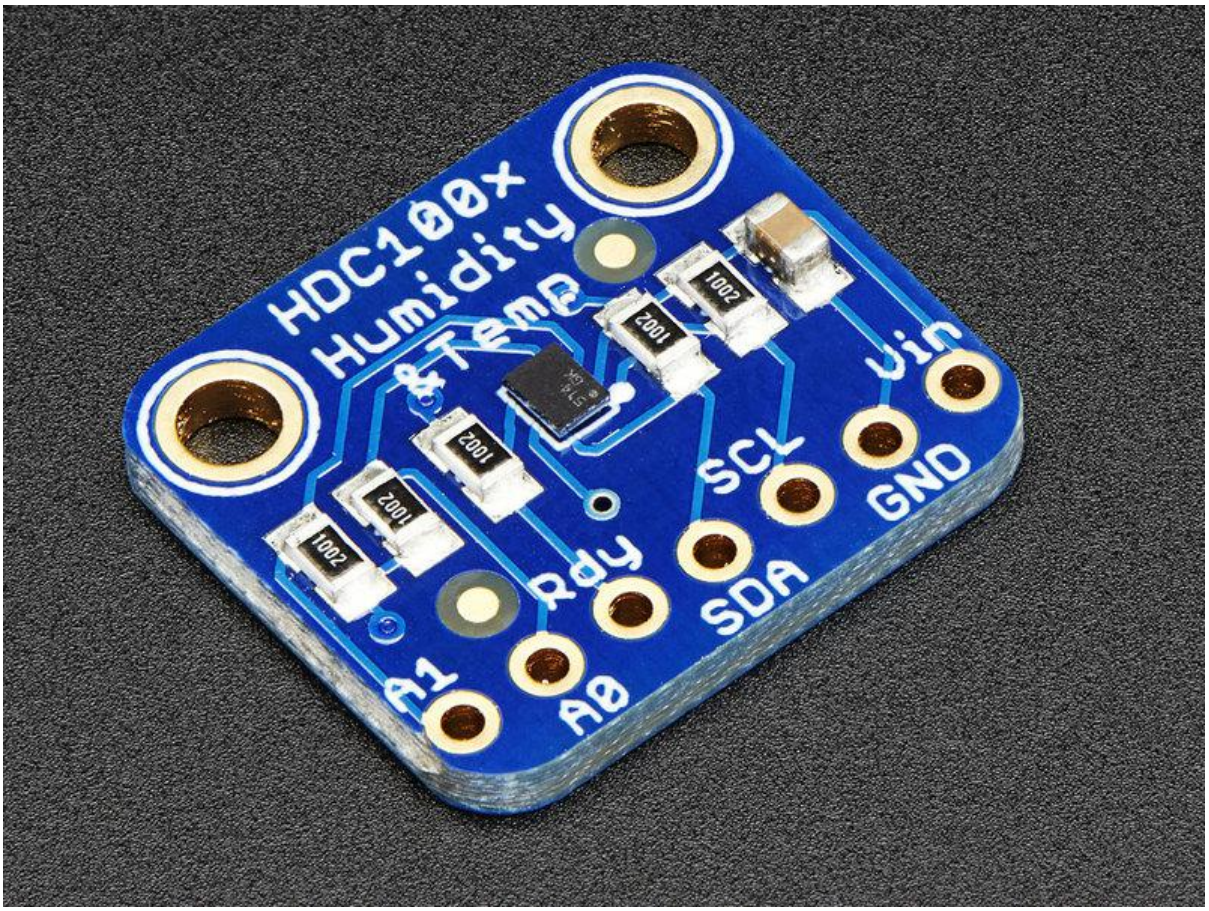
Adafruit HDC1008 Temperature and Humidity Sensor Breakout

Created by lady ada



https://learn.adafruit.com/adafruit-hdc1008-temperature-and-humidity-sensor-breakout

Last updated on 2022-12-01 02:34:40 PM EST

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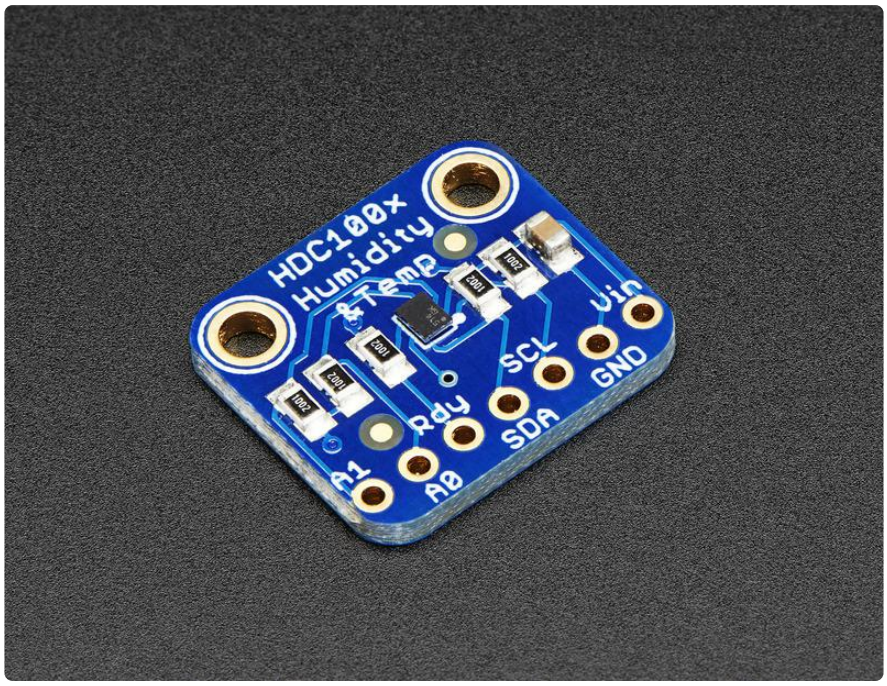
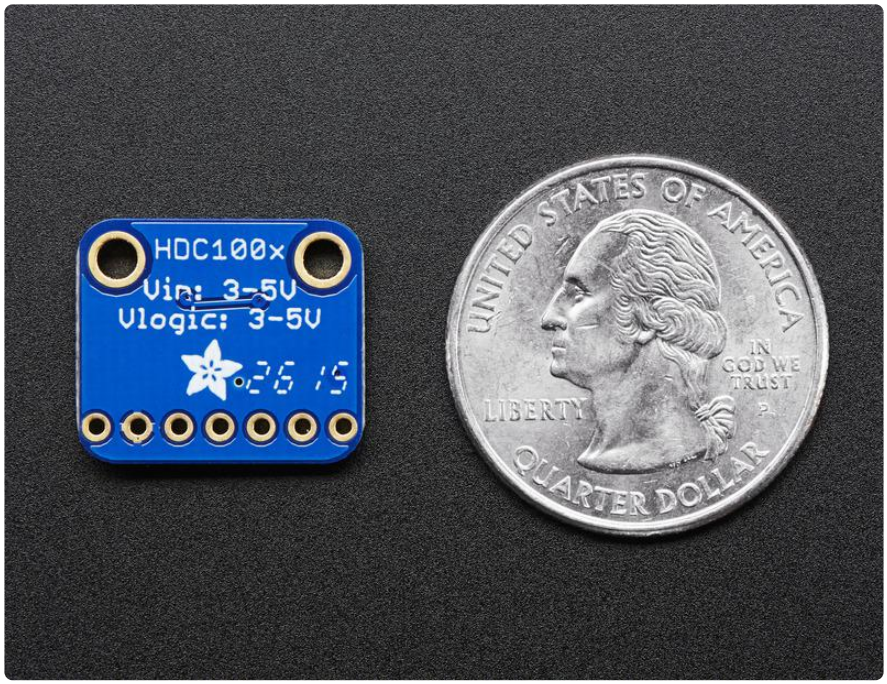
Overview



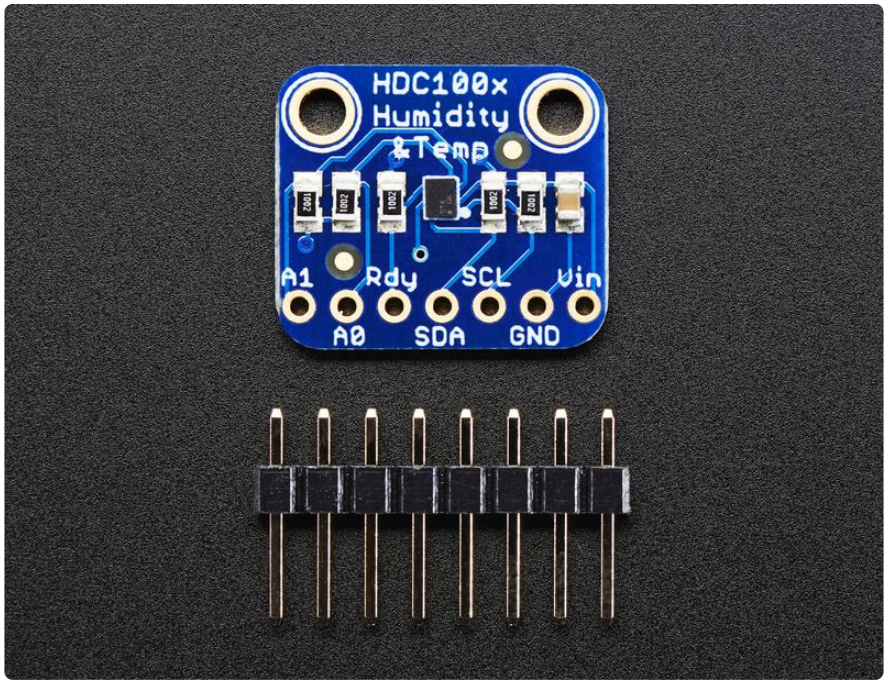
It's summer and you're sweating and your hair's all frizzy and all you really want to know is why the weatherman said this morning that today's relative humidity would max out at a perfectly reasonable 52% when it feels more like 77%. Enter the HDC100 8 Temperature + Humidity Sensor - the best way to prove the weatherman wrong!



This I2C digital humidity sensor is a fairly accurate and intelligent alternative to the much simpler Humidity and Temperature Sensor - SHT15 Breakout (http://adafru.it/1638) It has a typical accuracy of ±4% with an operating range that's optimized from

10% to 80% RH. Operation outside this range is still possible - just the accuracy might drop a bit. The temperature output has a typical accuracy of ±0.2°C from -20~85°C.

The HDC1008 sensor chip has 2 address-select pins, so you can have up to 4 shared on a single I2C bus. It's also 3-5V power and logic safe so you don't need any level shifters or regulators to use with a 5V or 3V microcontroller

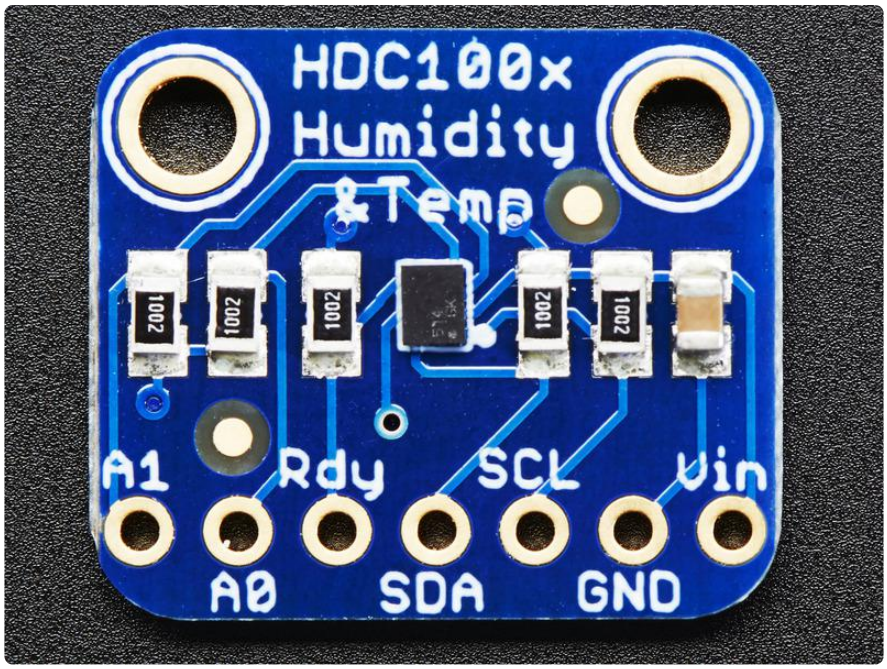


Such a lovely chip, but only available in a tiny BGA package. So we spun up a breakout board with the chip and some extra passive components to make it easy to use. Each order comes with one fully assembled and tested PCB breakout and a small piece of header. You'll need to solder the header onto the PCB but it's fairly easy and takes only a few minutes even for a beginner.

Please note: TI has indicated that there's a 'settling' effect for the humidity and that you will need to re-hydrate the sensor once you receive it. To rehydrate it, place it in a location with 85% humidity for 24 hours or 60% humidity for 10 days.

Pinouts

The HDC1008 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 default I2C address is 0x40 but you can adjust it by connecting the address pins to Vin ('high' logic votlage), for four possible addresess: 0x40, 0x41, 0x42 or 0x43



Power Pins:

- Vin - this is the power pin. Unlike many sensors, this chip can be powered by 3-5 VDC, so there is no voltage regulator on board. Simply power the board with the same power as the logic level of your microcontroller - e.g. for a 5V micro like Arduino, use 5V. For a 3V ARM processor, use 3V
- GND - common ground for power and logic

I2C Logic pins:

- SCL - I2C clock pin, connect to your microcontrollers I2C clock line. 3-5V logic OK
- SDA - I2C data pin, connect to your microcontrollers I2C data line. 3-5V logic OK

Optional Pins

These are pins you don't need to connect to unless you want to!

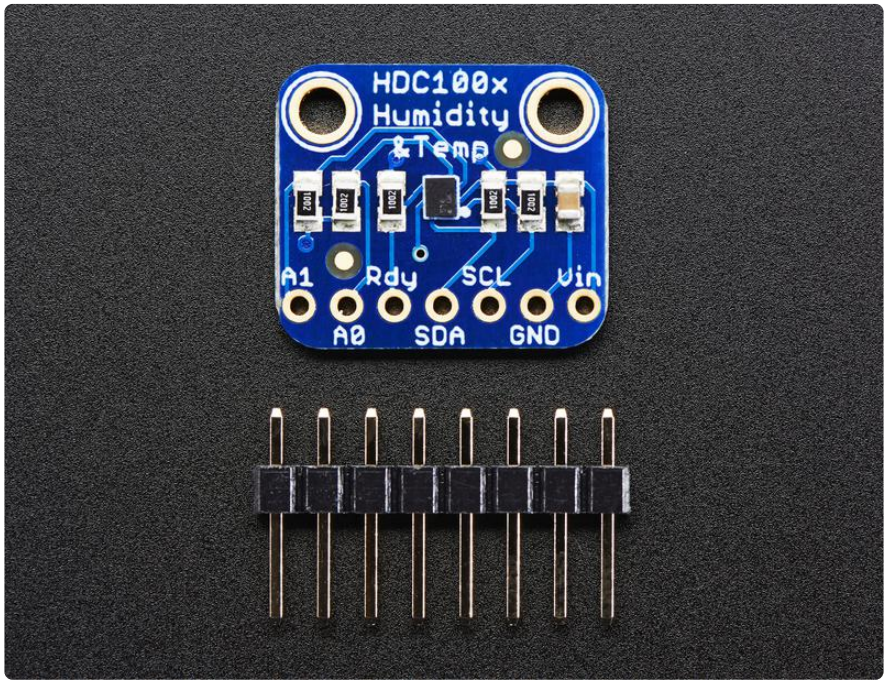
- RDY - This is the interrupt/'ready' pin from the HDC100x. The chip has some capability to 'alert' you when data is ready to be read from the sensor. We don't use this pin in our library but it's available if you need it! It is open collector so you need to use a pull-up resistor if you want to read signal from this pin.
- A0 A1 - These are the address select pins. Since you can only have one device with a given address on an i2c bus, there must be a way to adjust the address if

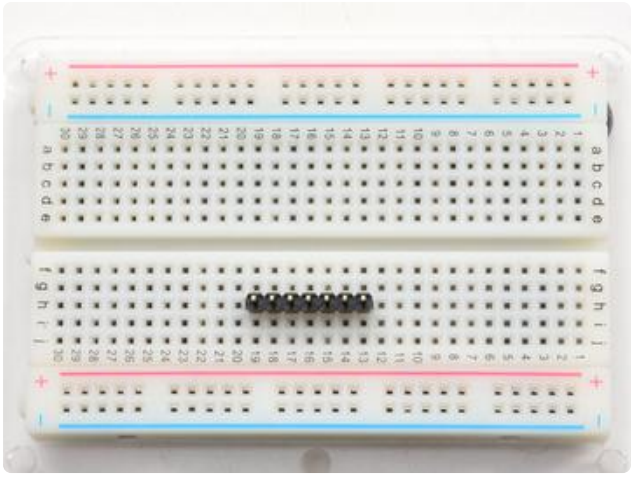
you want to put more than one HDC100X on a shared i2c bus. The A0/A1 pins set the bottom 2 bits of the i2c address. There are pull-down resistors on the board so connect them to Vin to set the bits to '1'. They are read on power up, so de-power and re-power to reset the address

The default address is 0x40 and the address can be calculated by 'adding' the A0/A1 to the base of 0x40
A0 sets the lowest bit with a value of 1, A1 sets the middle bit with a value of 2. The final address is 0x40 + A1 + A0.
So for example if A1 is tied to Vin and A0 is tied to Vin, the address is 0x40 + 2 + 1 = 0x43.
If only A0 is tied to Vin, the address is 0x40 + 1 = 0x41
If only A1 is tied to Vin, the address is 0x42 + 2 = 0x42

In the first revision of the PCB for this design we swapped the silkscreen for A0 and A1 by accident. Please note A0 is the pin all the way to the left, A1 is one pin to the right. We will fix in the next order of PCBs!

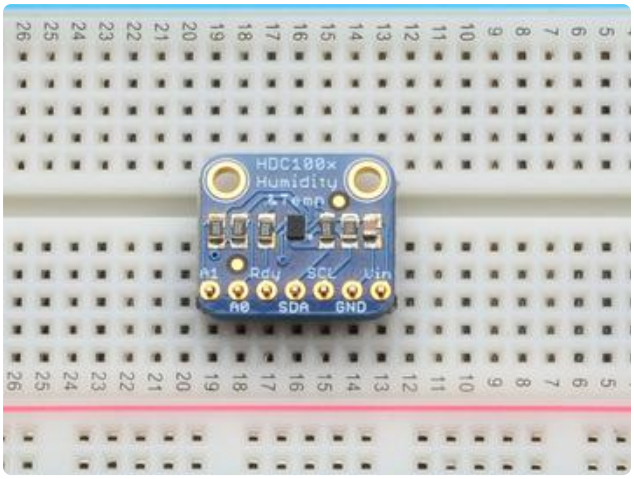
Assembly





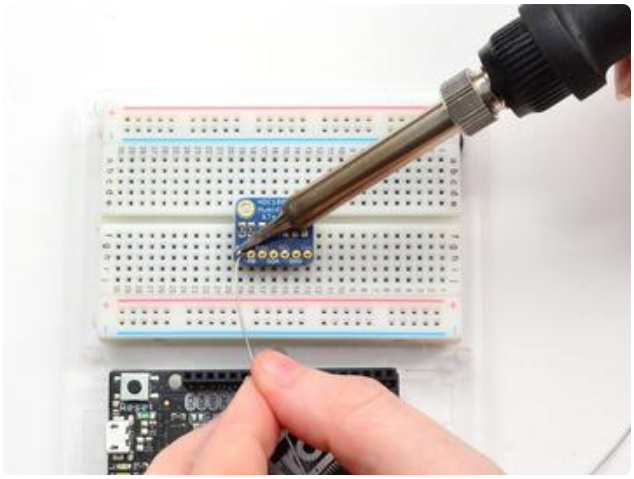
Prepare the header strip:

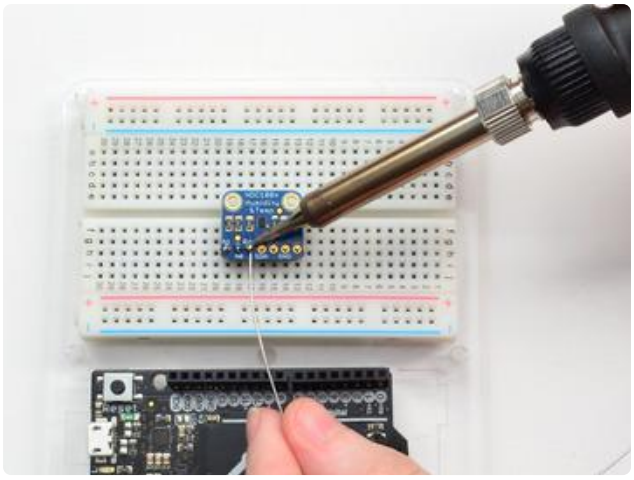
Cut the strip to length if necessary. It will be easier to solder if you insert it into a breadboard - long pins down

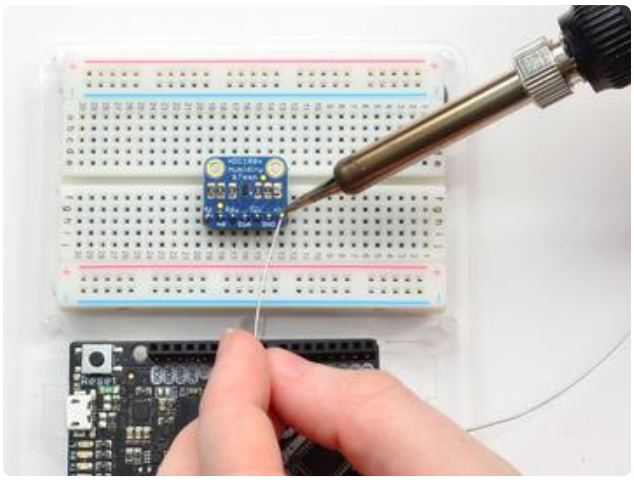


Add the breakout board:

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



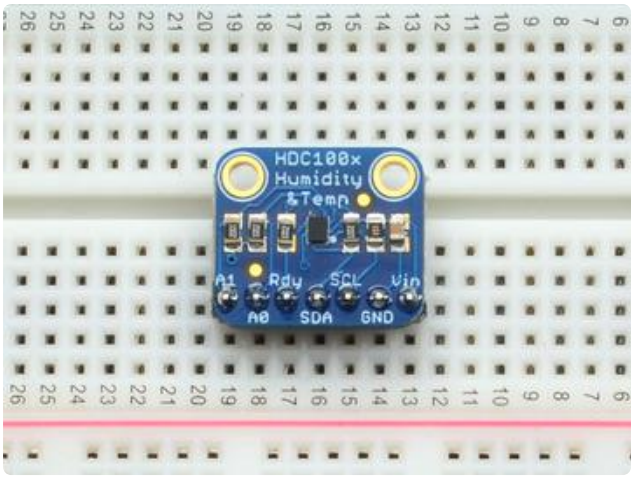




And Solder!

Be sure to solder all pins for reliable electrical contact.

(For tips on soldering, be sure to check out our Guide to Excellent Soldering ()).



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

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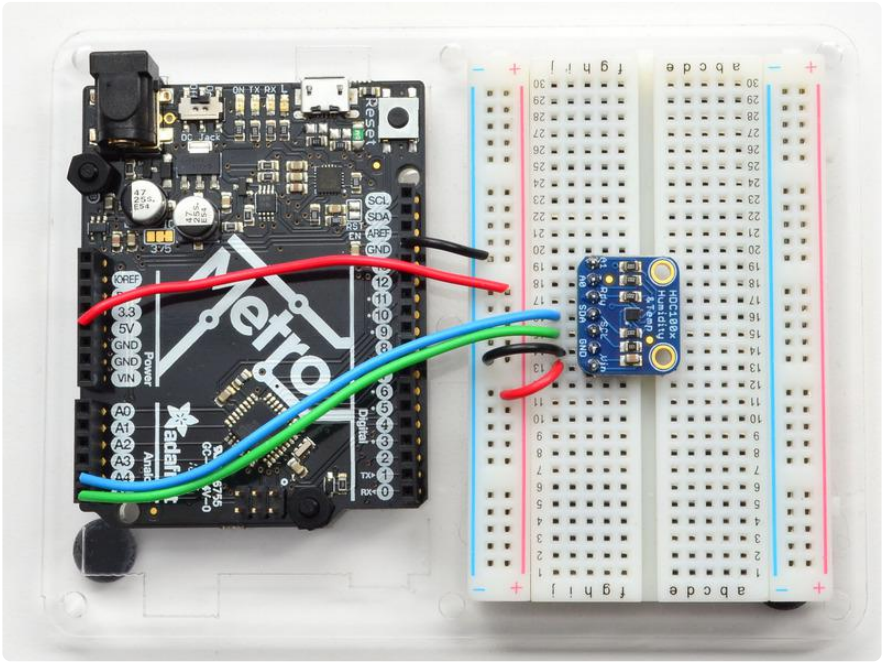
Wiring & Test

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!



- 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

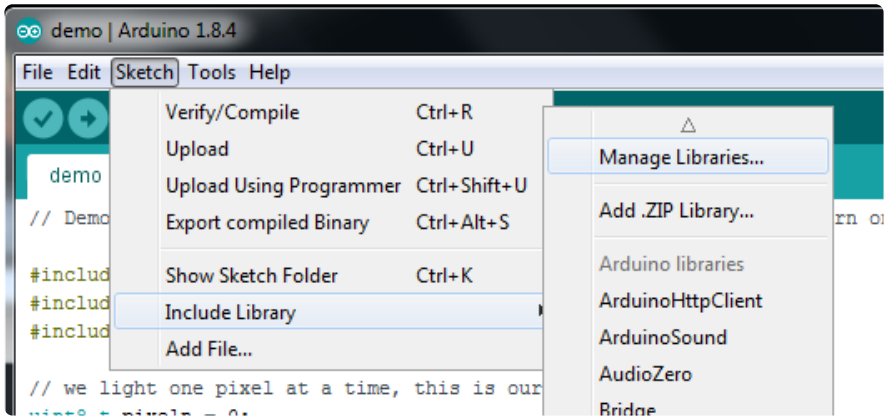
- Connect the SDA pin to the I2C data SDA pin on your Arduino. On an UNO & '328 based Arduino, this is also known as A4, on a Mega it is also known as digital 20 and on a Leonardo/Micro, digital 2

The HDC1008 has a default I2C address of 0x40

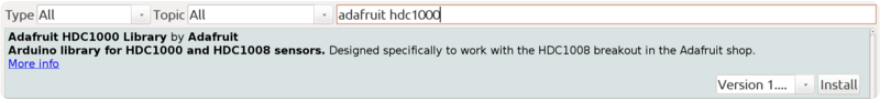
Download Adafruit_HDC1000

To begin reading sensor data, you will need to download Adafruit_HDC1000 library from the Arduino library manager.

Open up the Arduino library manager:



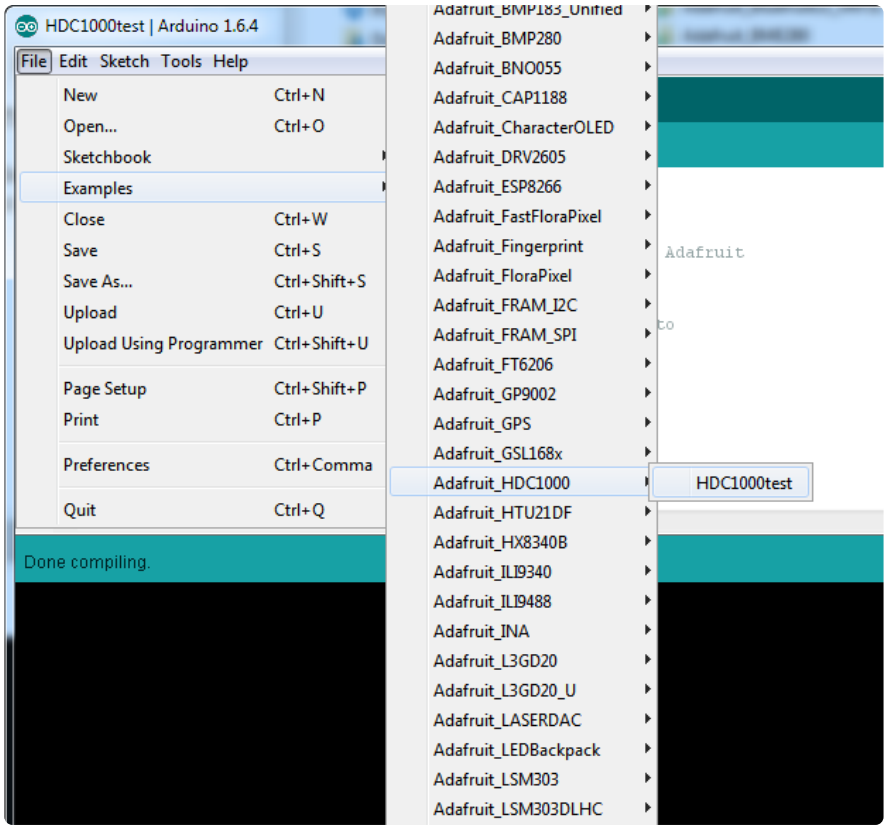
Search for the Adafruit HDC1000 library and install it



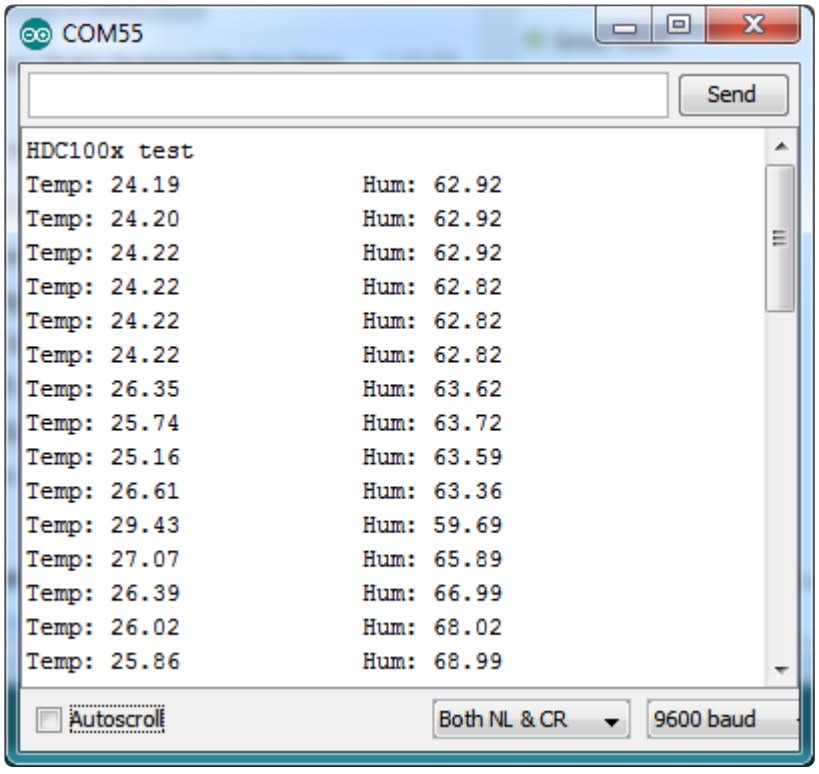
We also have a great tutorial on Arduino library installation at: http://learn.adafruit.com/adafruit-all-about-arduino-libraries-install-use ()

Load Demo

Open up File->Examples->Adafruit_HDC1000->HDC1000test and upload to your Arduino wired up to the sensor



Thats it! Now open up the serial terminal window at 9600 speed to begin the test.



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Library Reference

The library we have is simple and easy to use

You can create the Adafruit_HDC1000 object with:

```
Adafruit_HDC1000 hdc = Adafruit_HDC1000()
```

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

Then initialize the sensor with:

```
hdc.begin()
```

if you aren't using the default 0x40 i2c address, you can pass in the i2c address to be gin to have it use that one instead.

```
hdc.begin(0x42)
```

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

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

```
hdc.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

```
hdc.readHumidity()
```

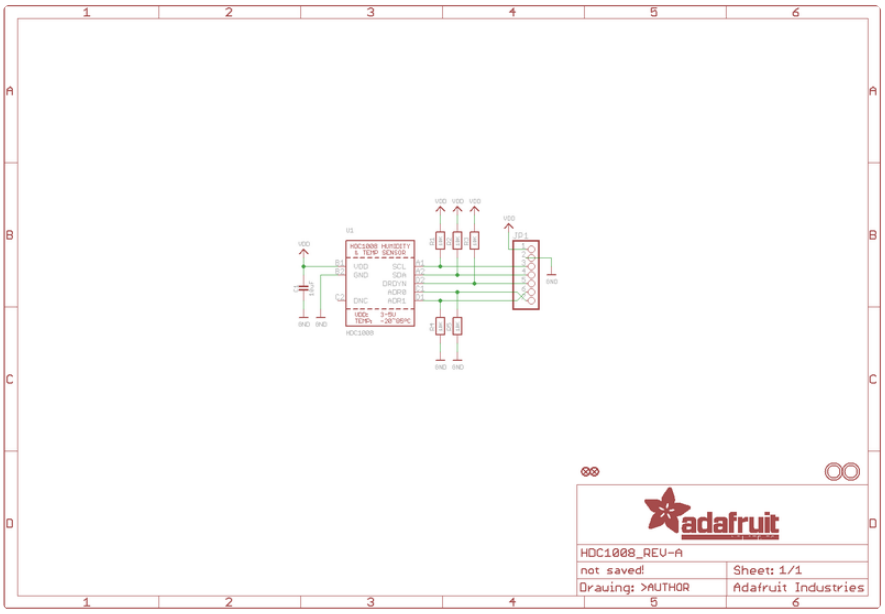
to read the humidity also as a floating point value between 0 and 100 (this reads % humidity)

Downloads

Files

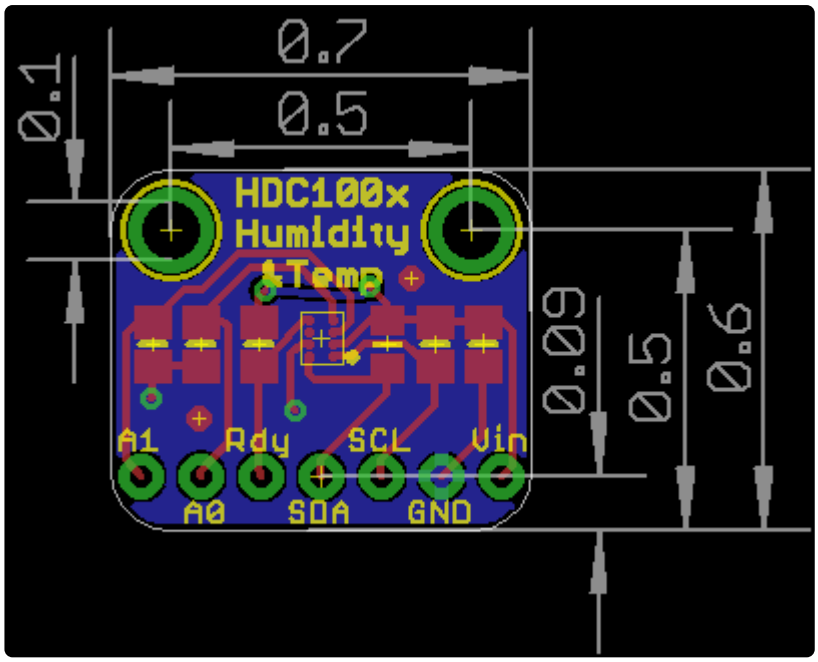
- Datasheet for the HDC1008 sensor on the breakout ()
- Arduino driver Library ()
- EagleCAD PCB files on GitHub ()
- Fritzing object in the Adafruit Fritzing Library ()

Schematics



PCB Print

Dimensions in Inches!


0.7
0.5
0.1
HDC100x
Humidity
+Temp
0.09
0.5
0.6
A1
Rdy
SCL
Vin
A0
SDA
GND