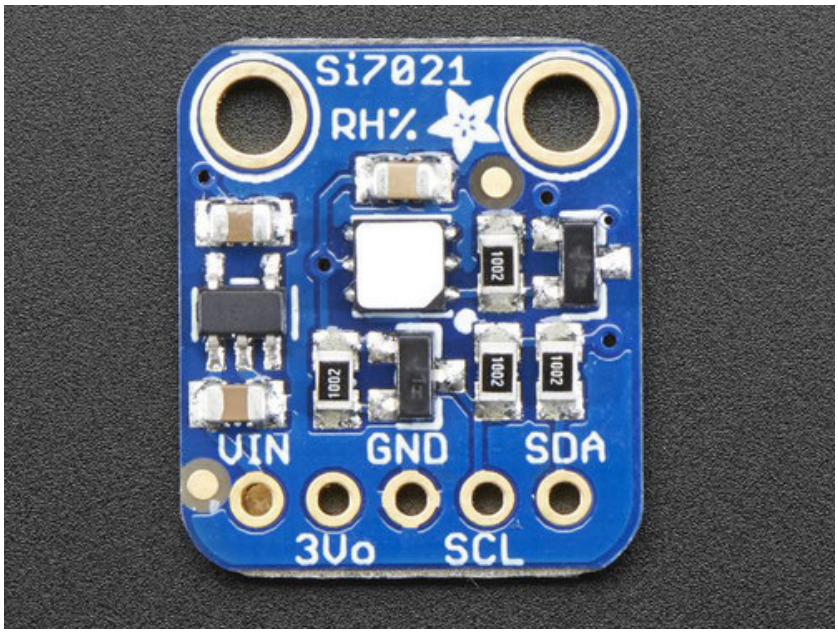
Adafruit Si7021 Temperature + Humidity Sensor

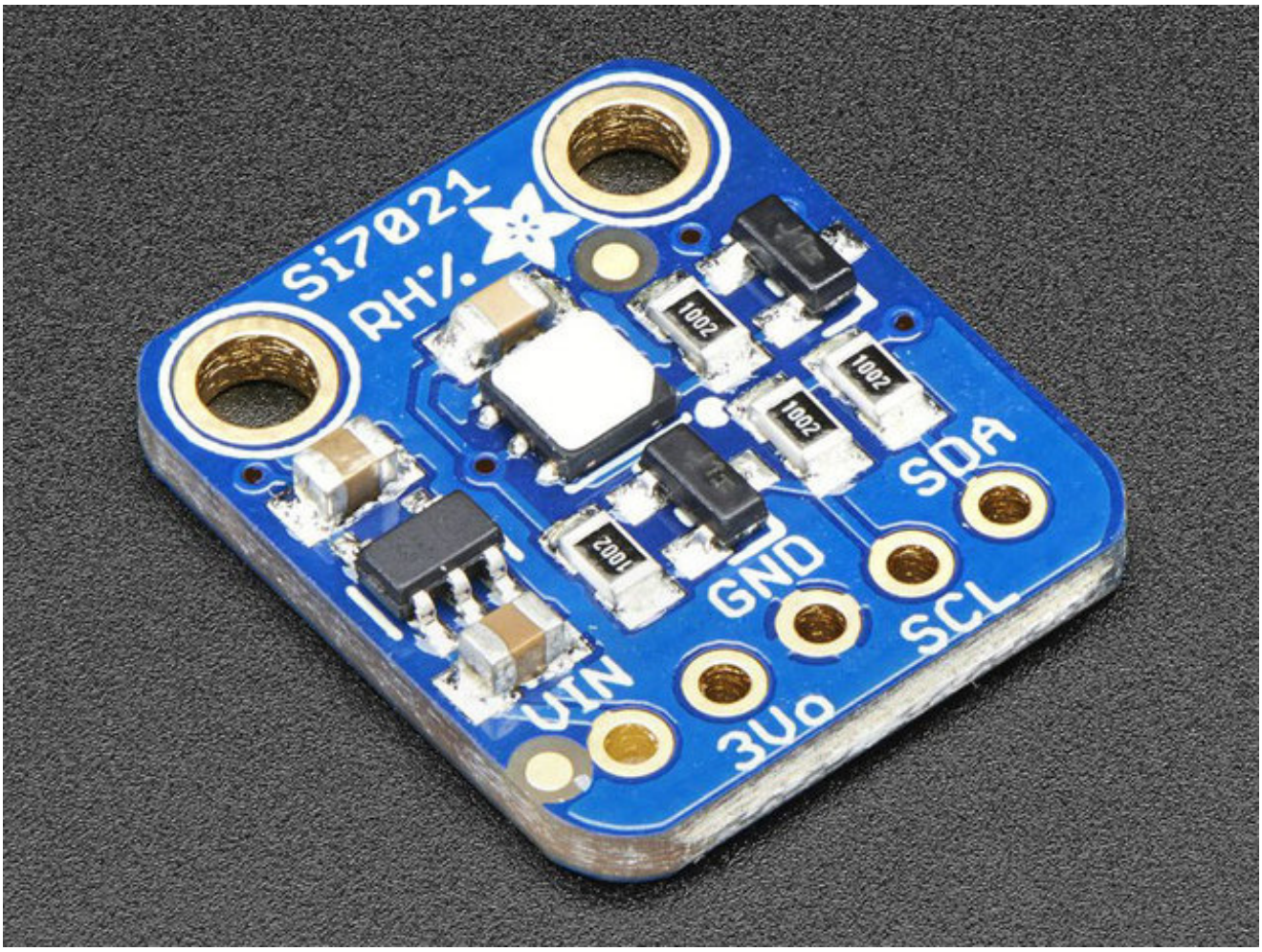
Created by lady ada



Last updated on 2016-09-22 08:17:36 PM UTC

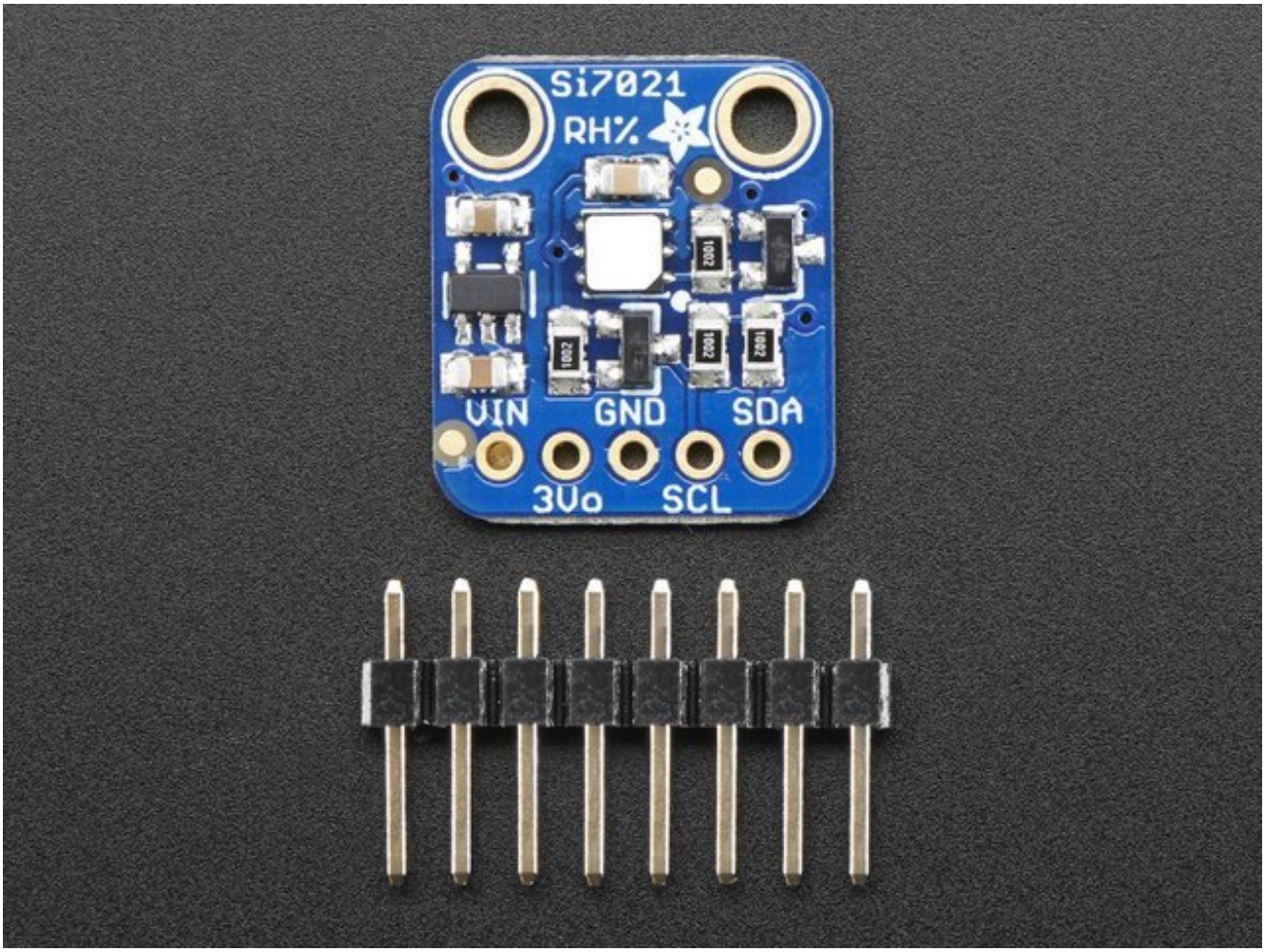
Guide Contents

Overview

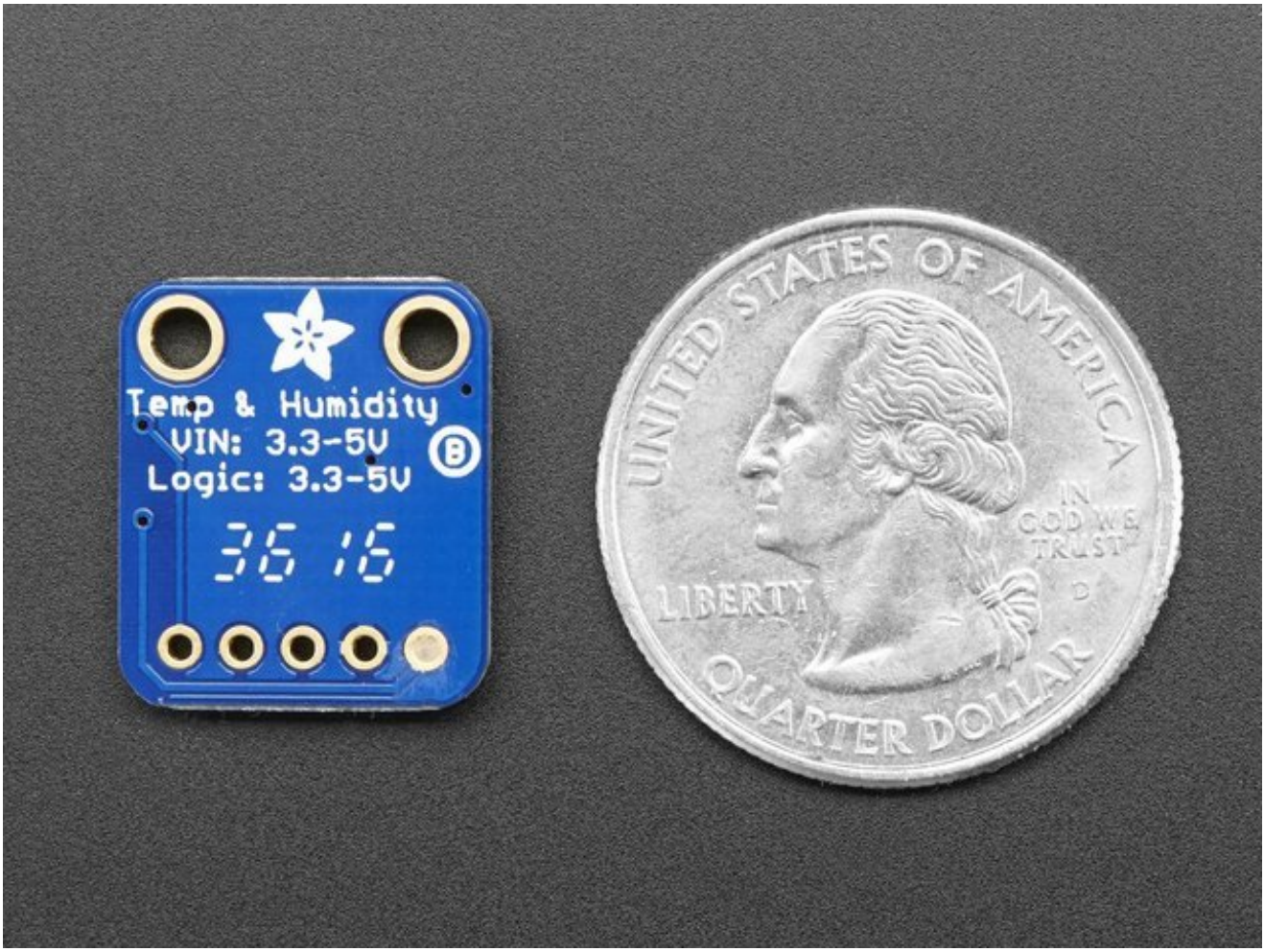


It's summer and you're sweating and your hair's all frizzy and all you really want to know is why the weatherman said this morning that today's relative humidity would max out at a perfectly reasonable 42% when it feels more like 77%. Enter the **Si7021 Temperature + Humidity Sensor** - the best way to prove the weatherman wrong!

This lovely sensor for Silicon labs has ± 3% relative humidity measurements with a range of 0–80% RH, and ±0.4 °C temperature accuracy at a range of -10 to +85 °C. Great for all of your environmental sensing projects. It uses I2C for data transfer so it works with a wide range of microcontrollers.

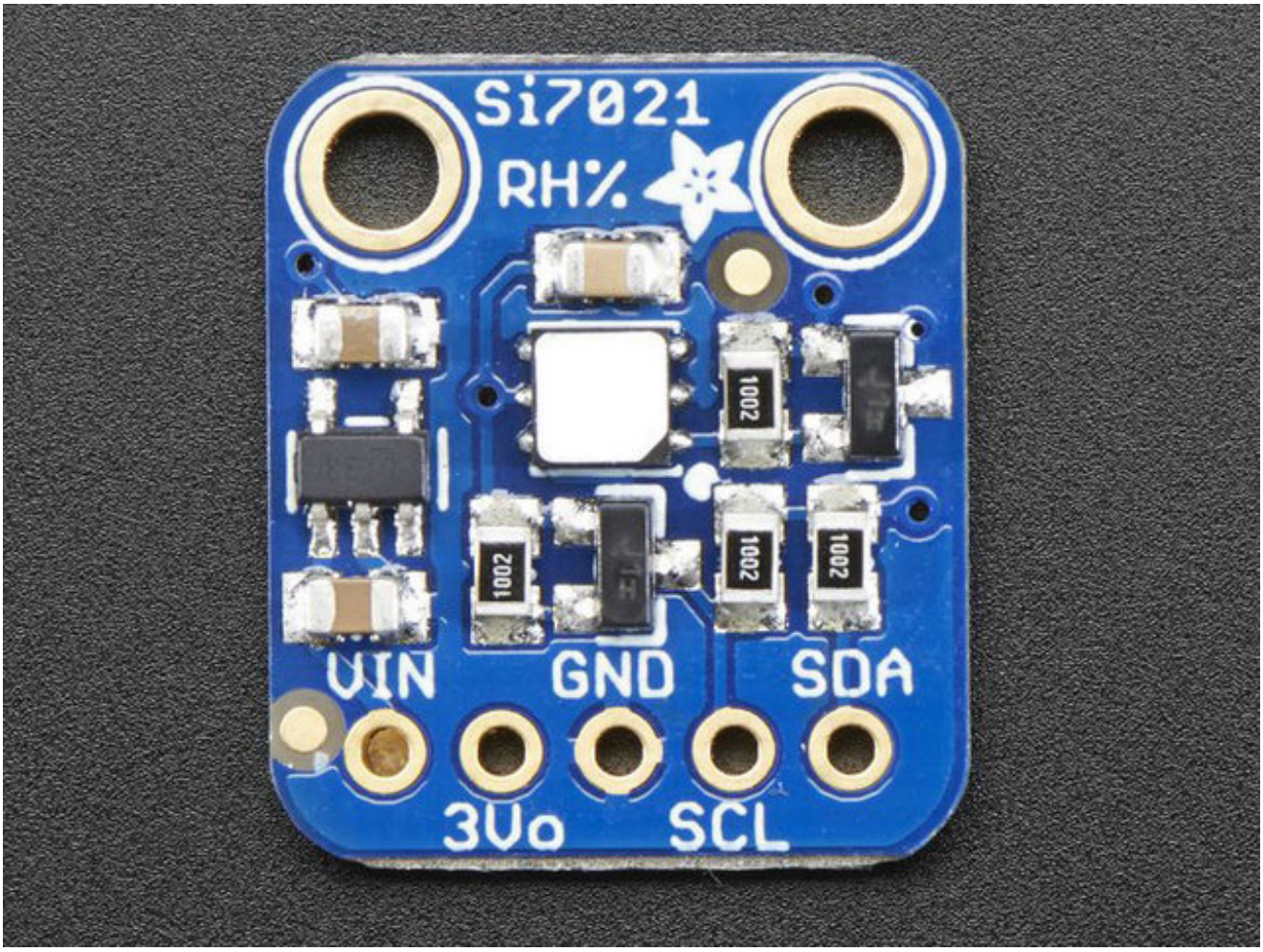


We put this nice sensor on a breakout board with a 3.3V regulator and level shifting so you can use it safely with 3.3V or 5V power & logic. There's a PTFE filter to keep the sensor clean, that's the white flat thing on top. Also comes with some pin header. Some light soldering is required to attach the header but it's easy to do.


Temp & Humidity
VIN: 3.3-5V
Logic: 3.3-5V
UNITED STATES OF AMERICA
IN GOD WE TRUST
LIBERTY
QUARTER DOLLAR

Pinouts

The Si7021 is a I2C sensor. That means it uses the two I2C data/clock wires available on most microcontrollers, and can share those pins with other sensors as long as they don't have an address collision. For future reference, the I2C address is **0x40** and you *can't* change it!



Power Pins:

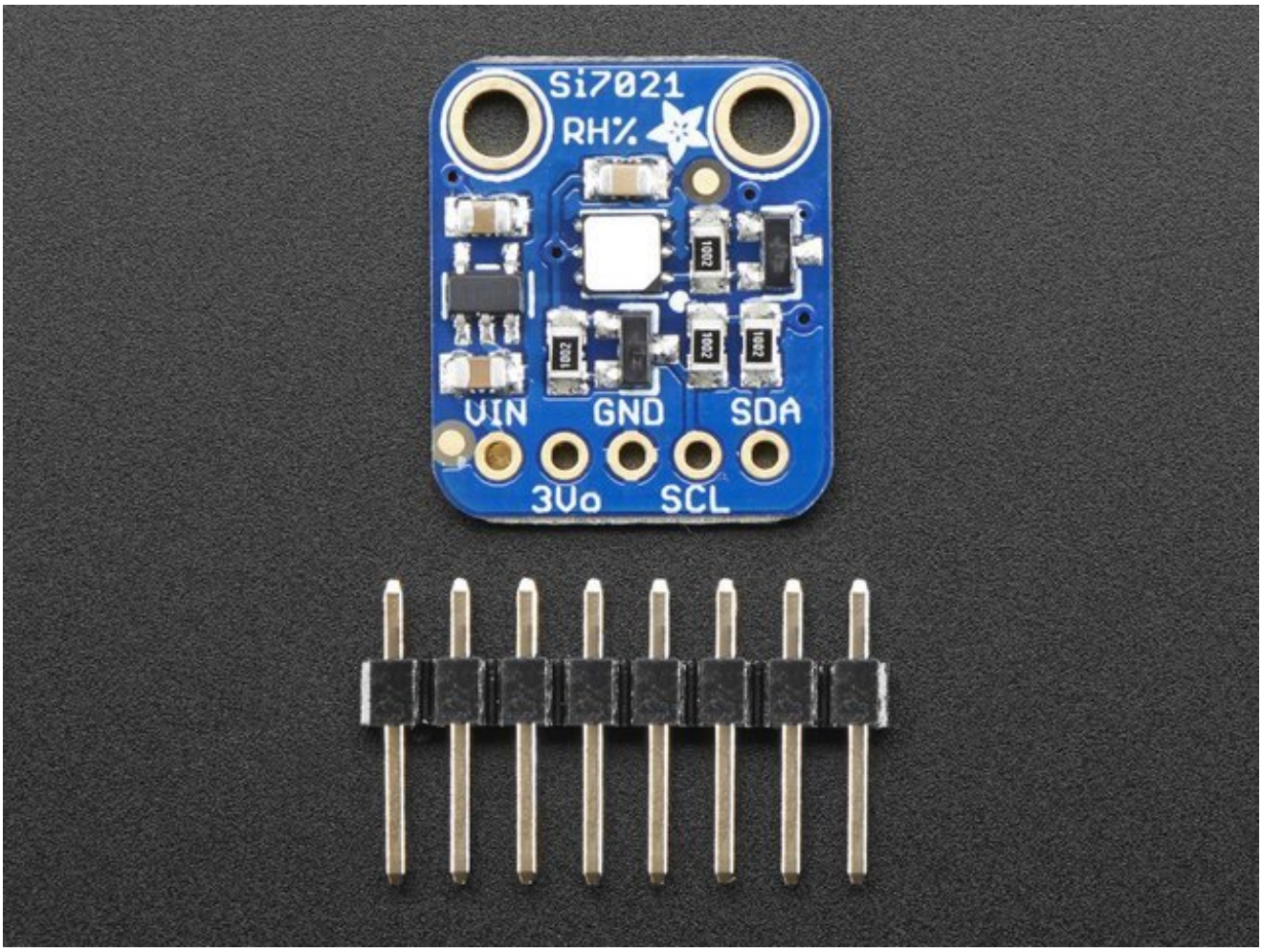
- **Vin** - this is the power pin. Since the chip uses 3 VDC, we have included a voltage regulator on board that will take 3-5VDC and safely convert it down. To power the board, give it the same power as the logic level of your microcontroller - e.g. for a 5V micro like Arduino, use 5V
- **3v3** - this 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:

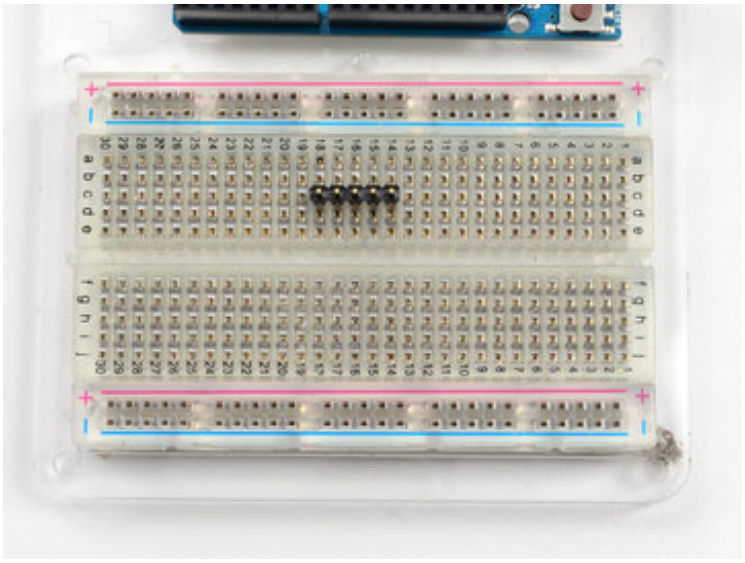
- **SCL** - I2C clock pin, connect to your microcontrollers I2C clock line.
- **SDA** - I2C data pin, connect to your microcontrollers I2C data line.

Assembly



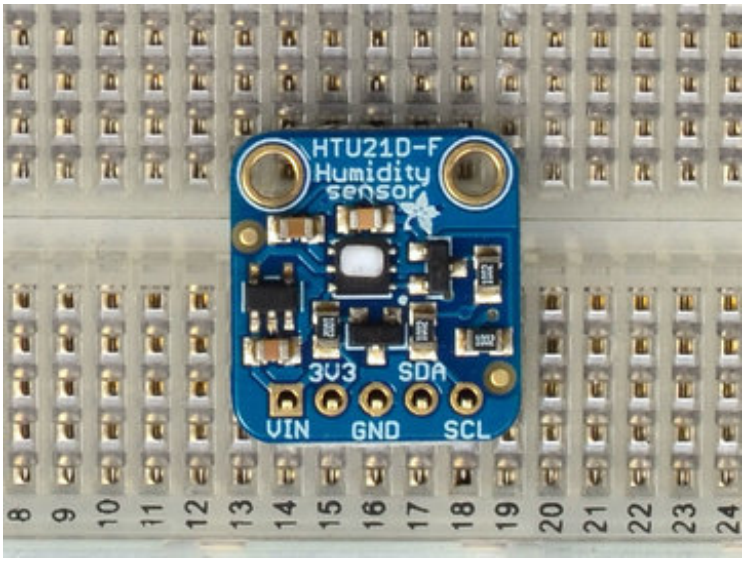
The photos below show a an HTUD21 sensor rather than the Si7021 but the soldering procedure is identical!

Prepare the header



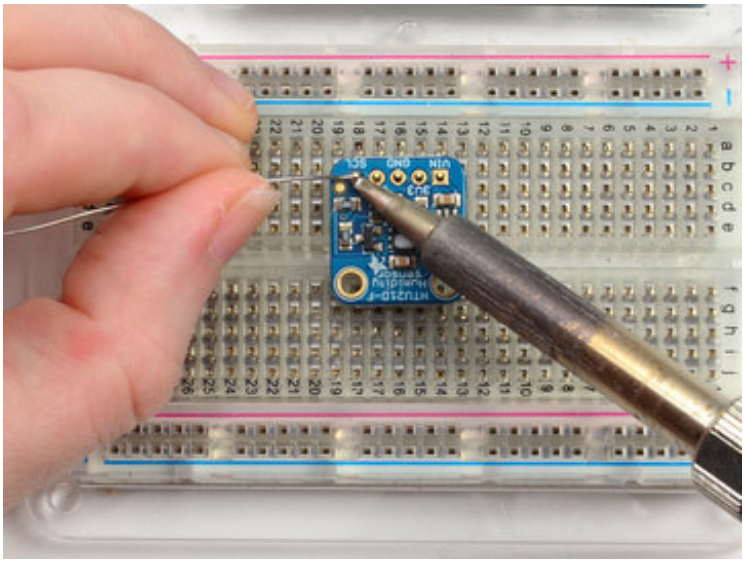
strip:

Cut the strip to length if necessary. It will be easier to solder if you insert it into a breadboard - **long pins down**



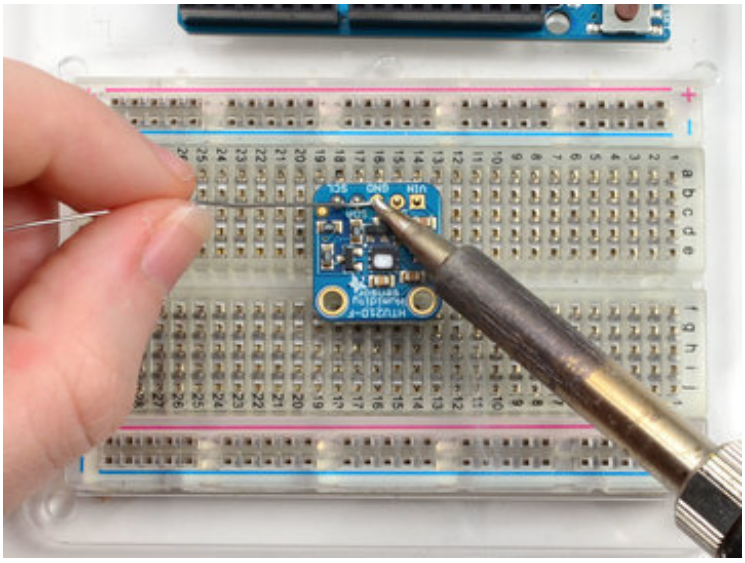
Add the breakout board:

Place the breakout board over the pins so that the short pins poke through the breakout pads

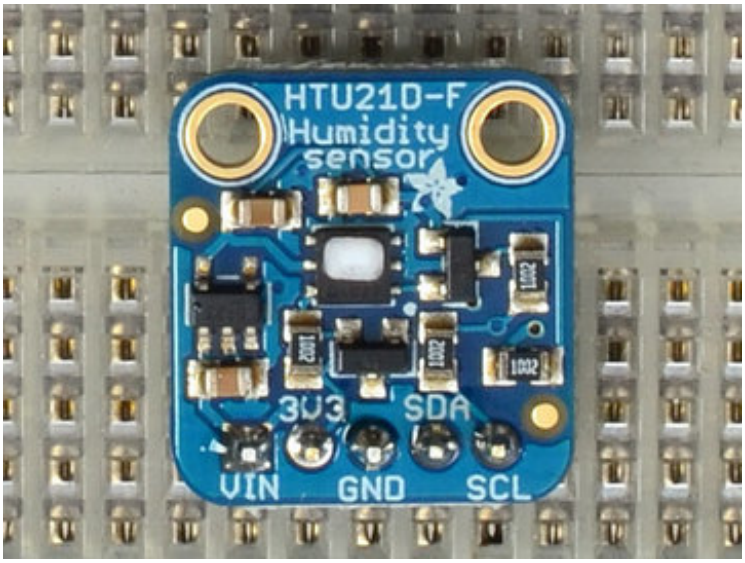
- 

And Solder!

Be sure to solder all pins for reliable electrical contact.

- 

(For tips on soldering, be sure to check out our [Guide to Excellent Soldering](http://adafru.it/aTk) (http://adafru.it/aTk)).

- 

You're done! Check your solder joints visually and continue onto the next steps

Wiring & Test

You can easily wire this breakout to any microcontroller, we'll be using an Arduino. For another kind of microcontroller, just make sure it has I2C, then port the code - its pretty simple stuff!

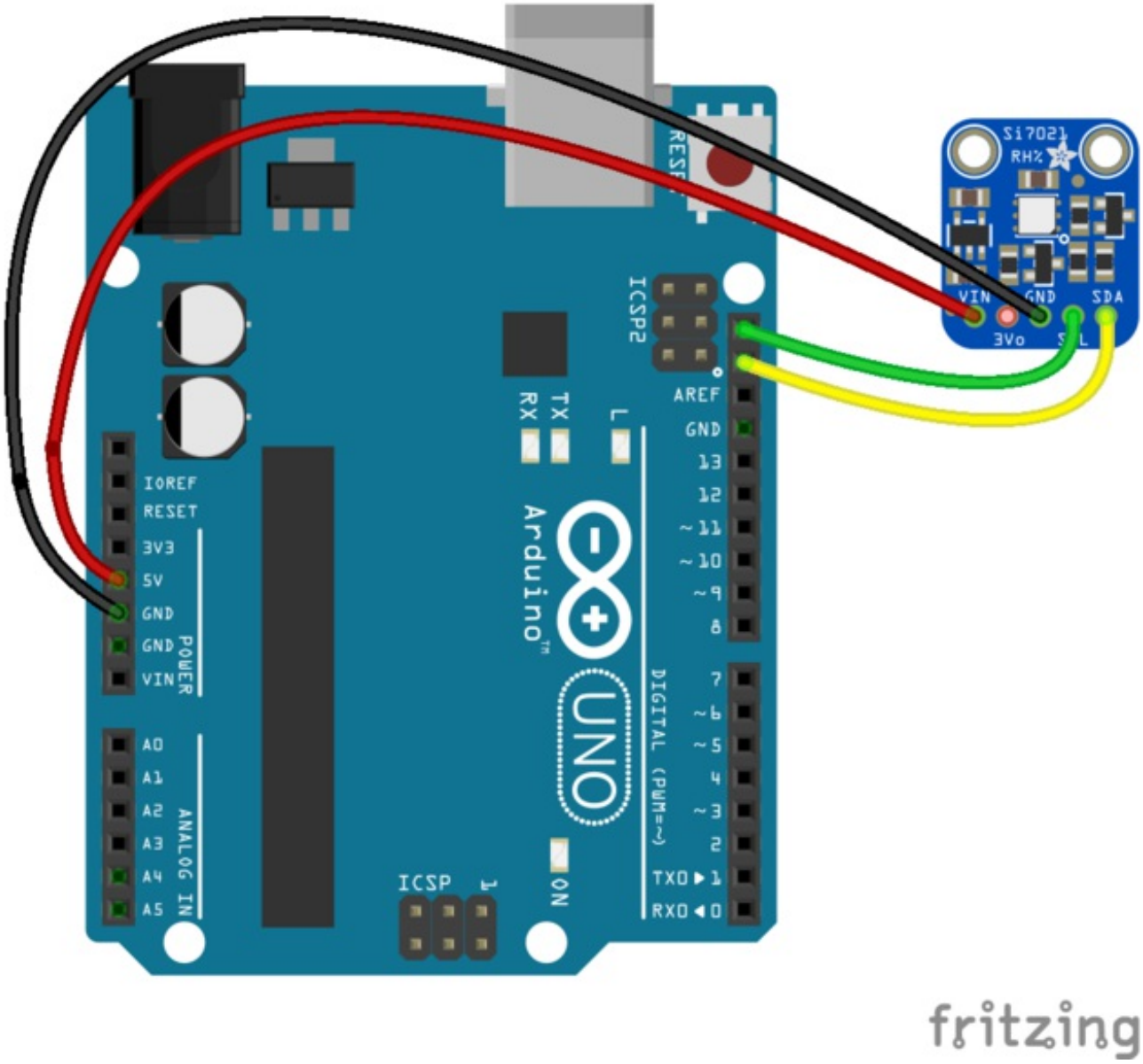


diagram.fzz Fritzing file
http://adafru.it/rAA

- Connect **Vin** to the power supply, 3-5V is fine. Use the same voltage that the microcontroller logic is based off of. For most Arduinos, that is 5V

- Connect **GND** to common power/data ground
- Connect the **SCL** pin to the I2C clock**SCL** pin on your Arduino. On an UNO & '328 based Arduino, this is also known as **A5**, on a Mega it is also known as**digital 21** and on a Leonardo/Micro, **digital 3**
- Connect the **SDA** pin to the I2C data**SDA** pin on your Arduino. On an UNO & '328 based Arduino, this is also known as **A4**, on a Mega it is also known as**digital 20** and on a Leonardo/Micro, **digital 2**

The Si7021 has a default I2C address of **0x40** and cannot be changed!

Download Adafruit_Si7021

To begin reading sensor data, you will need to download Adafruit_Si7021 Library from our github repository (http://adafru.it/rAw). You can do that by visiting the github repo and manually downloading or, easier, just click this button to download the zip

Download Adafruit Si7021 Library
http://adafru.it/rAx

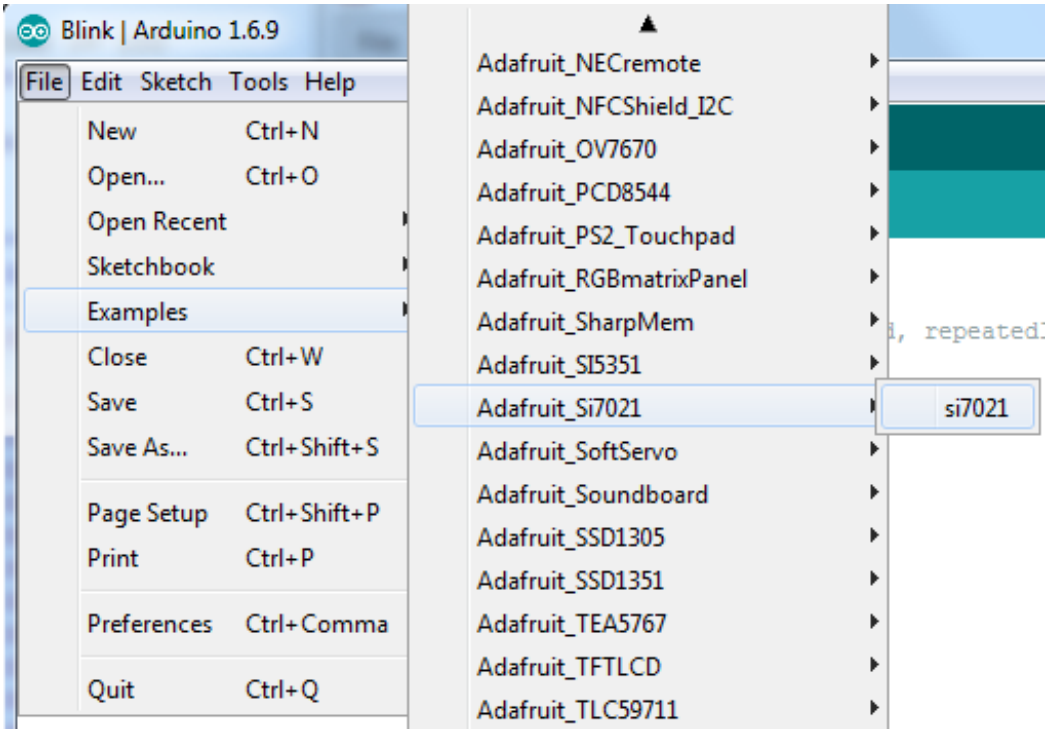
Rename the uncompressed folder **Adafruit_Si7021** and check that the **Adafruit_Si7021** folder contains **Adafruit_Si7021.cpp** and **Adafruit_Si7021.h**

Place the **Adafruit_Si7021** library folder your **arduinosketchfolder/libraries/** folder.
You may need to create the **libraries** subfolder if its your first library. Restart the IDE.

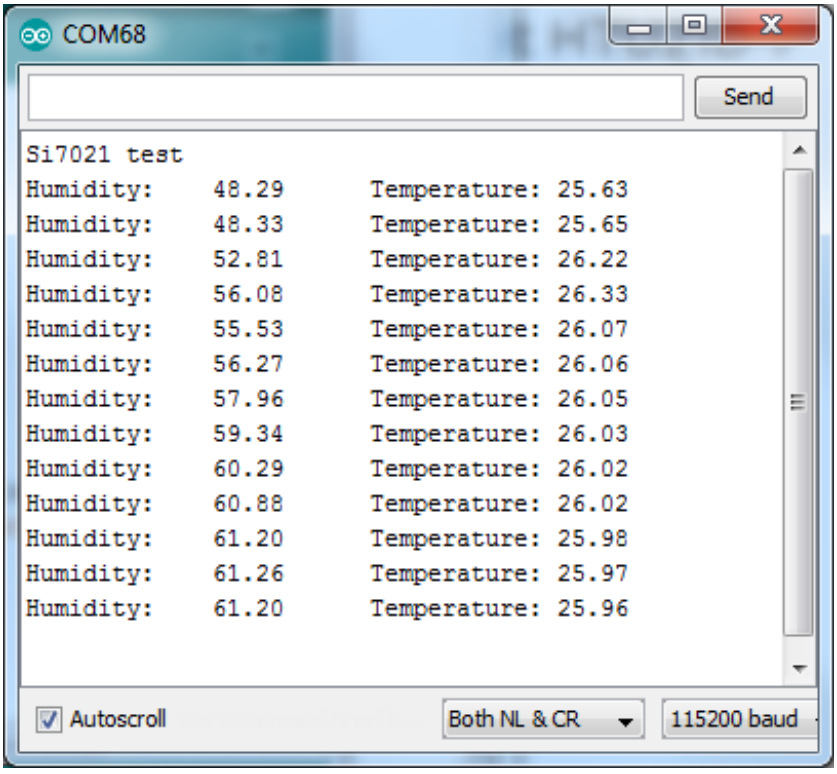
We also have a great tutorial on Arduino library installation at:
http://learn.adafruit.com/adafruit-all-about-arduino-libraries-install-use (http://adafru.it/aYM)

Load Demo

Open up **File->Examples->Adafruit_Si7021->si7021** and upload to your Arduino wired up to the sensor



Thats it! Now open up the serial terminal window at 115200 speed to begin the test.



You can try breathing on the sensor to increase the humidity. The sensor reacts very fast!

Library Reference

The library we have is simple and easy to use

You can create the **Adafruit_Si7021** object with:

```
Adafruit_Si7021 sensor = Adafruit_Si7021();
```

There are no pins to set since you must use the I2C bus!

Then initialize the sensor with:

```
sensor.begin();
```

this function returns **True** if the sensor was found and responded correctly and **False** if it was not found

Once initialized, you can query the temperature in °C with

```
sensor.readTemperature()
```

Which will return floating point (decimal + fractional) temperature. You can convert to Fahrenheit by multiplying by 1.8 and adding 32 as you have learned in grade school!

Reading the humidity is equally simple. Call

```
sensor.readHumidity()
```

to read the humidity also as a floating point value between 0 and 100 (this reads % humidity)

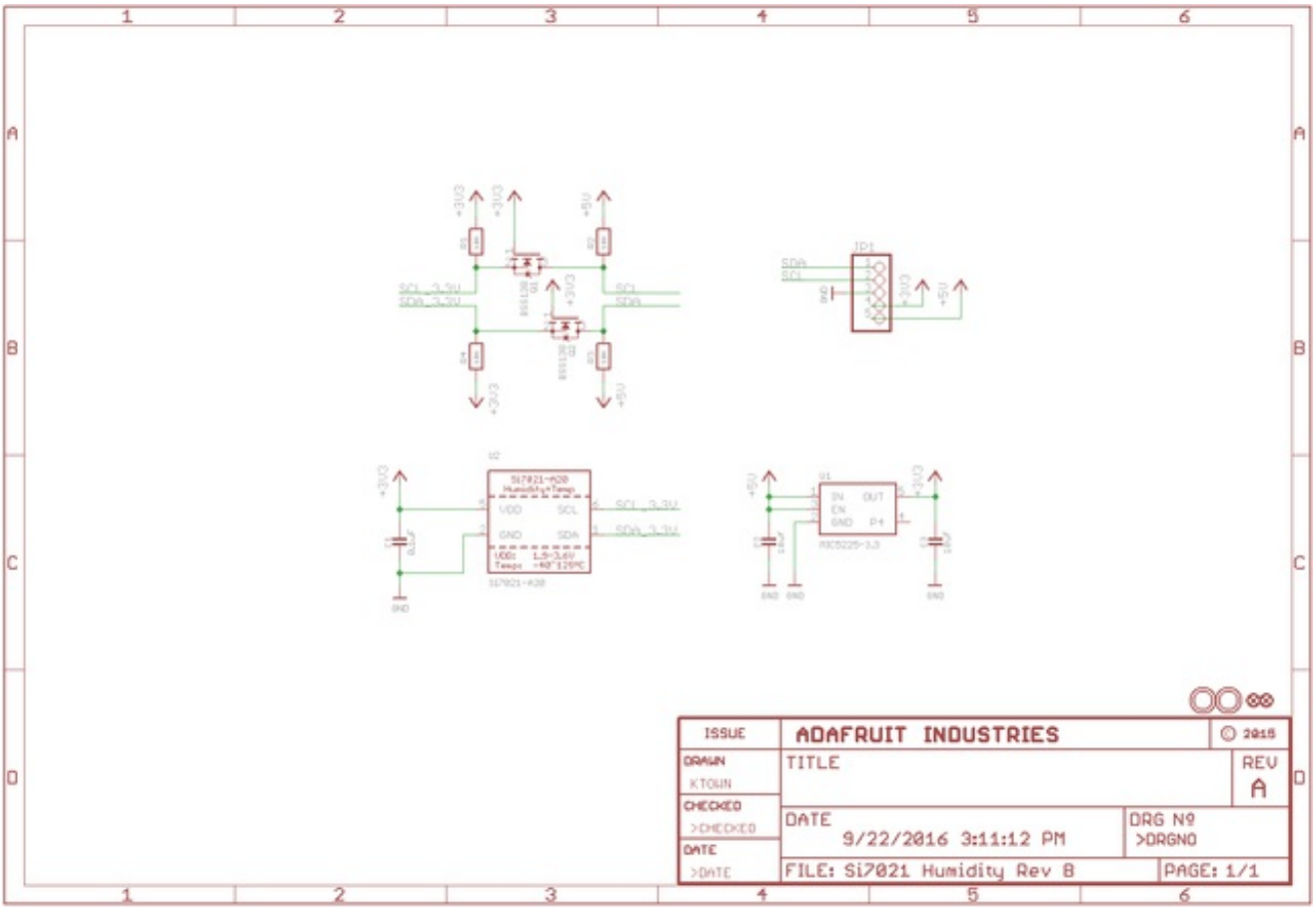
This sensor also has a serial number which you might find handy! Call `sensor.readSerialNumber()` to read out the 8 bytes of unique ID. Then you can access them from `sensor.sernum_a` and `sensor.sernum_b`

Downloads

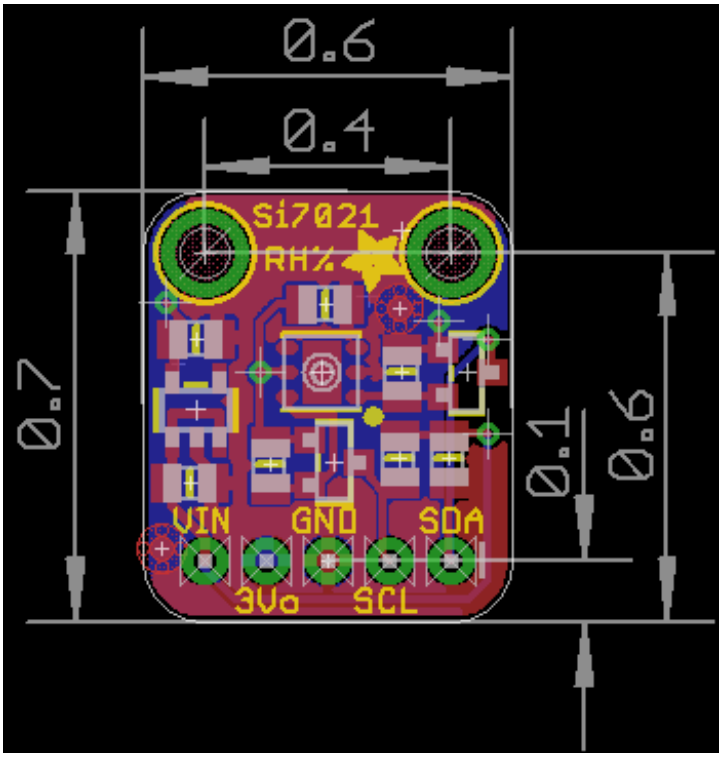
Files & Datasheets

- Fritzing object in Adafruit Fritzing library (http://adafru.it/aP3)
- Arduino library on GitHub (http://adafru.it/rAw)
- EagleCAD PCB files on GitHub (http://adafru.it/rAB)
- Si7021-A20 datasheet (http://adafru.it/rAC)

Schematic



Fabrication Print


0.6
0.4
Si7021
RH%
0.7
0.1
0.6
VIN
GND
SDA
3Vo
SCL