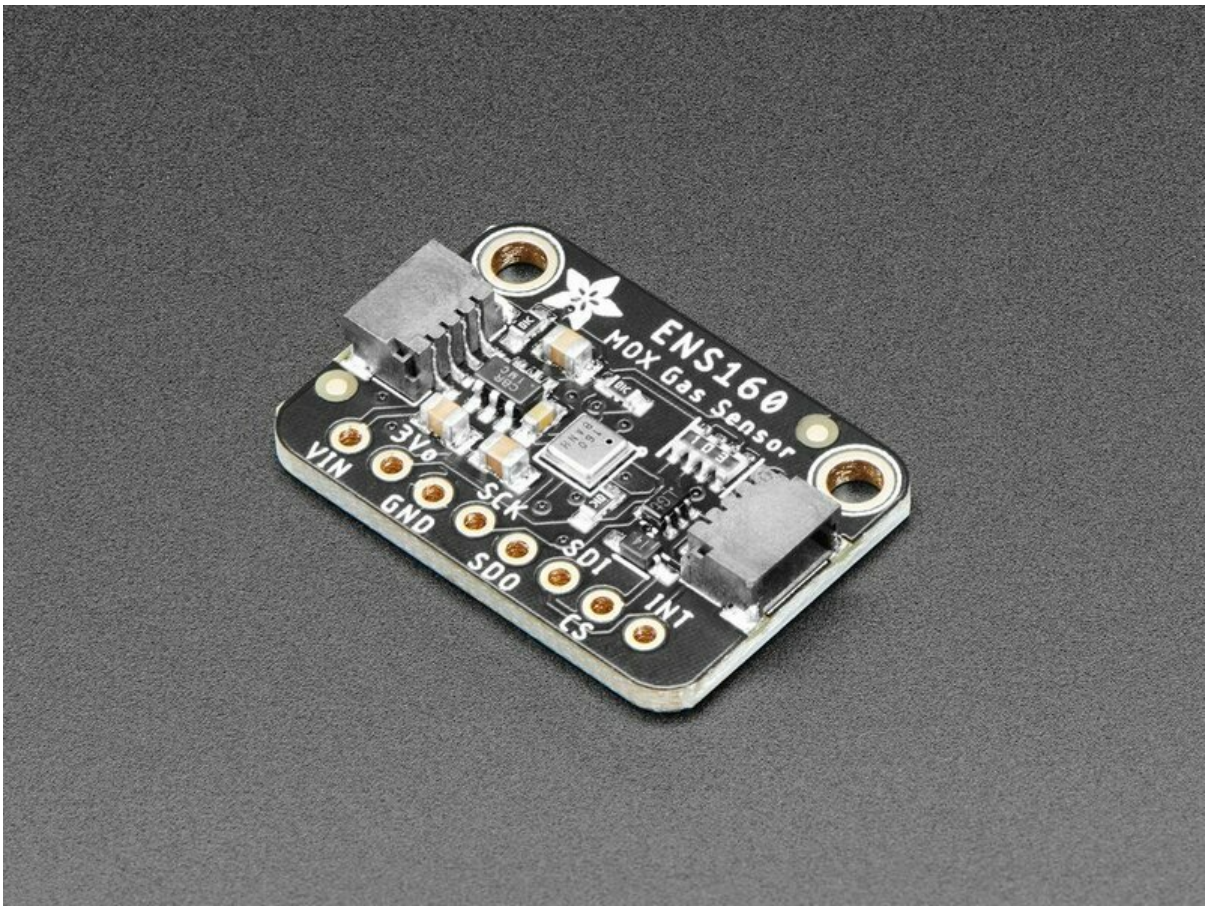
Adafruit ENS160 MOX Gas Sensor

Created by Liz Clark



https://learn.adafruit.com/adafruit-ens160-mox-gas-sensor

Last updated on 2025-01-06 08:59:53 AM EST

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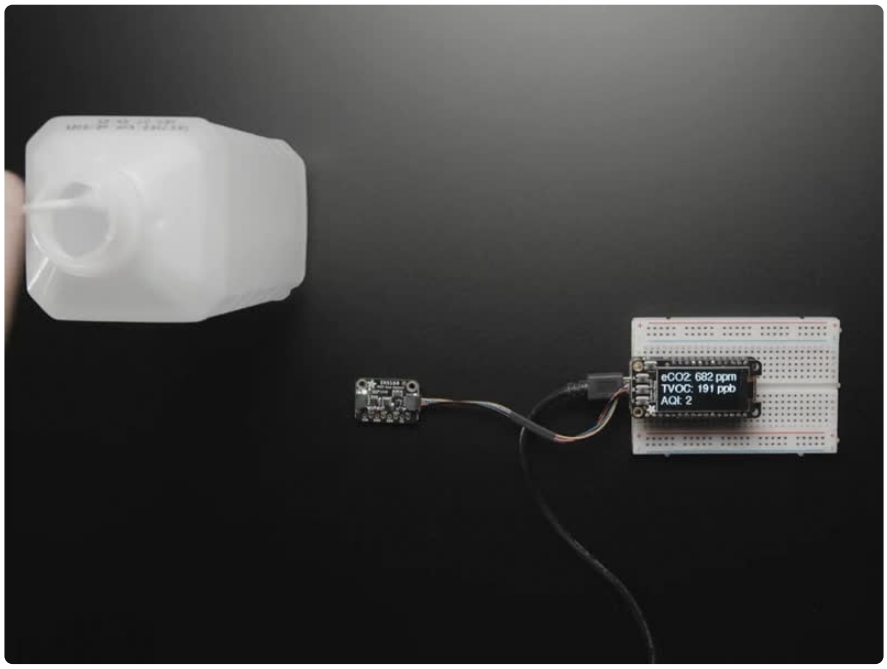
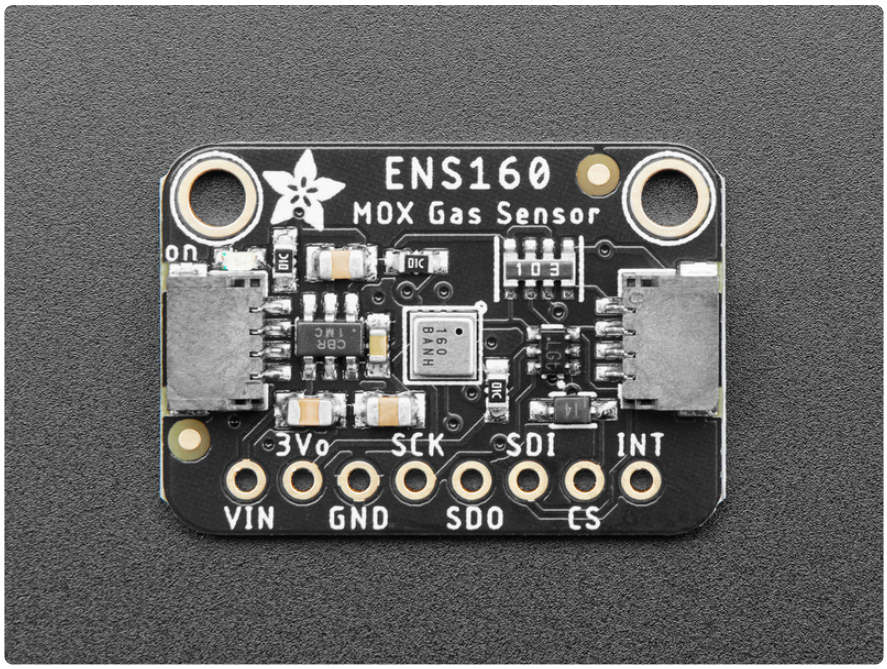
Overview



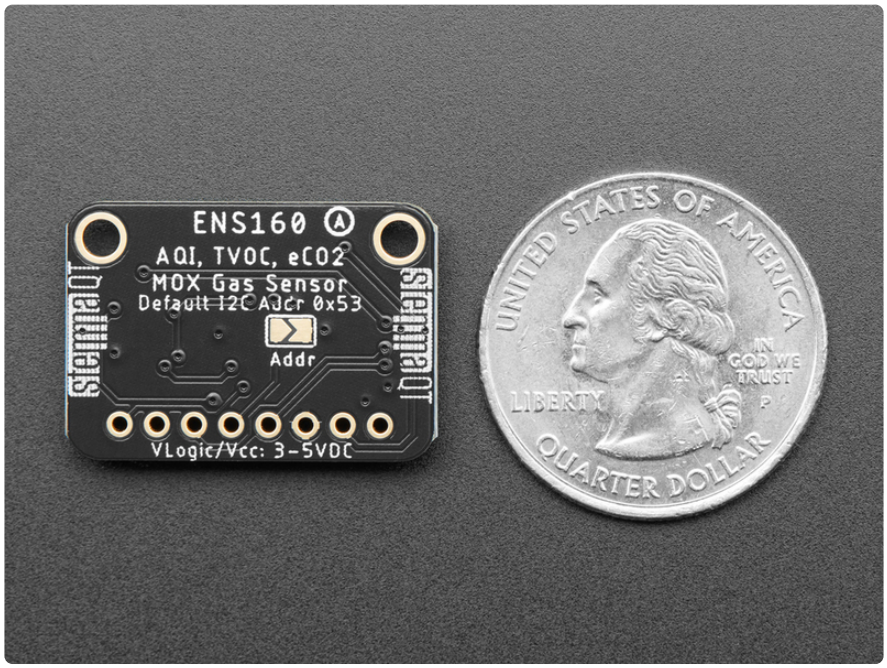
sniff *sniff* ... do you smell that? No need to stick your nose into a carton of milk anymore, you can build a digital nose with the ENS160 Gas Sensor, a fully integrated MOX gas sensor. This is a very fine air quality sensor from the sensor experts at ScioSense (https://adafru.it/11dX), with I2C interfacing so you don't have to manage the heater and analog reading of a MOX sensor. It combines multiple metal-oxide sensing and heating elements on one chip to provide more detailed air quality signals.

The ENS160 is the replacement for the popular, but now-discontinued CCS811 (https://adafru.it/11dY). It has similar functionality but does require all new driver code so be aware if you are updating from an original design with the CCS811 that some work is required to upgrade.

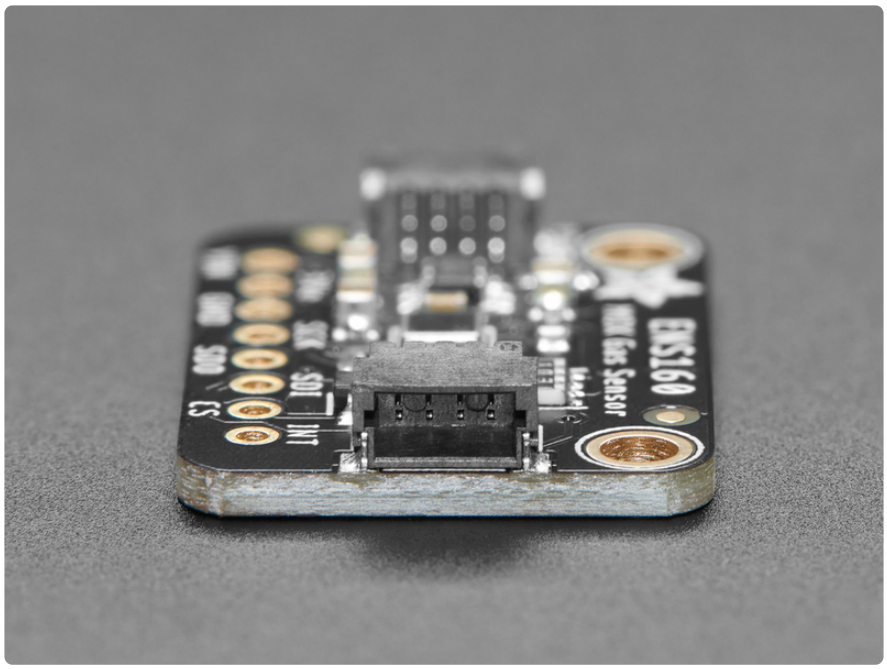


The ENS160 has a 'standard' hot-plate MOX sensor, as well as a small microcontroller that controls power to the plate, reads the analog voltage, and provides an I2C interface to read from. ScioSense provides an Arduino library with examples of reading the four raw resistance values and also the TVOC and eCO2 (https://adafru.it/PaX) and a Python/CircuitPython library (https://adafru.it/11dZ) that can be used with Linux computers like the Raspberry Pi or our CircuitPython boards.

Please note, this sensor, like all VOC/gas sensors, has variability, and to get precise measurements you will want to calibrate it against known sources! That said, for general environmental sensors, it will give you a good idea of trends and comparison.



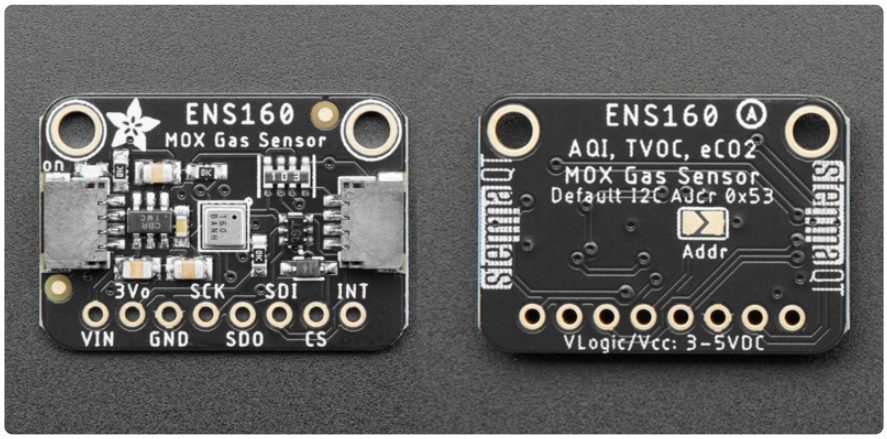
Another nice element to this sensor is the ability to set temperature and humidity compensation for better accuracy (https://adafru.it/11d-). An external humidity sensor is required and then the RH% is written over I2C to the sensor, so it can better calibrate the MOX sensor reading and reduce humidity/temperature-based variations.



Nice sensor right? So we made it easy for you to get right into your next project. The surface-mount sensor is soldered onto a custom-made PCB in the **STEMMA QT** form factor (https://adafru.it/LBQ), making them easy to interface with. The STEMMA QT connectors (https://adafru.it/JqB) on either side are compatible with the SparkFun Qwiic (https://adafru.it/Fpw) I2C connectors. This allows you to make solderless connections between your development board and the ENS160 or to chain it with a wide range of other sensors and accessories using a **compatible cable** (https://adafru.it/JnB). QT Cable is not included, but we have a variety in the shop (https://adafru.it/17VE)

We've of course broken out all the pins to standard headers and added a 3.3V voltage regulator and level shifting to allow you to use it with either 3.3V or 5V systems such as the Arduino Uno, or Feather M4.

Pinouts



The default I2C address is **0x53**.

Power Pins

- **VIN** - this is the power pin. Since the gas sensor chip may use 3 VDC, we have included a voltage regulator on board that will take 3-5VDC and safely convert it down. To power the board, give it the same power as the logic level of your microcontroller - e.g. for a 5V microcontroller like Arduino, use 5V.
- **3Vo** - this is the 3.3V output from the voltage regulator, you can grab up to 100mA from this if you like.
- **GND** - common ground for power and logic.

I2C Logic Pins

- **SCL** (labeled **SCK**) - I2C clock pin, connect to your microcontroller I2C clock line. This pin is level shifted so you can use 3-5V logic, and there's a **10K pullup** on this pin.
- **SDA** (labeled **SDI**) - I2C data pin, connect to your microcontroller I2C data line. This pin is level shifted so you can use 3-5V logic, and there's a **10K pullup** on this pin.
- STEMMA QT **(https://adafru.it/Ft4)** - These connectors allow you to connectors to dev boards with **STEMMA QT** connectors or to other things with various associated accessories (https://adafru.it/Ft6).

Address Pin

On the back of the board is one **address jumper**, labeled **Addr**. This jumper allows you to chain up to 2 of these boards on the same pair of I2C clock and data pins. To do so, you solder the jumper "closed" by connecting the two pads.

On the front of the board is one address pin, labeled **SDO**. Just like the jumper, this pin allows you to change the I2C address to connect multiple boards by connecting it to **GND**.

The default I2C address is **0x53**. The other address option can be calculated by "subtracting" the **Addr** from the base of **0x53**.

Addr sets the lowest bit with a value of **1.** The final address is **0x53 - Addr** which would be **0x52**.

The table below shows all possible addresses, and whether the pin should be high (open) or low (closed).

ADDR	Addr
0x53	H
0x52	L

SPI Logic Pins

- **SCK** - This is the SPI clock pin, its an input to the gas sensor.
- **SDO** - This is the Serial Data Out pin, for data sent from the gas sensor to your processor.
- **SDI** - This is the Serial Data In pin, for data sent from your processor to the gas sensor.
- **CS** - This is the Chip Select pin, drop it low to start an SPI transaction. Its an input to the gas sensor.

Please note the libraries do not support the SPI interface.

Interrupt Pin

- **INT** - Interrupt signal output. Can be pulled low on sensor reading thresholds.

Power LED

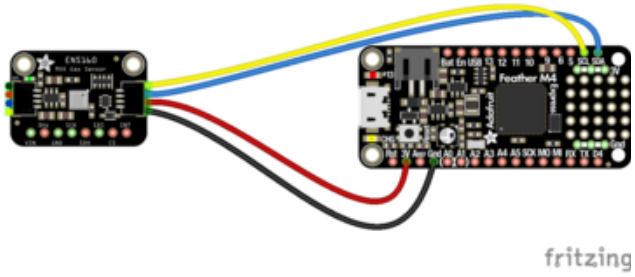
- **Power LED -** In the upper left corner, above the STEMMA connector, on the front of the board, is the power LED, labeled **on**. It is the green LED.

CircuitPython & Python

It's easy to use the **ENS160** with Python or CircuitPython, and the Adafruit_CircuitPython_ENS160 (https://adafru.it/11dZ) module. This module allows you to easily write Python code that allows you to read the **ENS160** gas sensor. You can use this gas 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 (https://adafru.it/BSN).

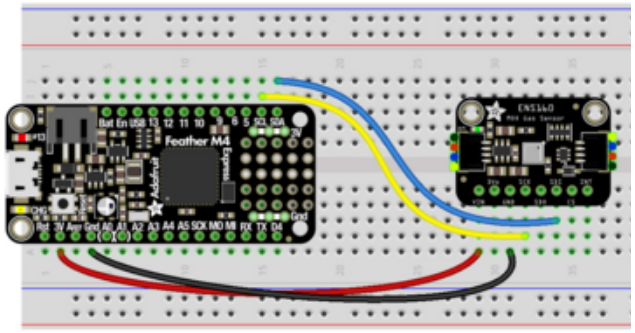
CircuitPython Microcontroller Wiring

First, wire up an ENS160 to your board exactly as shown below. Here's an example of wiring a Feather M4 to the ENS160 with I2C using one of the handy **STEMMA QT** (https://adafru.it/Ft4) connectors:



Board 3V to **sensor VIN (red wire)**
Board GND to **sensor GND (black wire)**
Board SCL to **sensor SCL (yellow wire)**
Board SDA to **sensor SDA (blue wire)**

You can also use standard **0.100" pitch** headers to wire it up on a breadboard:

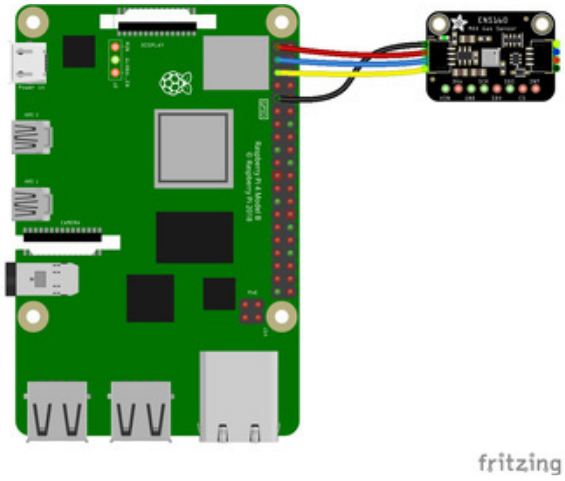


Board 3V to **sensor VIN (red wire)**
Board GND to **sensor GND (black wire)**
Board SCL to **sensor SCL (yellow wire)**
Board SDA to **sensor SDA (blue wire)**

Python Computer Wiring

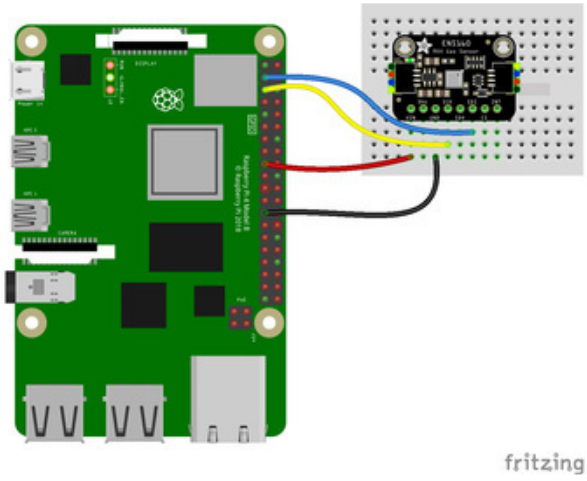
Since there's dozens of Linux computers/boards you can use, below shows wiring for Raspberry Pi. For other platforms, please visit the guide for CircuitPython on Linux to see whether your platform is supported (https://adafru.it/BSN).

Here's the Raspberry Pi wired to the gas sensor using I2C and a **STEMMA QT** (https://adafru.it/Ft4) connector:



Pi 3V to **sensor VIN (red wire)**
Pi GND to **sensor GND (black wire)**
Pi SCL to **sensor SCL (yellow wire)**
Pi SDA to **sensor SDA (blue wire)**

Finally here is an example of how to wire up a Raspberry Pi to the gas sensor using a solderless breadboard:



Pi 3V to **sensor VIN (red wire)**
Pi GND to **sensor GND (black wire)**
Pi SCL to **sensor SCL (yellow wire)**
Pi SDA to **sensor SDA (blue wire)**

Python Installation of ENS160 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 (https://adafru.it/BSN)!

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

- `pip3 install adafruit-circuitpython-ens160`

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

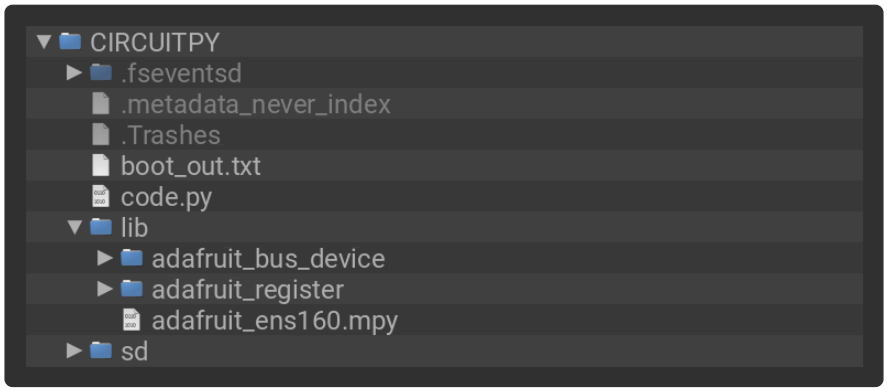
CircuitPython Usage

To use with CircuitPython, you need to first install the ENS160 library, and its dependencies, into the **lib** folder on your **CIRCUITPY** drive. Then you need to update **code.py** with the example script.

Thankfully, we can do this in one go. In the example below, click the **Download Project Bundle** button below to download the necessary libraries and the **code.py** file in a zip file. Extract the contents of the zip file, and copy the **entire lib folder** and the **code.py** file to your **CIRCUITPY** drive.

Your **CIRCUITPY/lib** folder should contain the following folders and file:

- **adafruit_bus_device/**
- **adafruit_register/**
- **adafruit_ens160.mpy**



Python Usage

Once you have the library `pip3` installed on your computer, copy or download the following example to your computer, and run the following, replacing **code.py** with whatever you named the file:

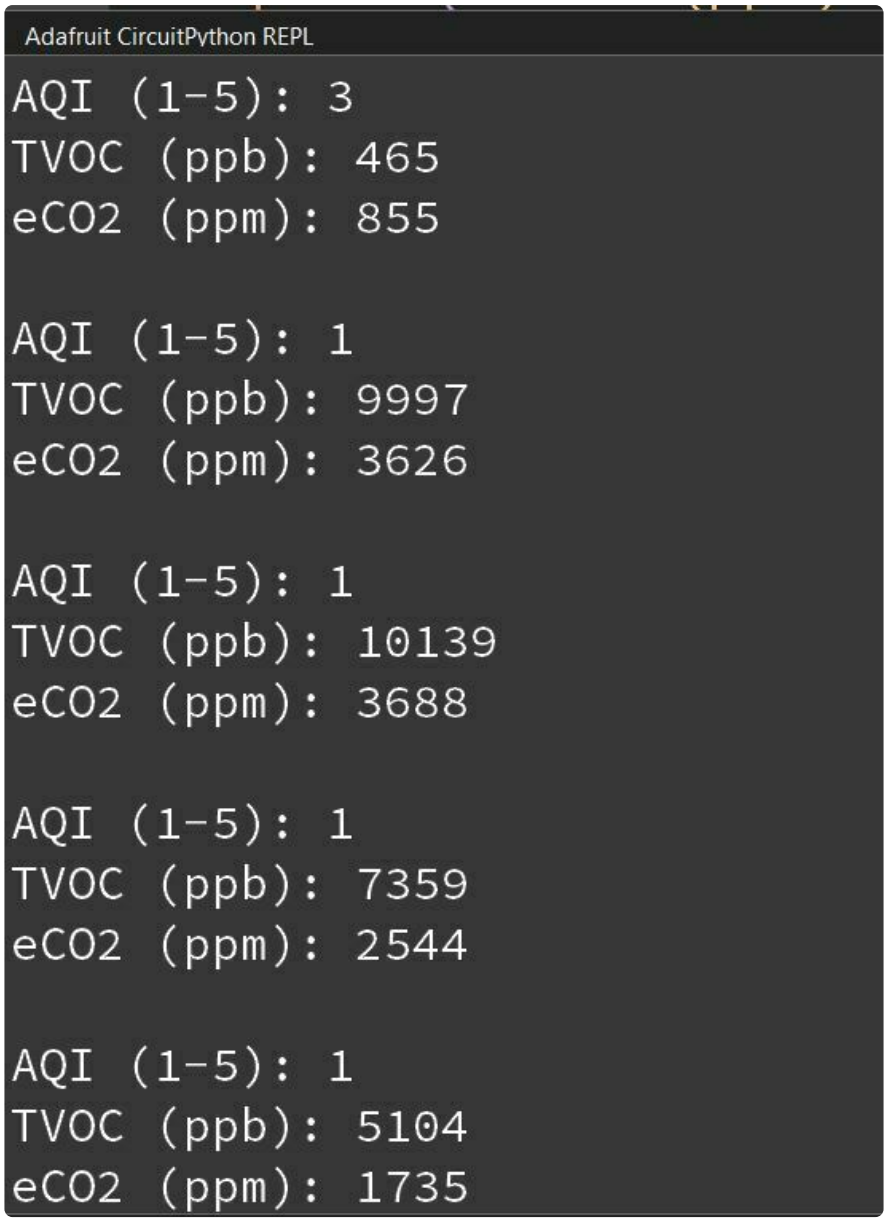
```
python3 code.py
```

Example Code

```
# SPDX-FileCopyrightText: Copyright (c) 2022 ladyada for Adafruit Industries
#
# SPDX-License-Identifier: Unlicense

import time
import board
import adafruit_ens160

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

ens = adafruit_ens160.ENS160(i2c)

# Set the temperature compensation variable to the ambient temp
# for best sensor calibration
ens.temperature_compensation = 25
# Same for ambient relative humidity
ens.humidity_compensation = 50


while True:
    print("AQI (1-5):", ens.AQI)
    print("TVOC (ppb):", ens.TVOC)
    print("eCO2 (ppm):", ens.eCO2)
    print()

    # new data shows up every second or so
    time.sleep(1)
```

If running CircuitPython: Once everything is saved to the **CIRCUITPY** drive, connect to the serial console (https://adafru.it/Bec) to see the data printed out!

If running Python: The console output will appear wherever you are running Python.



In the example, the gas sensor is instantiated on I2C. Then, in the loop, `AQI`, `TVOC` and `eCO2` readings are printed to the REPL every second.

Python Docs

Python Docs (https://adafru.it/11cM)

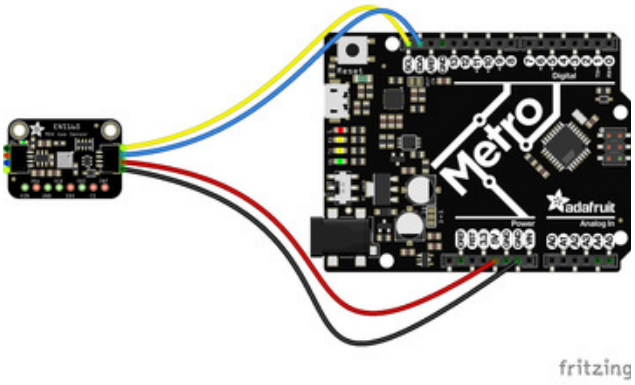
Arduino

Using the ENS160 gas sensor with Arduino involves wiring up the sensor to your Arduino-compatible microcontroller, installing the ENS160 (https://adafru.it/18fl) library and running the provided example code.

Wiring

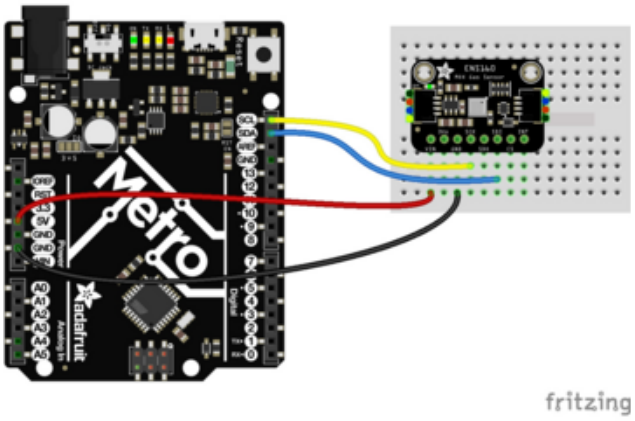
Wire as shown for a **5V** board like an Uno. If you are using a **3V** board, like an Adafruit Feather, wire the board's 3V pin to the ENS160 VIN.

Here is an Adafruit Metro wired up to the ENS160 using the STEMMA QT connector:



Board 5V to **sensor VIN (red wire)**
Board GND to **sensor GND (black wire)**
Board SCL to **sensor SCL (yellow wire)**
Board SDA to **sensor SDA (blue wire)**

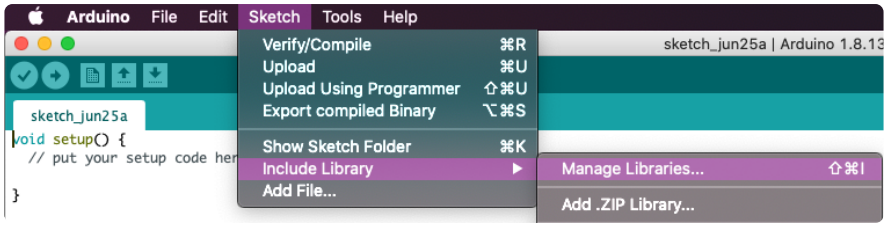
Here is an Adafruit Metro wired up using a solderless breadboard:



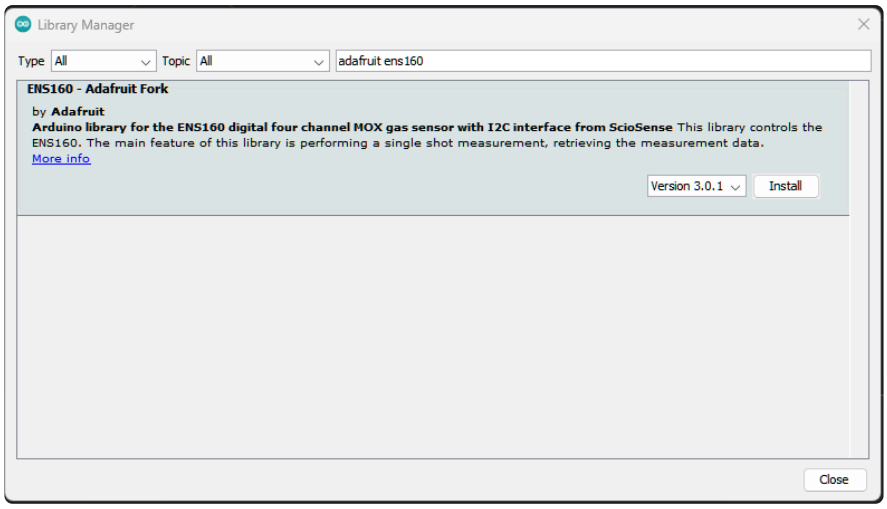
Board 5V to **sensor VIN (red wire)**
Board GND to **sensor GND (black wire)**
Board SCL to **sensor SCL (yellow wire)**
Board SDA to **sensor SDA (blue wire)**

Library Installation

You can install the **ENS160 - Adafruit Fork** library for Arduino using the Library Manager in the Arduino IDE.



Click the **Manage Libraries ...** menu item, search for **Adafruit ENS160**, and select the **ENS160 - Adafruit Fork** library:



No additional libraries are required.

Example Code

```
/**************************************************************************
  ENS160 - Digital Air Quality Sensor

  This is an example for ENS160 basic reading in custom mode

  Updated by Sciosense / 25-Nov-2021
 **************************************************************************/

#include <Wire.h>

int ArduinoLED = 13;

//------------------------------------------------------------

//ENS160 related items

//------------------------------------------------------------

#include "ScioSense_ENS160.h"  // ENS160 library

ScioSense_ENS160      ens160(ENS160_I2CADDR_0);
//ScioSense_ENS160      ens160(ENS160_I2CADDR_1);


/*-------------------------------------------------------------------------
  SETUP function
  initiate sensor
 -------------------------------------------------------------------------*/
void setup() {

  Serial.begin(115200);

  while (!Serial) {}

  //Switch on LED for init
```

```
  pinMode(ArduinoLED, OUTPUT);
  digitalWrite(ArduinoLED, LOW);

  Serial.println("------------------------------------------------------------");
  Serial.println("ENS160 - Digital air quality sensor");
  Serial.println();
  Serial.println("Sensor readout in custom mode");
  Serial.println();
  Serial.println("------------------------------------------------------------");
  delay(1000);

  Serial.print("ENS160...");
  bool ok = ens160.begin();
  Serial.println(ens160.available() ? "done." : "failed!");
  if (ens160.available()) {
    // Print ENS160 versions

    Serial.print("\tRev: "); Serial.print(ens160.getMajorRev());
    Serial.print("."); Serial.print(ens160.getMinorRev());
    Serial.print("."); Serial.println(ens160.getBuild());

    Serial.print("\tCustom mode ");
    ens160.initCustomMode(3);                                   // example has 3
steps, max. 20 steps possible


    // Step time is a multiple of 24ms and must not be smaller than 48ms

    ens160.addCustomStep(48, 0, 0, 0, 0, 80, 80, 80, 80);         // Step 1: 48ms,
no measurments, all hotplates at low temperatures

    ens160.addCustomStep(196, 0, 0, 0, 0, 160, 215, 215, 200);    // Step 2: 196ms,
no measurments, all hotplates at medium temperatures

    ens160.addCustomStep(600, 1, 1, 1, 1, 250, 350, 350, 325);    // Step 3: 600ms,
measurments done, all hotplates at high temperatures

    Serial.println(ens160.setMode(ENS160_OPMODE_CUSTOM) ? "done." : "failed!");
  }
}

/*-------------------------------------------------------------------------
  MAIN LOOP FUNCTION
  Cylce every 1000ms and perform measurement
 -------------------------------------------------------------------------*/

void loop() {

  if (ens160.available()) {
    ens160.measureRaw(true);

    Serial.print("R HP0: ");Serial.print(ens160.getHP0());Serial.print("Ohm\t");
    Serial.print("R HP1: ");Serial.print(ens160.getHP1());Serial.print("Ohm\t");
    Serial.print("R HP2: ");Serial.print(ens160.getHP2());Serial.print("Ohm\t");
    Serial.print("R HP3: ");Serial.print(ens160.getHP3());Serial.println("Ohm");
  }
  delay(1000);
}
```

I2C Address

In the Arduino library, `ENS160_I2CADDR_0` is I2C address `0x52` and `ENS160_I2CADDR_1` is I2C address `0x53`.

The default I2C address for the breakout board is `0x53`. To run the example code for address `0x53`, edit the top of the example code by commenting out `ENS160_I2CADDR_0` and uncommenting `ENS160_I2CADDR_1`:

```
#include "ScioSense_ENS160.h"  // ENS160 library
//ScioSense_ENS160      ens160(ENS160_I2CADDR_0);
ScioSense_ENS160      ens160(ENS160_I2CADDR_1);
```

To use the sensor with address `0x52`, leave the example code as-is with `ENS160_I2CADDR_0` uncommented.

```
#include "ScioSense_ENS160.h"  // ENS160 library
ScioSense_ENS160      ens160(ENS160_I2CADDR_0);
//ScioSense_ENS160      ens160(ENS160_I2CADDR_1);
```

```
/*-------------------------------------------------------------------------
  MAIN LOOP FUNCTION
  Cylce every 1000ms and perform measurement
 -------------------------------------------------------------------------*/

void loop() {

  if (ens160.available()) {
    ens160.measure(0);

    Serial.print("AQI: ");Serial.print(ens160.getAQI());Serial.print("\t");
    Serial.print("TVOC: ");Serial.print(ens160.getTVOC());Serial.print("ppb\t");
    Serial.print("eCO2: ");Serial.print(ens160.geteCO2());Serial.print("ppm\t");
    Serial.print("R HP0: ");Serial.print(ens160.getHP0());Serial.print("Ohm\t");
    Serial.print("R HP1: ");Serial.print(ens160.getHP1());Serial.print("Ohm\t");
    Serial.print("R HP2: ");Serial.print(ens160.getHP2());Serial.print("Ohm\t");
    Serial.print("R HP3: ");Serial.print(ens160.getHP3());Serial.println("Ohm");
  }
  delay(1000);
}
```

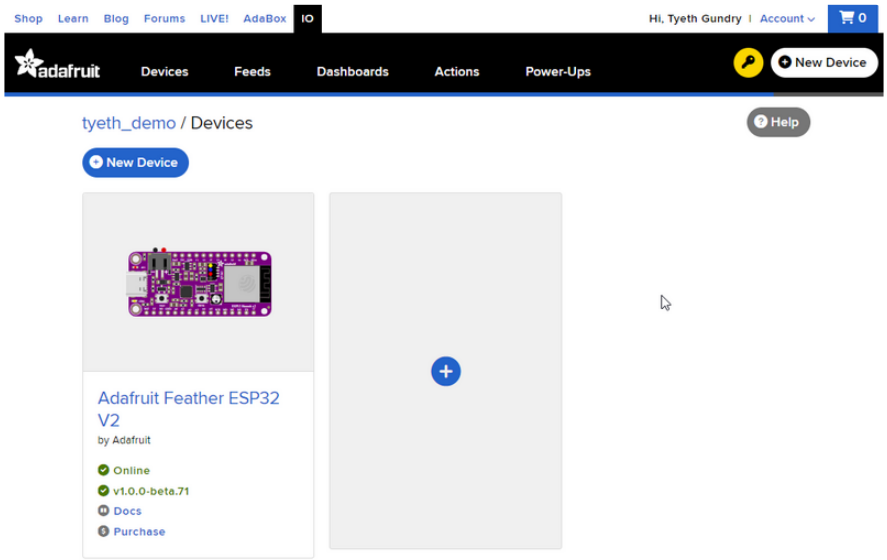
```
COM5
Send
------------------------------------------------------------
ENS160 - Digital air quality sensor

Sensor readout in standard mode

------------------------------------------------------------
ENS160...done.
        Rev: 5.4.6
        Standard mode done.
AQI: 0  TVOC: 0ppb      eCO2: 0ppm      R HP0: 0Ohm     R HP1: 0Ohm     R HP2: 0Ohm     R HP3: 0Ohm
AQI: 0  TVOC: 0ppb      eCO2: 0ppm      R HP0: 0Ohm     R HP1: 0Ohm     R HP2: 0Ohm     R HP3: 0Ohm
AQI: 1  TVOC: 24ppb     eCO2: 400ppm    R HP0: 280150hm R HP1: 1Ohm     R HP2: 274420hm R HP3: 337810hm
AQI: 1  TVOC: 18ppb     eCO2: 400ppm    R HP0: 282340hm R HP1: 1Ohm     R HP2: 281190hm R HP3: 341720hm
AQI: 1  TVOC: 28ppb     eCO2: 409ppm    R HP0: 286770hm R HP1: 1Ohm     R HP2: 280620hm R HP3: 338500hm
AQI: 1  TVOC: 34ppb     eCO2: 423ppm    R HP0: 284930hm R HP1: 1Ohm     R HP2: 283680hm R HP3: 334060hm
AQI: 1  TVOC: 60ppb     eCO2: 477ppm    R HP0: 290480hm R HP1: 1Ohm     R HP2: 284830hm R HP3: 317090hm
AQI: 1  TVOC: 51ppb     eCO2: 459ppm    R HP0: 292250hm R HP1: 1Ohm     R HP2: 283010hm R HP3: 322500hm
AQI: 1  TVOC: 32ppb     eCO2: 420ppm    R HP0: 296640hm R HP1: 1Ohm     R HP2: 290380hm R HP3: 335080hm
AQI: 5  TVOC: 4991ppb   eCO2: 1694ppm   R HP0: 287930hm R HP1: 1Ohm     R HP2: 136840hm R HP3: 8205Ohm
AQI: 5  TVOC: 7163ppb   eCO2: 2469ppm   R HP0: 279480hm R HP1: 1Ohm     R HP2: 100330hm R HP3: 5697Ohm
AQI: 5  TVOC: 18237ppb  eCO2: 7722ppm   R HP0: 241960hm R HP1: 1Ohm     R HP2: 3785Ohm  R HP3: 2234Ohm
AQI: 5  TVOC: 10848ppb  eCO2: 4002ppm   R HP0: 261720hm R HP1: 1Ohm     R HP2: 5678Ohm  R HP3: 3758Ohm
AQI: 5  TVOC: 6891ppb   eCO2: 2367ppm   R HP0: 274610hm R HP1: 1Ohm     R HP2: 8774Ohm  R HP3: 5923Ohm
AQI: 5  TVOC: 4102ppb   eCO2: 1567ppm   R HP0: 282340hm R HP1: 1Ohm     R HP2: 122130hm R HP3: 8909Ohm
AQI: 4  TVOC: 1693ppb   eCO2: 1156ppm   R HP0: 288620hm R HP1: 1Ohm     R HP2: 164500hm R HP3: 127800hm
AQI: 4  TVOC: 738ppb    eCO2: 934ppm    R HP0: 296240hm R HP1: 1Ohm     R HP2: 204430hm R HP3: 174660hm
AQI: 3  TVOC: 338ppb    eCO2: 814ppm    R HP0: 300680hm R HP1: 1Ohm     R HP2: 234620hm R HP3: 224670hm
AQI: 2  TVOC: 158ppb    eCO2: 638ppm    R HP0: 302830hm R HP1: 1Ohm     R HP2: 255160hm R HP3: 271740hm
AQI: 2  TVOC: 72ppb     eCO2: 499ppm    R HP0: 302110hm R HP1: 1Ohm     R HP2: 271830hm R HP3: 310400hm
AQI: 1  TVOC: 35ppb     eCO2: 424ppm    R HP0: 305190hm R HP1: 1Ohm     R HP2: 281100hm R HP3: 333610hm
AQI: 1  TVOC: 7ppb      eCO2: 400ppm    R HP0: 304270hm R HP1: 1Ohm     R HP2: 291760hm R HP3: 355400hm
Autoscroll  Show timestamp
Newline  115200 baud  Clear output
```

Upload the sketch to your board and open up the Serial Monitor (**Tools -> Serial Monitor**) at 115200 baud. You should see that the sketch has found your connected I2C ENS160 gas sensor. Then, sensor readings for AQI, TVOC, eCO2 and the raw resistance values of the four hot plates in the sensor are printed to the Serial Monitor every second.

Arduino Docs

Arduino Docs (https://adafru.it/11cN)

WipperSnapper



What is WipperSnapper

WipperSnapper is a firmware designed to turn any WiFi-capable board into an Internet-of-Things device without programming a single line of code. WipperSnapper connects to Adafruit IO (https://adafru.it/fsU), a web platform designed (by Adafruit! (https://adafru.it/Bo5)) to display, respond, and interact with your project's data.

Simply load the WipperSnapper firmware onto your board, add credentials, and plug it into power. Your board will automatically register itself with your Adafruit IO account.

From there, you can add components to your board such as buttons, switches, potentiometers, sensors, and more! Components are dynamically added to hardware, so you can immediately start interacting, logging, and streaming the data your projects produce without writing code.

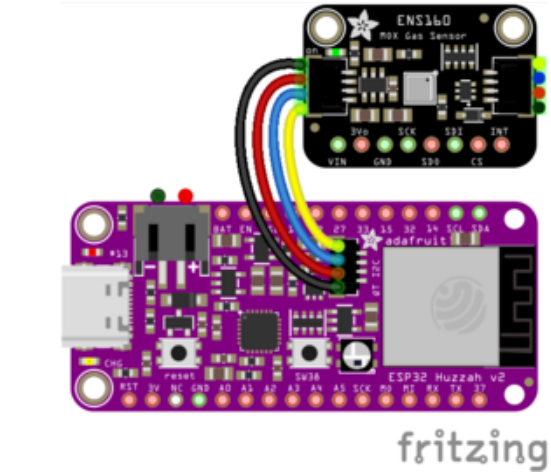
If you've never used WipperSnapper, click below to read through the quick start guide before continuing.

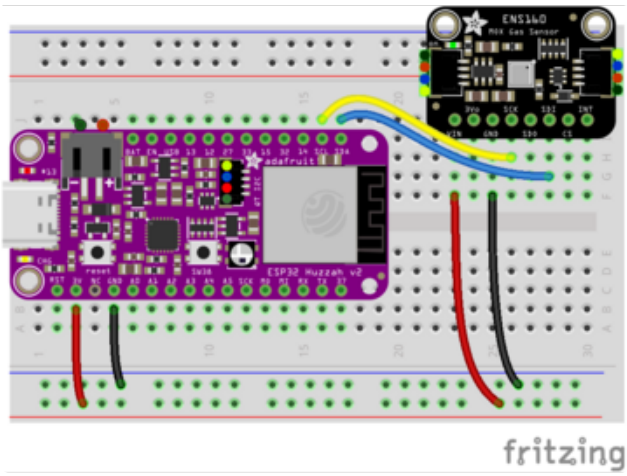
Quickstart: Adafruit IO WipperSnapper

https://adafru.it/Vfd

Wiring

First, wire up an **ENS160** to your board exactly as follows. Here is an example of the **ENS160** wired to an Adafruit ESP32 Feather V2 (http://adafru.it/5400) using I2C with a STEMMA QT cable (no soldering required) (http://adafru.it/4210)



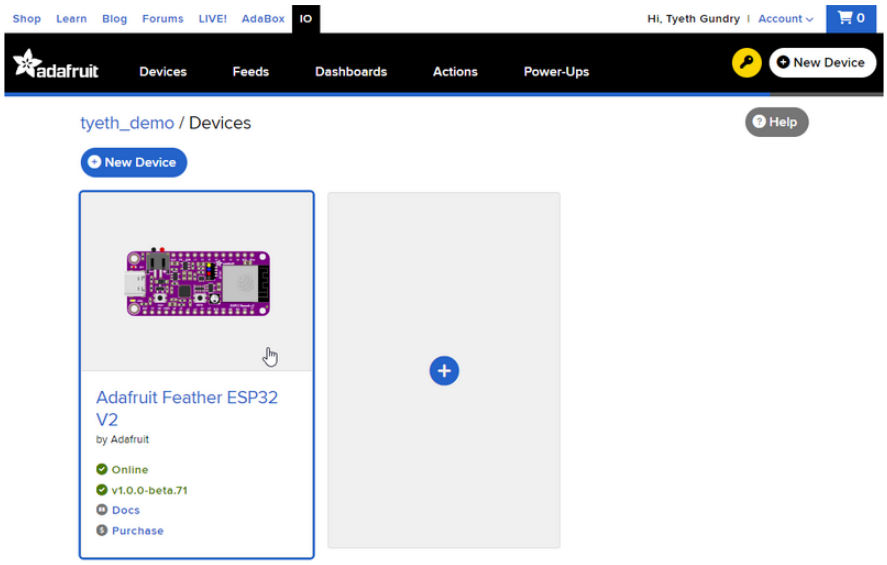


Board 3V to **sensor VIN (red wire on STEMMA QT)**
Board GND to **sensor GND (black wire on STEMMA QT)**
Board SCL to **sensor SCK (yellow wire on STEMMA QT)**
Board SDA to **sensor SDI (blue wire on STEMMA QT)**

Usage

Connect your board to Adafruit IO Wippersnapper and navigate to the WipperSnapper board list **(https://adafru.it/TAu)**.

On this page, **select the WipperSnapper board you're using** to be brought to the board's interface page.



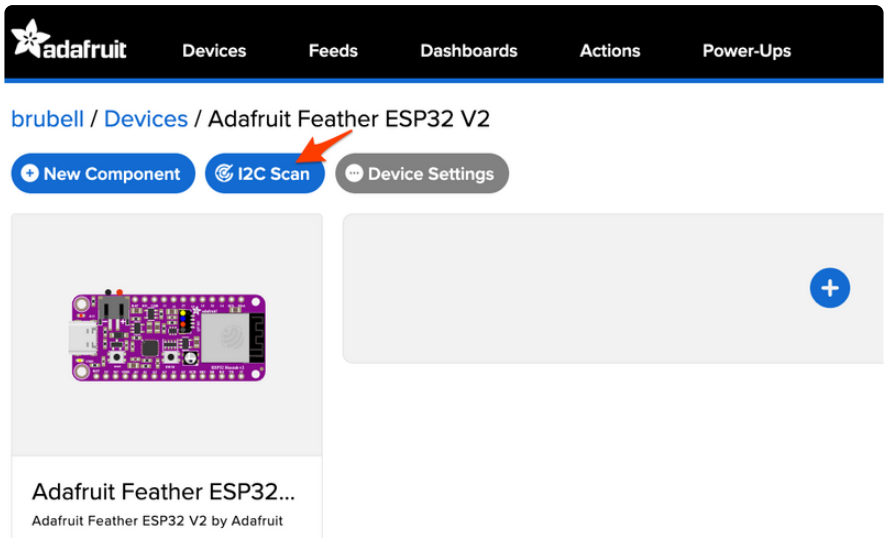
If you do not see your board listed here - you need to connect your board to Adafruit IO (https://adafru.it/Vfd) first.

On the device page, quickly **check that you're running the latest version of the WipperSnapper firmware**.

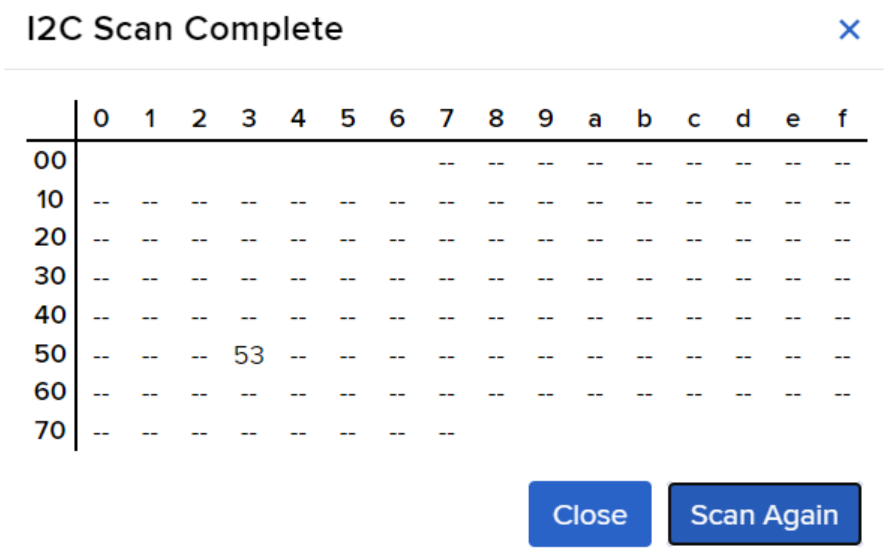
The device tile on the left indicates the version number of the firmware running on the connected board.

If the firmware version is green with a checkmark - continue with this guide.
If the firmware version is red with an exclamation mark "!" - update to the latest WipperSnapper firmware (https://adafru.it/Vfd) on your board before continuing.

Next, make sure the sensor is plugged into your board and click the **I2C Scan** button.



You should see the **ENS160**'s default I2C address of `0x53` pop-up in the I2C scan list.



I don't see the sensor's I2C address listed!

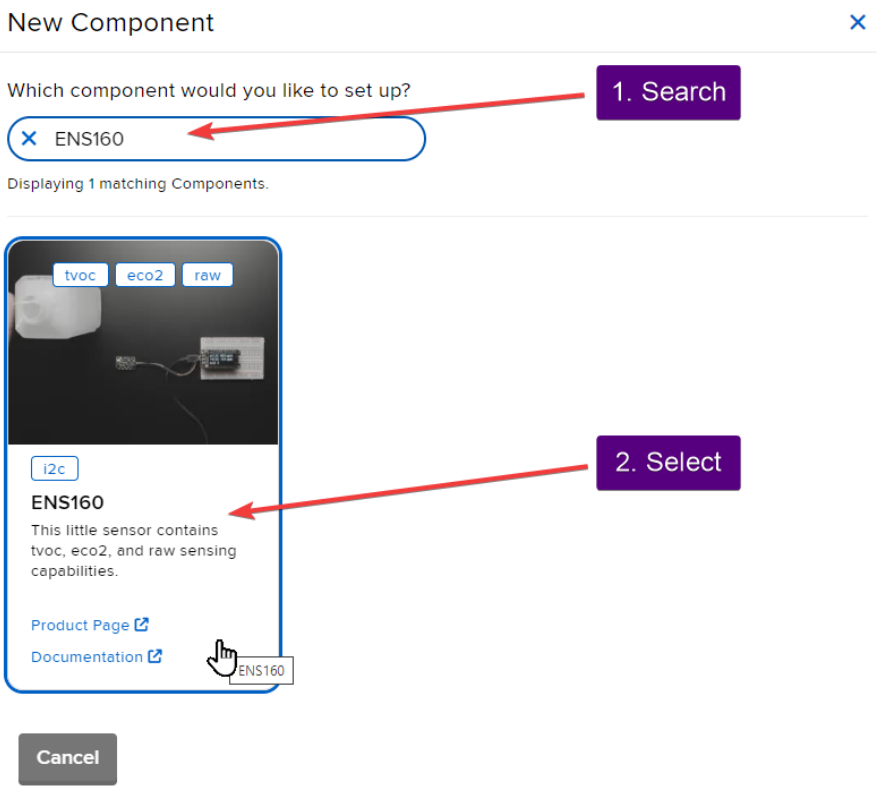
First, double-check the connection and/or wiring between the sensor and the board.

Then, reset the board and let it re-connect to Adafruit IO WipperSnapper.

With the sensor detected in an I2C scan, you're ready to add the sensor to your board.

Click the New Component button or the + button to bring up the component picker.

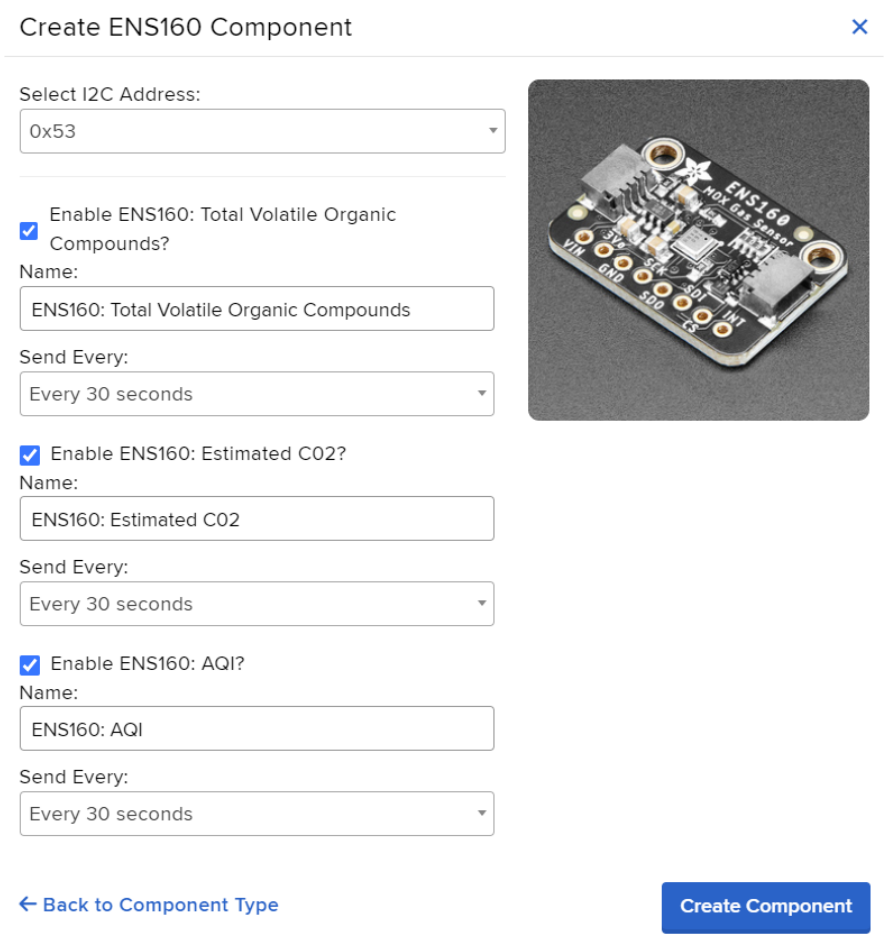
Adafruit IO supports a large amount of components. To quickly find your sensor, type `ENS160` into the search bar, then select the **ENS160** component.



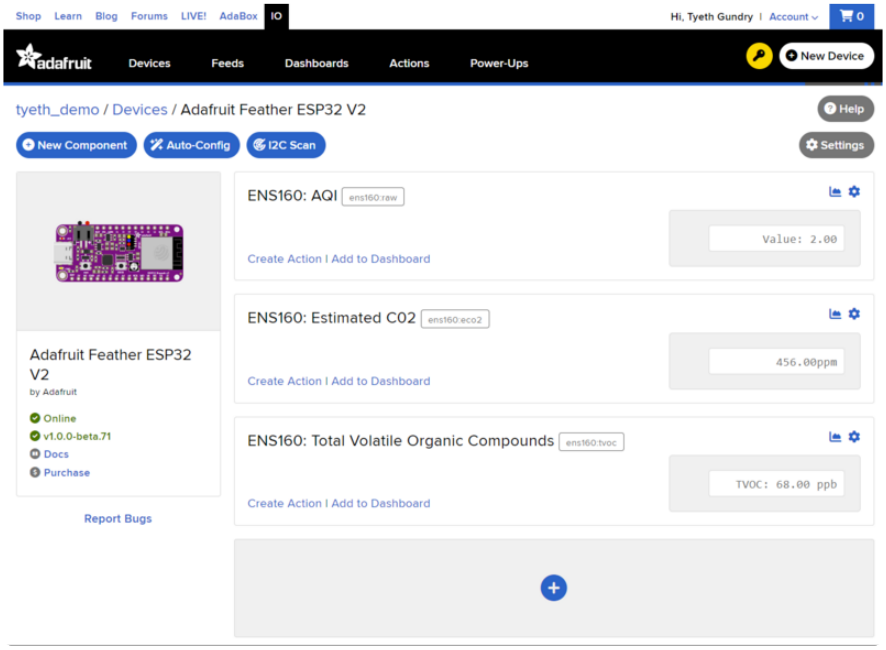
On the component configuration page, the **ENS160**'s sensor address should be listed along with the sensor's settings.

The **Send Every** option is specific to each sensor's measurements. This option will tell the Feather how often it should read from the **ENS160** sensor and send the data to Adafruit IO. Measurements can range from every 30 seconds to every 24 hours.

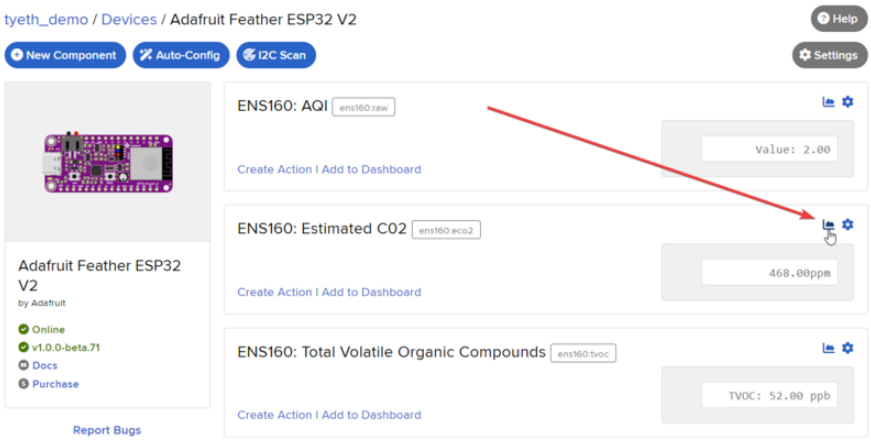
For this example, set the **Send Every** interval to every 30 seconds.



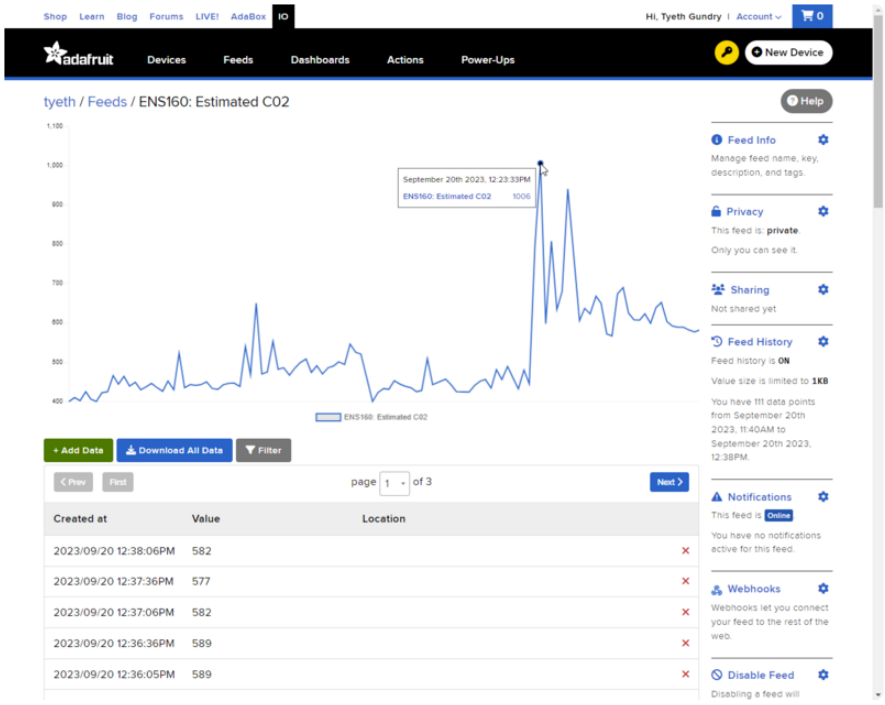
Your device interface should now show the sensor components you created. After the interval you configured elapses, WipperSnapper will automatically read values from the sensor(s) and send them to Adafruit IO.



To view the data that has been logged from the sensor, click on the graph next to the sensor name.



Here you can see the feed history and edit things about the feed such as the name, privacy, webhooks associated with the feed and more. If you want to learn more about how feeds work, check out this page (https://adafru.it/10aZ).

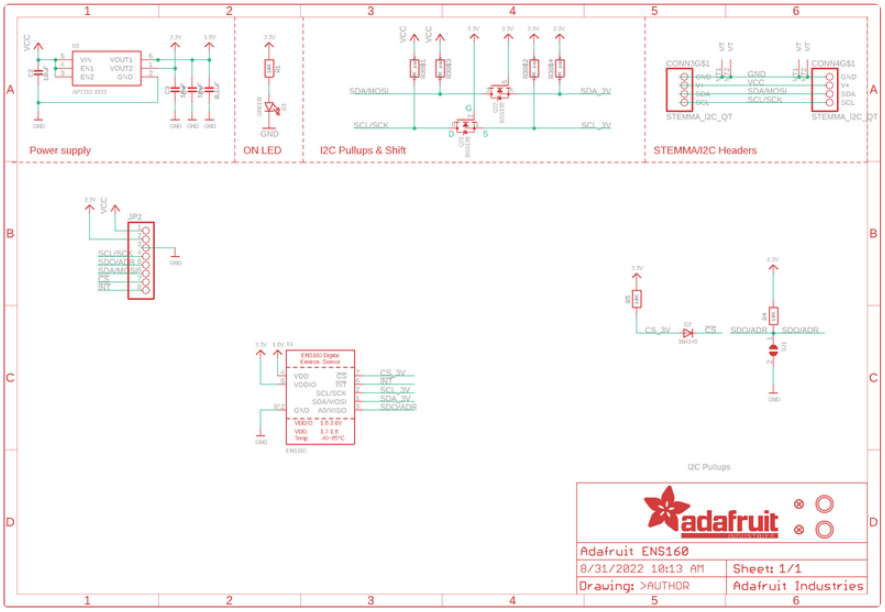


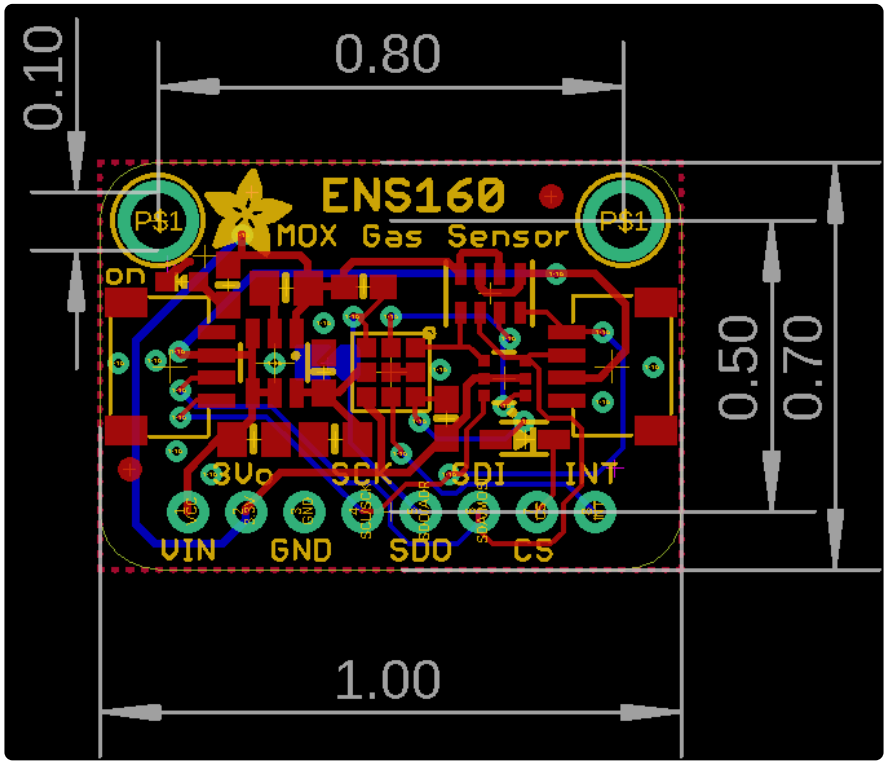
Downloads

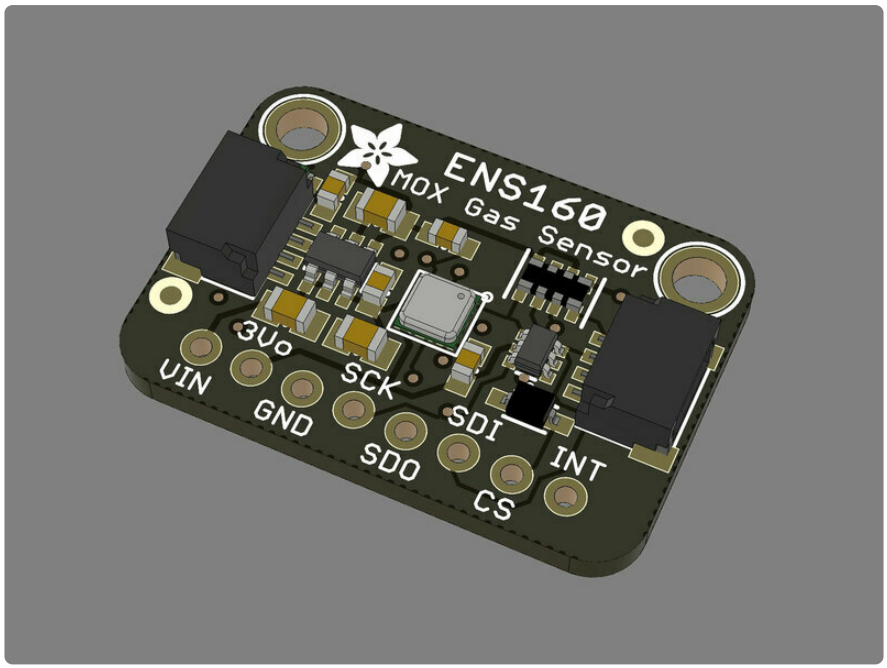
Files

- ENS160 Datasheet (https://adafru.it/11e1)
- EagleCAD PCB files on GitHub (https://adafru.it/11e2)
- Fritzing object in the Adafruit Fritzing Library (https://adafru.it/11e3)
- 3D models on GitHub (https://adafru.it/18fK)

Schematic and Fab Print






ENS160
MOX Gas Sensor
3Vo
SCK
VIN
GND
SDI
SDO
INT
CS