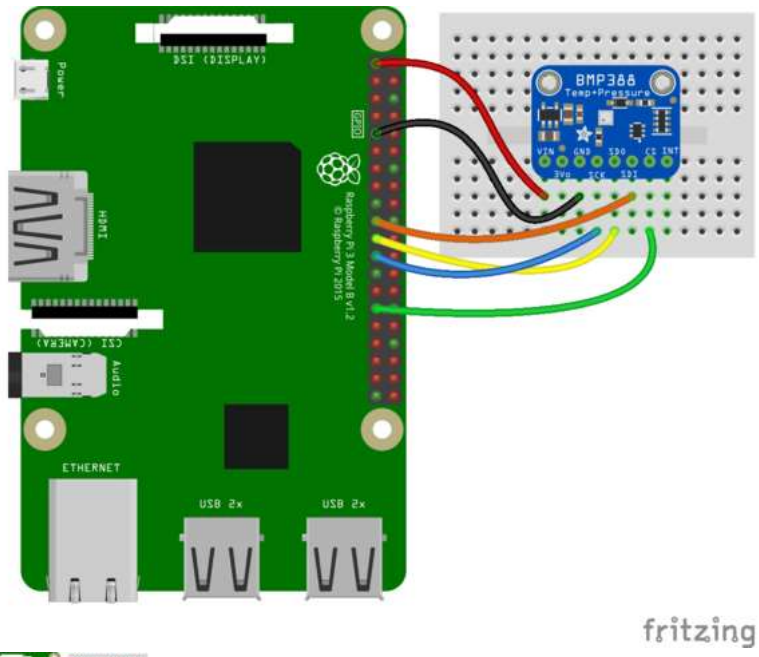
Here's the Raspberry Pi wired with I2C:

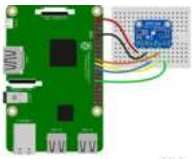
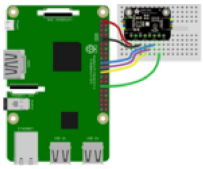
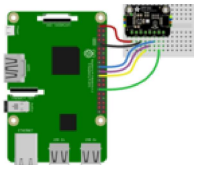



- 
- 
- 
- 
- 

- **Pi 3V3** to **sensor VIN**
- **Pi GND** to **sensor GND**
- **Pi SCL** to **sensor SCK/SCL**
- **Pi SDA** to **sensor SDI/SDA**

And an example on the Raspberry Pi 3 Model B wired with SPI:




- 
- 
- 

- **Pi 3V3** to **sensor VIN**
- **Pi GND** to **sensor GND**
- **Pi MOSI** to **sensor SDI/SDA**
- **Pi MISO** to **sensor SDO**
- **Pi SCLK** to **sensor SCK/SCL**
- **Pi #5** to **sensor CS** (or use any other free GPIO pin)

## CircuitPython Installation of BMP3XX Library

You'll need to install the Adafruit CircuitPython BMP3XX library on your CircuitPython board.

First make sure you are running the latest version of Adafruit CircuitPython 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. Our CircuitPython starter guide has a great page on how to install the library bundle.

For non-express boards like the Trinket M0 or Gemma M0, you'll need to manually install the necessary libraries from the bundle:

- **adafruit_bmp3xx.mpy**
- **adafruit_bus_device**

Before continuing, make sure your board's **lib** folder or root filesystem has the **adafruit_bmp3xx.mpy,** and **adafruit_bus_device** files and folders copied over.

Next connect to the board's serial REPL so you are at the CircuitPython >>> prompt.

## Python Installation of BMP3XX Library

You'll need to install the **Adafruit_Blinka** library that provides the CircuitPython support in Python. This may also require enabling I2C on your platform and verifying you are running Python 3. Since each platform is a little different, and Linux changes often, please visit the CircuitPython on Linux guide to get your computer ready!

Once that's done, from your command line run the following command:

- `sudo pip3 install adafruit-circuitpython-bmp3xx`

If your default Python is version 3 you may need to run 'pip' instead. Just make sure you aren't trying to use CircuitPython on Python 2.x, it isn't supported!

## CircuitPython & Python Usage

To demonstrate the usage of the sensor, we'll initialize it and read the pressure, temperature and more from the Python REPL.

If you're using an I2C connection, run the following code to import the necessary modules and initialize the I2C connection with the sensor:

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Copy Code

```
import time
import board
import adafruit_bmp3xx
i2c = board.I2C()
bmp = adafruit_bmp3xx.BMP3XX_I2C(i2c)
```

Or if you're using a SPI connection run this code instead to setup the SPI connection and sensor:

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Copy Code

```
import time
import board
import adafruit_bmp3xx
import digitalio
spi = board.SPI()
cs = digitalio.DigitalInOut(board.D5)
bmp = adafruit_bmp3xx.BMP3XX_SPI(spi, cs)
```

Now you're ready to read values from the sensor using any of these properties:

- `temperature` - The sensor temperature in degrees Celsius.
- `pressure` - The pressure in hPa.
- `altitude` - The altitude in meters.

For example to print temperature and pressure:

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```
print("Pressure: {:6.1f}".format(bmp.pressure))
print("Temperature: {:5.2f}".format(bmp.temperature))
```

```
>>> print("Pressure: {:6.1f}".format(bmp.pressure))
Pressure:  985.0
>>> print("Temperature: {:5.2f}".format(bmp.temperature))
Temperature: 19.25
```

For altitude, you'll want to set the pressure at sea level for your location to get the most accurate measurement (remember these sensors can only infer altitude based on pressure and need a set calibration point). Look at your local weather report for a pressure at sea level reading and set the `sea_level_pressure` property:

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```
bmp.sea_level_pressure = 1013.25
```

Then read the `altitude` property for a more accurate altitude reading (but remember this altitude will fluctuate based on atmospheric pressure changes!):

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```
print('Altitude: {} meters'.format(bmp.altitude))
```

```
>>> bmp.sea_level_pressure = 1013.25
>>> print('Altitude: {} meters'.format(bmp.altitude))
Altitude: 238.16 meters
```

That's all there is to using the BMP388 sensor with CircuitPython!

## Full Example Code

Download Project Bundle
Copy Code

```
# SPDX-FileCopyrightText: 2021 ladyada for Adafruit Industries
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import time
import board
import adafruit_bmp3xx

# I2C setup
i2c = board.I2C()  # uses board.SCL and board.SDA
# i2c = board.STEMMA_I2C()  # For using the built-in STEMMA QT connector on a microcontroller
bmp = adafruit_bmp3xx.BMP3XX_I2C(i2c)
```

```
# SPI setup
# from digitalio import DigitalInOut, Direction
# spi = board.SPI()
# cs = DigitalInOut(board.D5)
# bmp = adafruit_bmp3xx.BMP3XX_SPI(spi, cs)

bmp.pressure_oversampling = 8
bmp.temperature_oversampling = 2

while True:
    print(
        "Pressure: {:6.4f}  Temperature: {:5.2f}".format(bmp.pressure, bmp.temperature)
    )
    time.sleep(1)
```

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This page (Python & CircuitPython) was last updated on Jun 10, 2023.

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Difficulty: Beginner
Guide Type: Product
Products: Adafruit BMP388 - Precision Barometric Pressure and Altimeter
Contributors: Kattni Rembor, Isaac Wellish, lady ada
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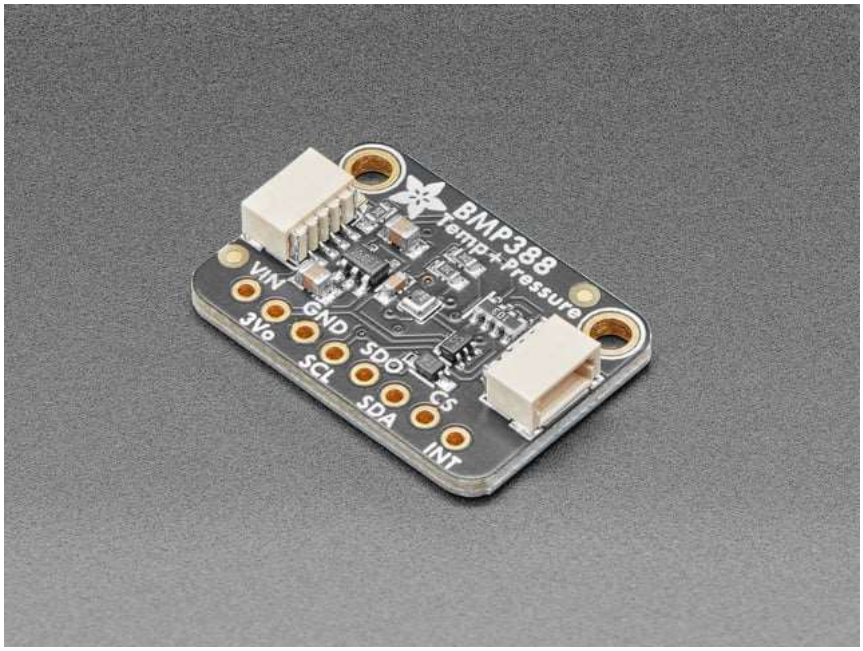


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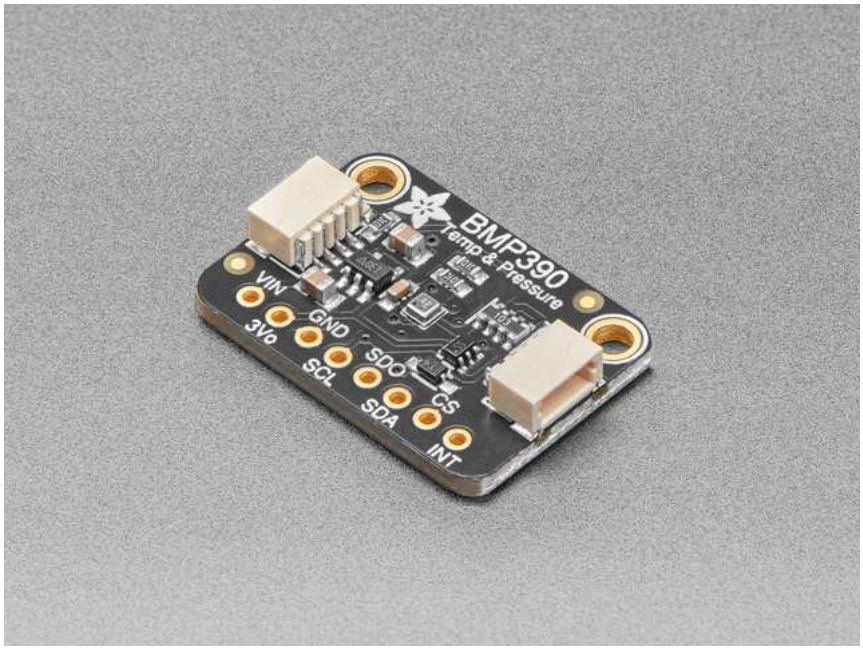


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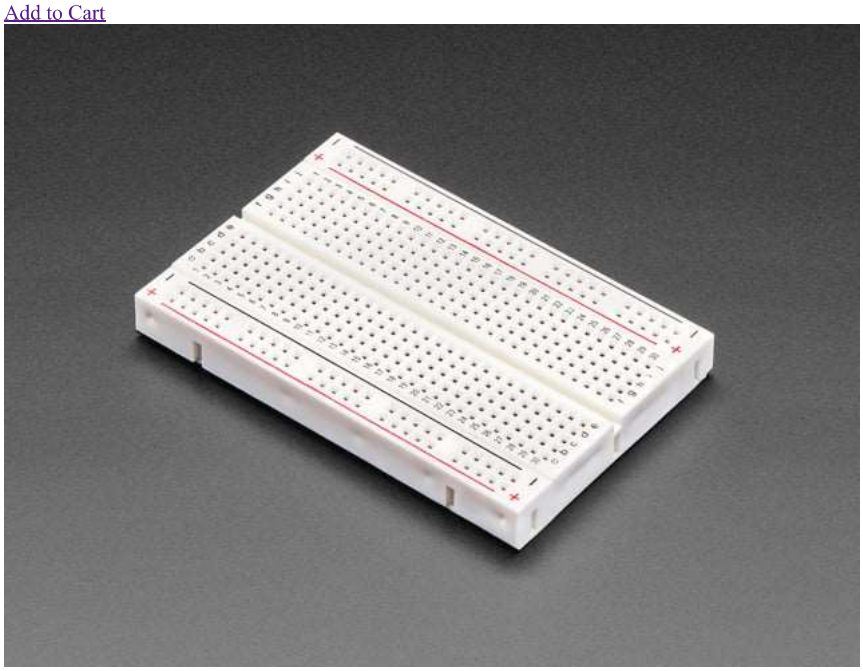

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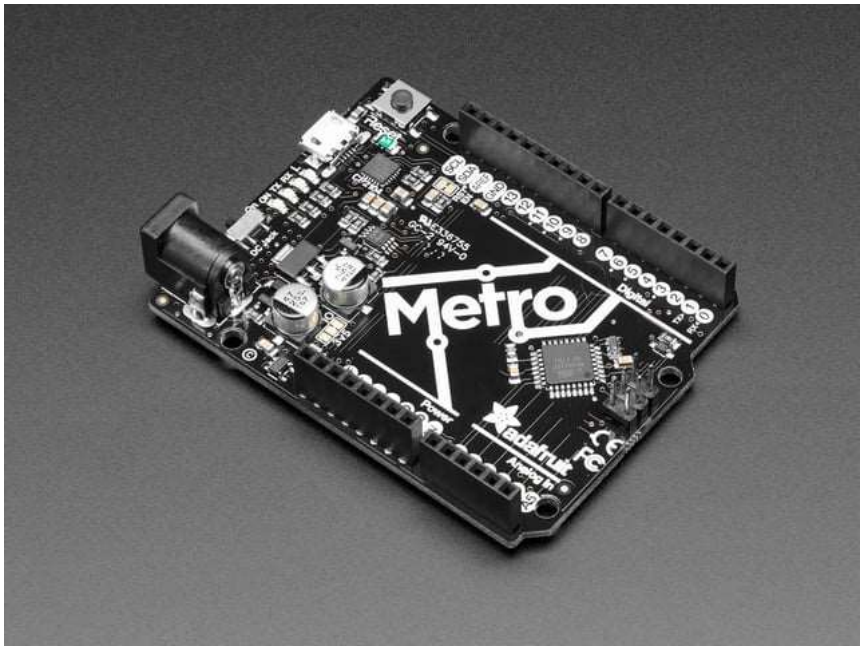


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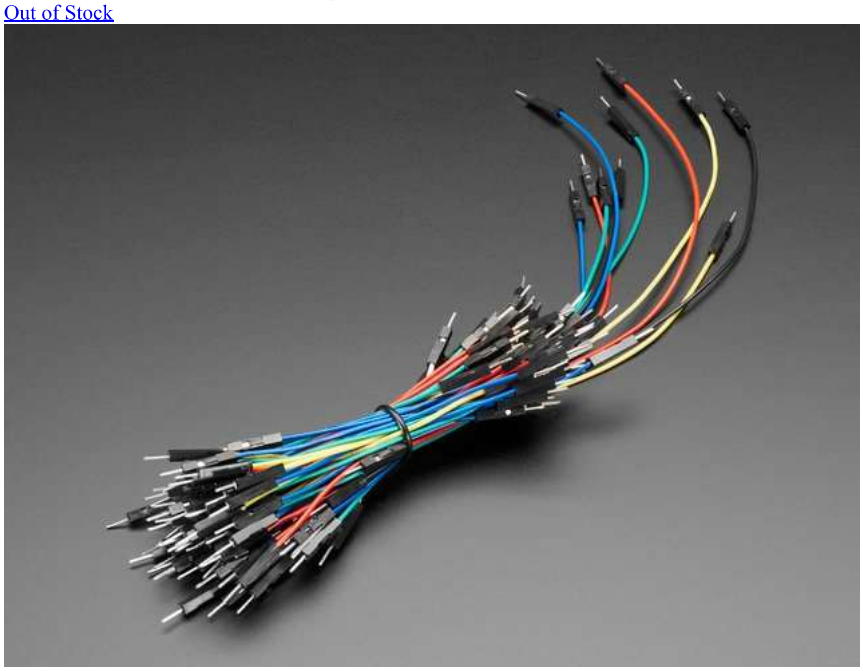

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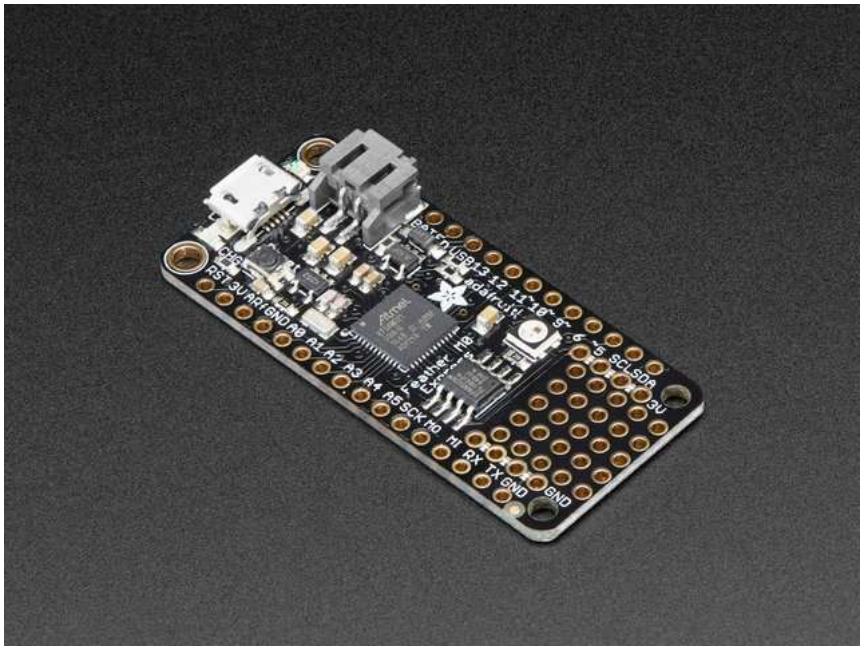


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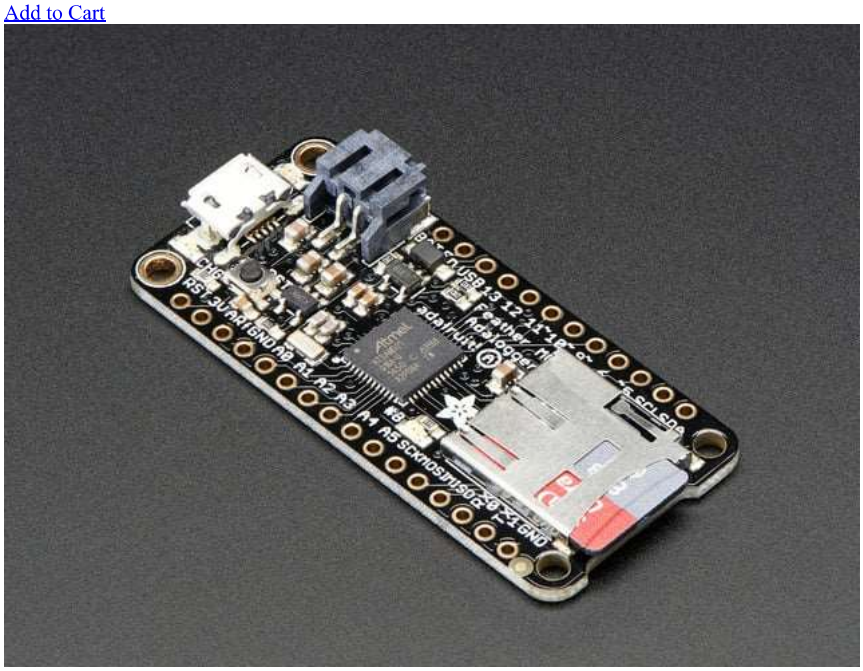


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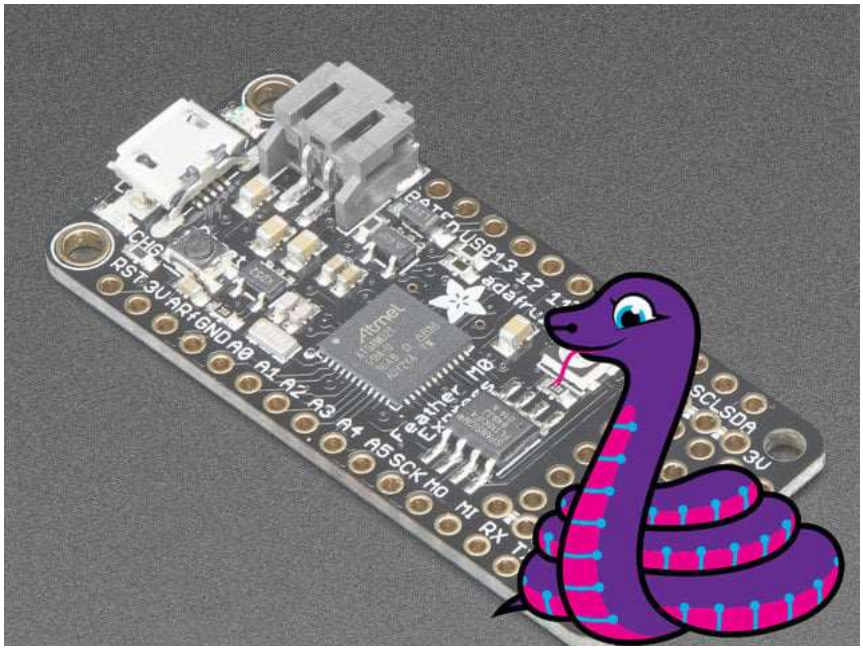

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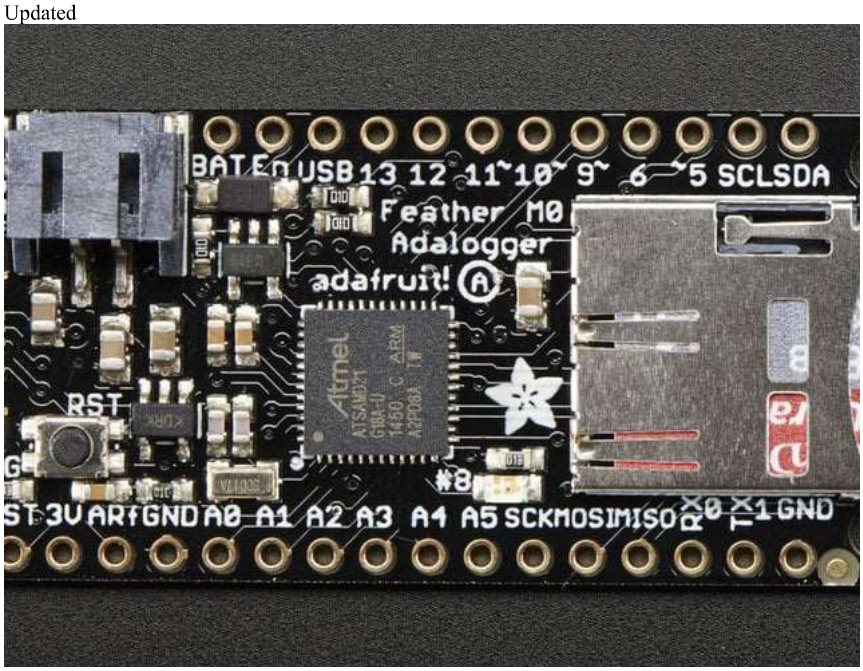


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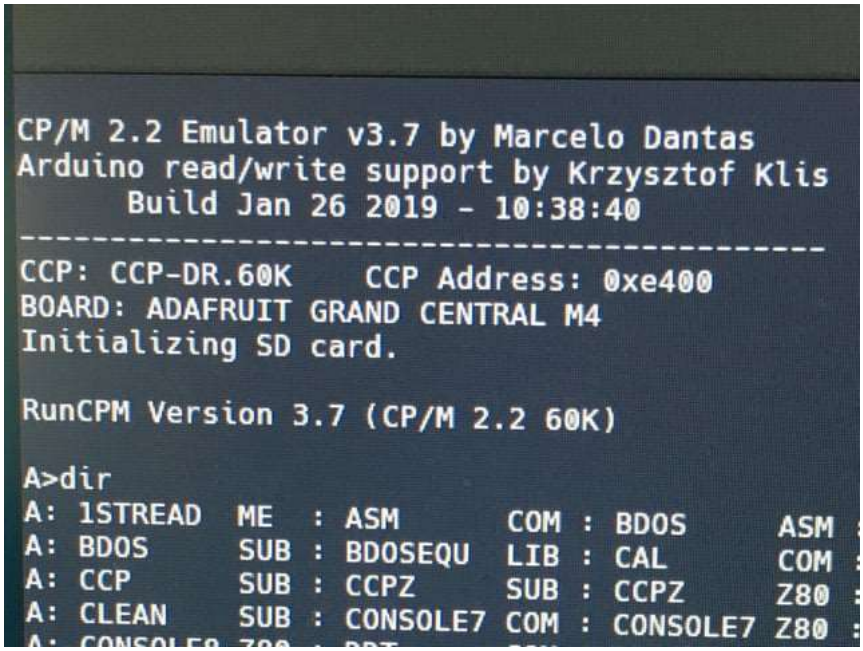


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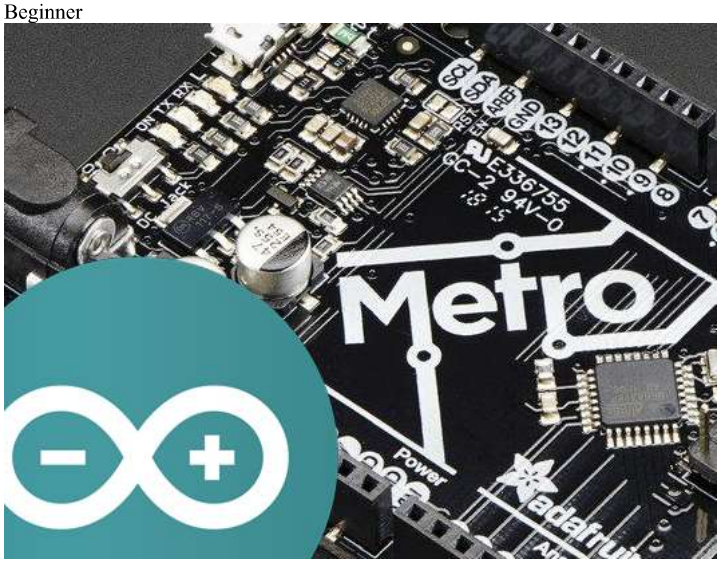

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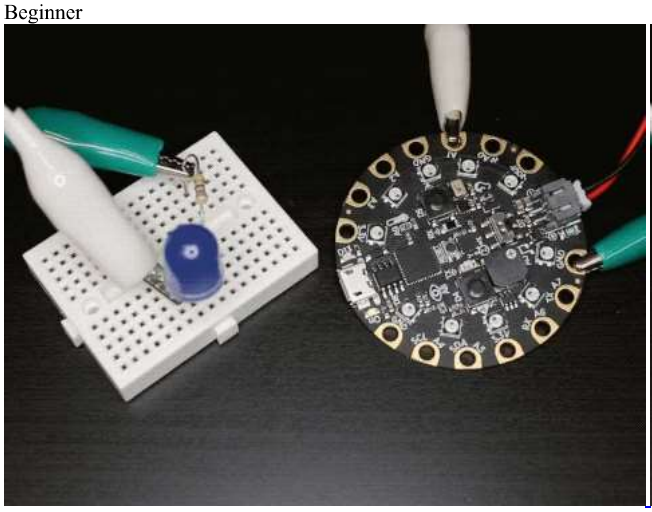
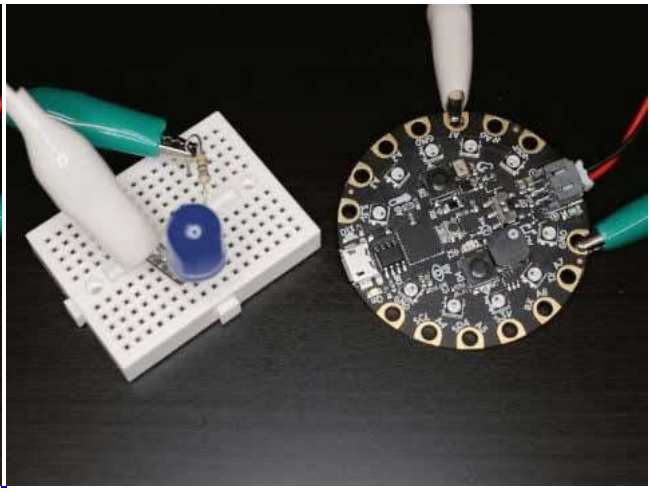

[CircuitPython Basics: Digital Inputs & Outputs]
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Beginner


[Kombucha Thermostat with CircuitPython and Feather]
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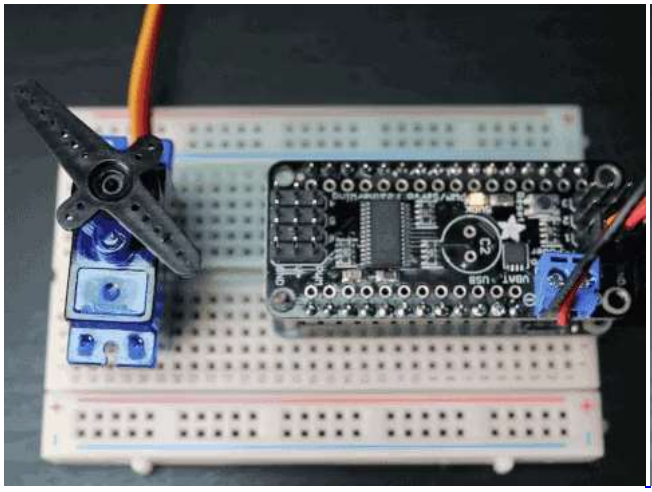
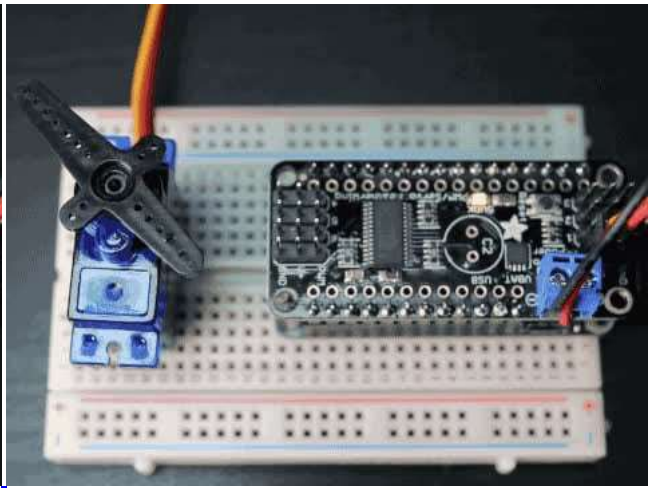

[CircuitPython Hardware: PCA9685 PWM & Servo Driver]
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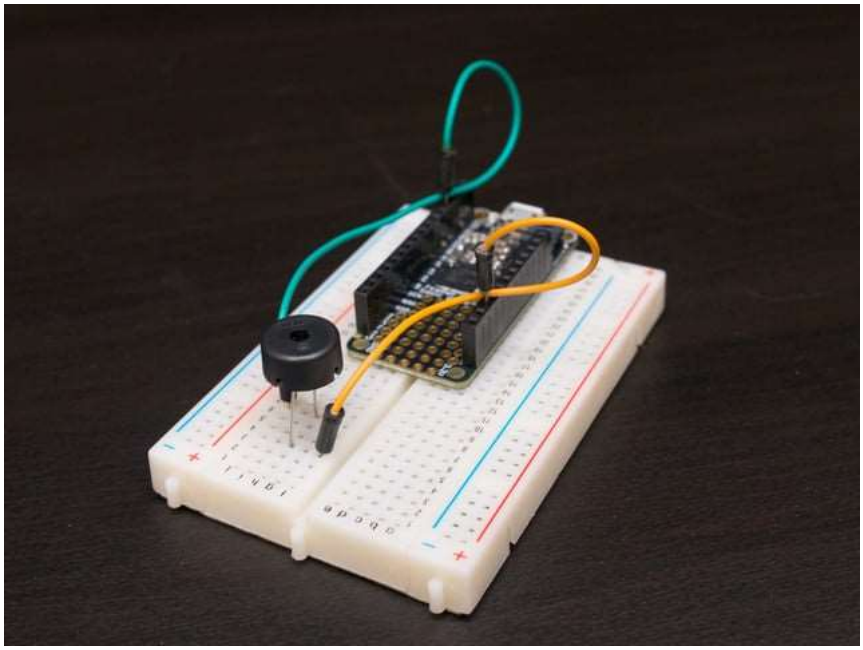

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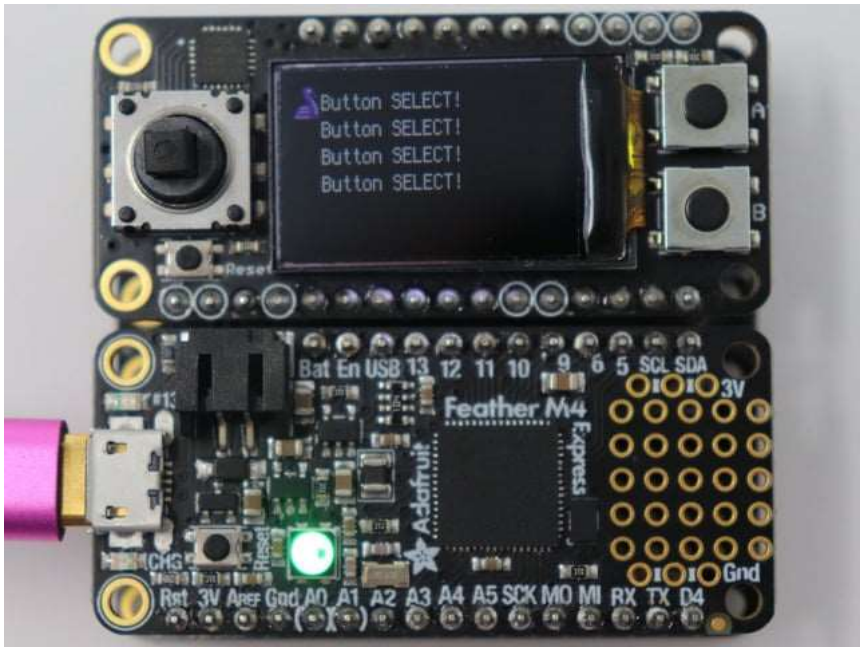


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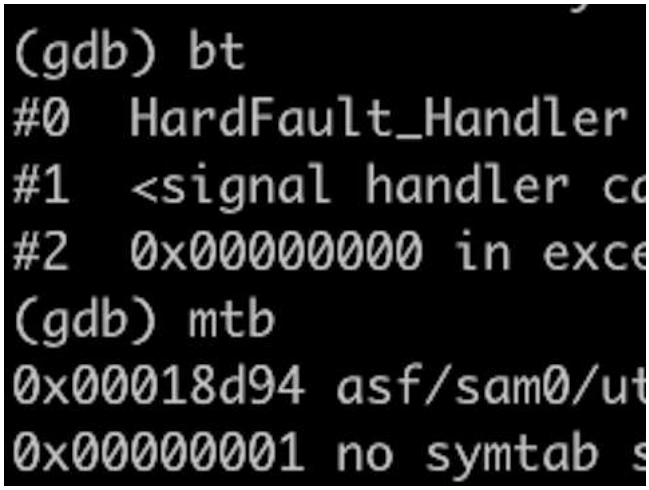
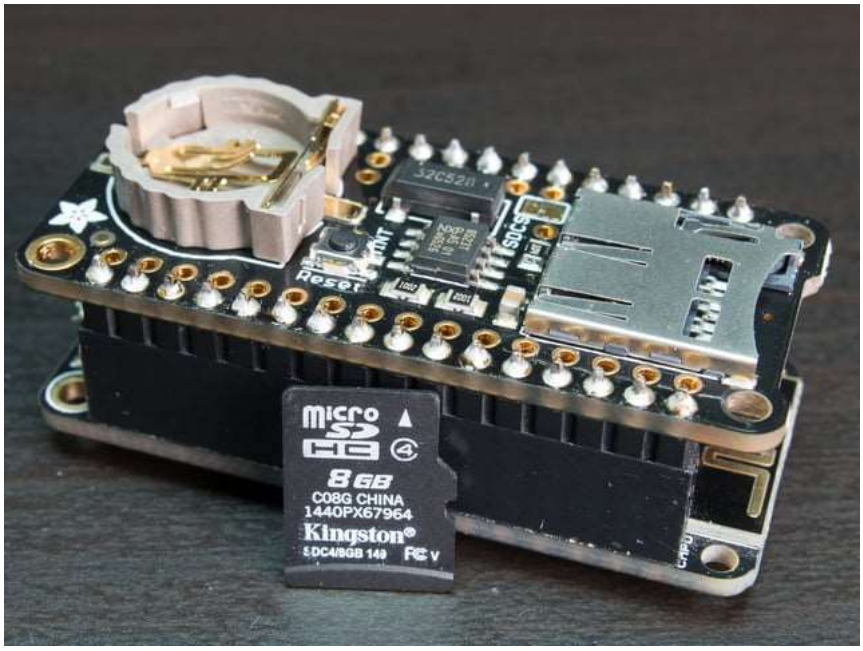
29
Intermediate

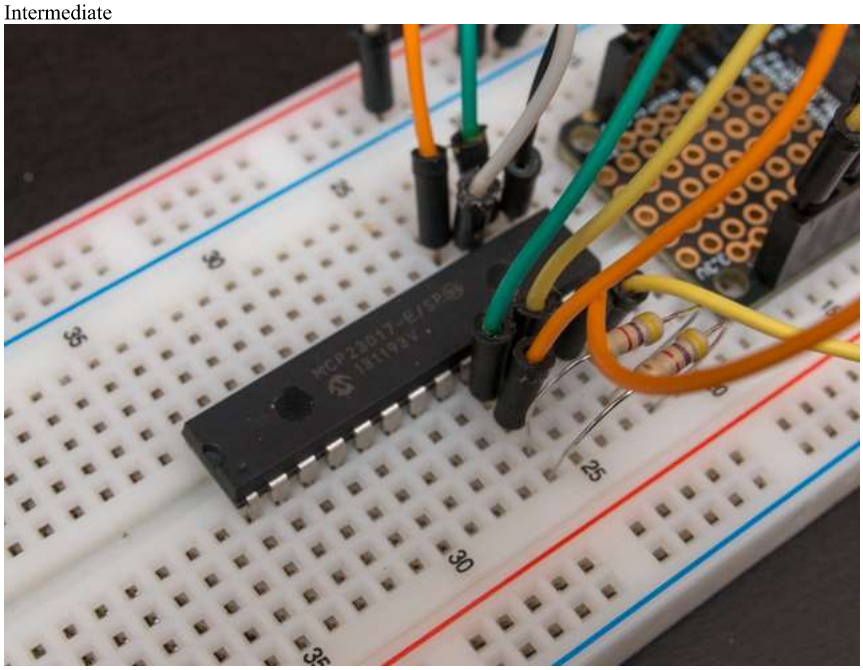



Debugging the SAMD21 with GDB
By Scott Shawcroft
19

Intermediate




CircuitPython Hardware: SD Cards
By Tony DiCola
54
Intermediate



Using MCP23008 & MCP23017 with CircuitPython
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Beginner
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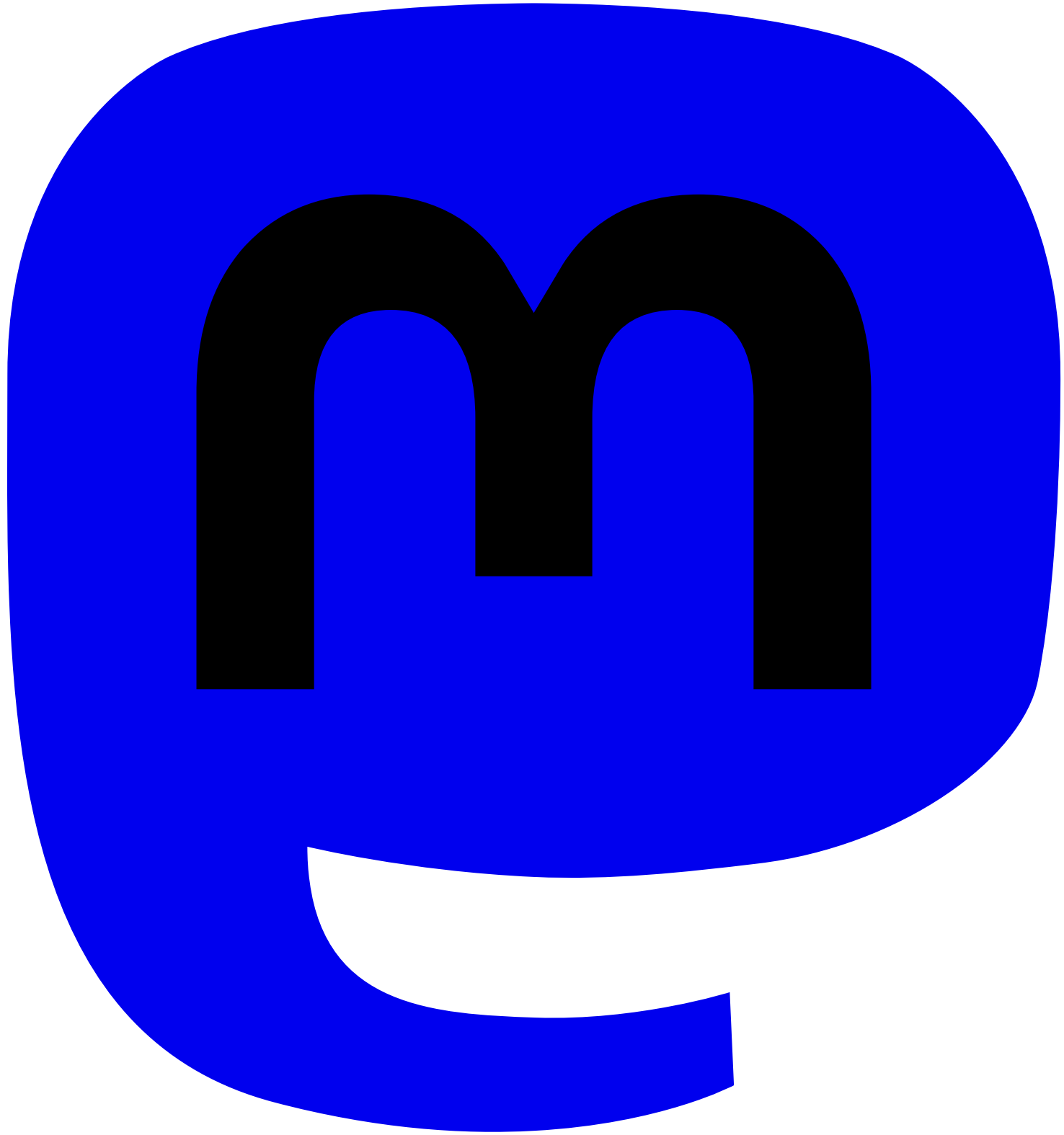
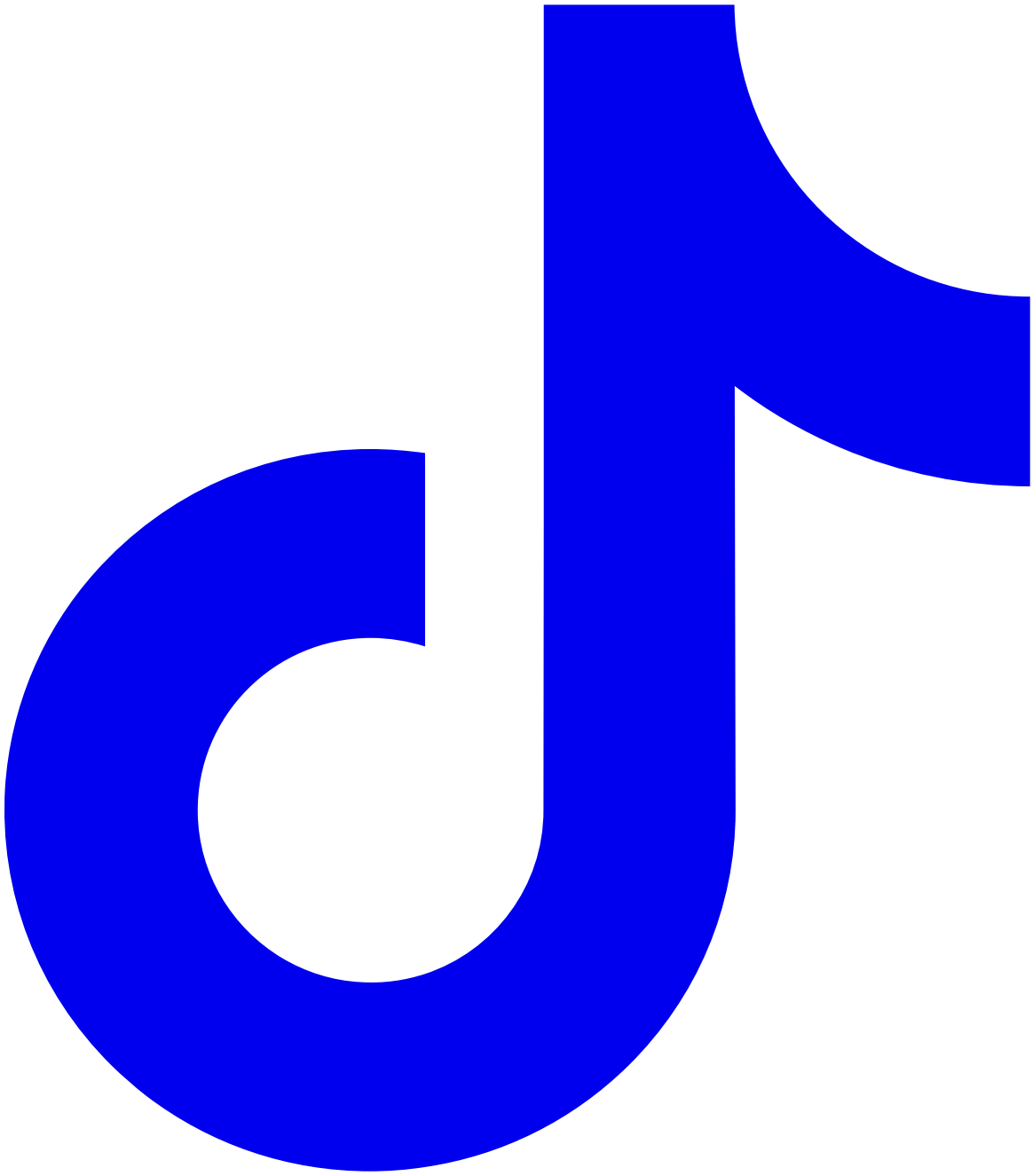
Rumi





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