Make your own network attached weather center

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Basic idea is to read sensor data (weather data) using microcontroller (in this project Atmega 328 (Arduino Uno) and display it in web browser, networking is done by Onion omega (omega2+) embedded linux.

following parts are use in this project

(a) Onion omega (Onion Omega2+) , (http://onion.io)

Figure 1 , Onion omega2+

onion omega2+ module has embedded linux out of box, for introduction to omega2+ module ,

please visit https://www.sparkfun.com/products/14431

(b) Adafruit BME680 sensor (outputs , temperate , pressure , humidity , air quality)

(https://www.adafruit.com/product/3660)

there are two versions of BME680 from Adafruit, the one shown below is earlier version

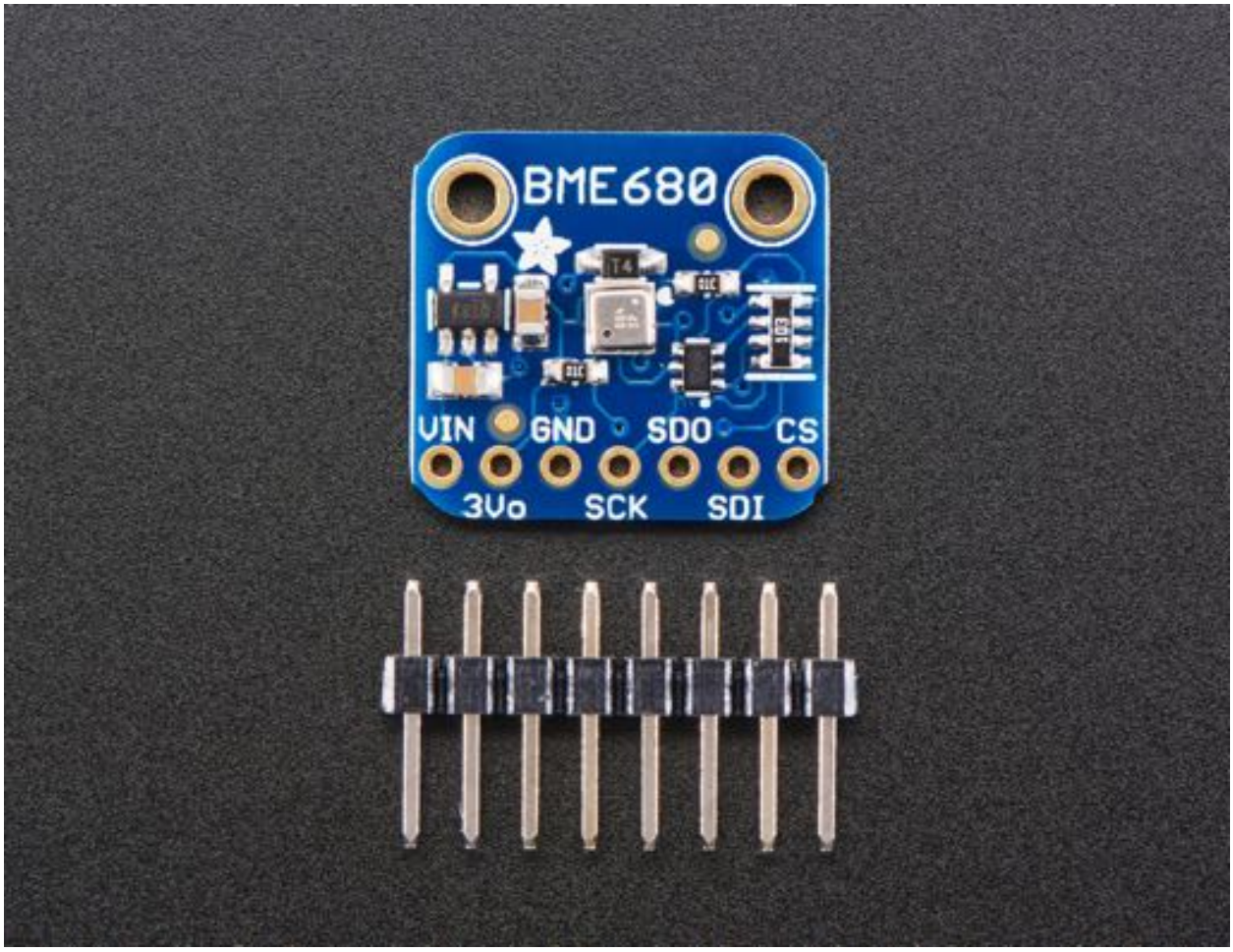


Figure 2 , BME680 older version

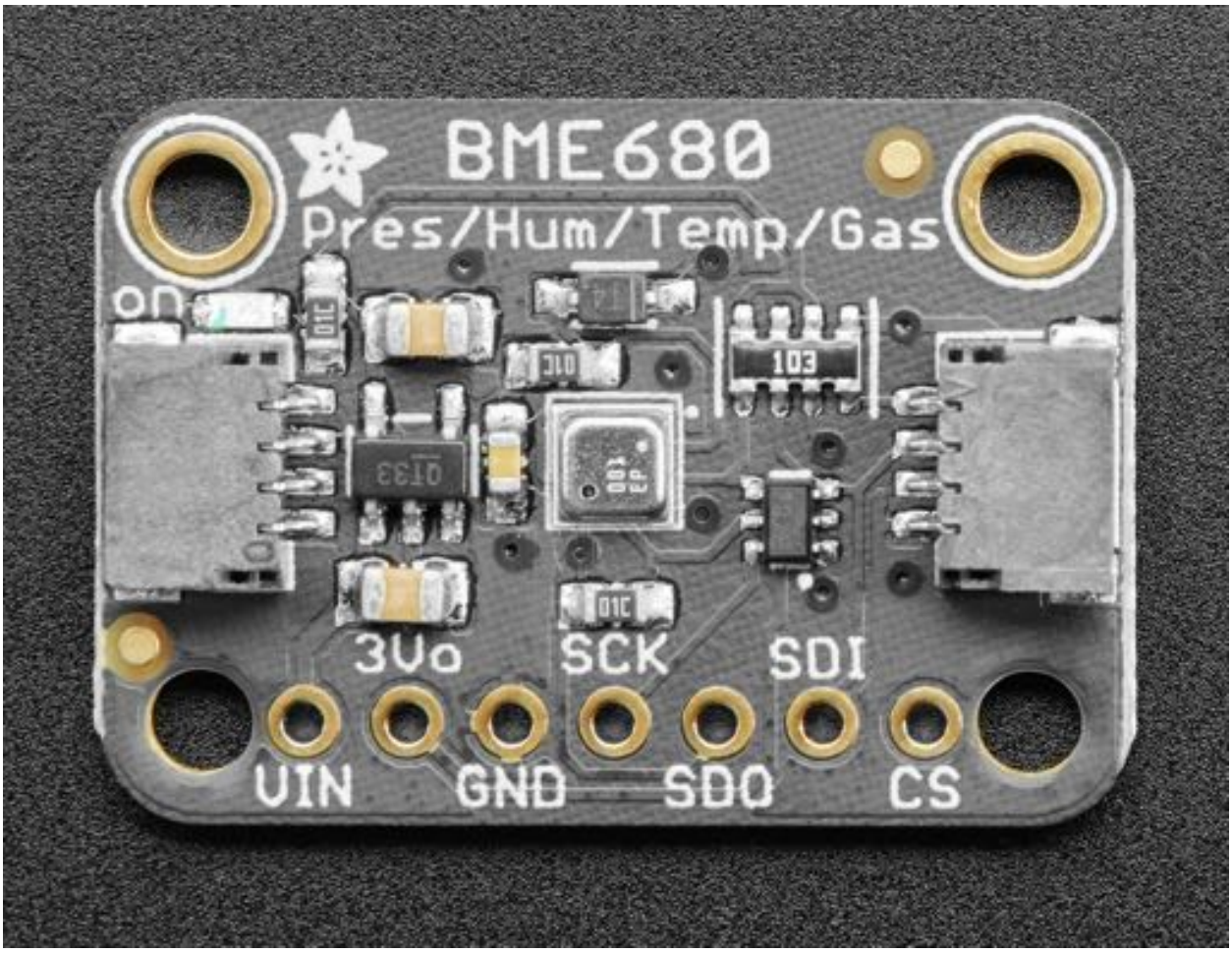


Figure- 3 BME680 newer STEMMA QT Version

same code will work on both,

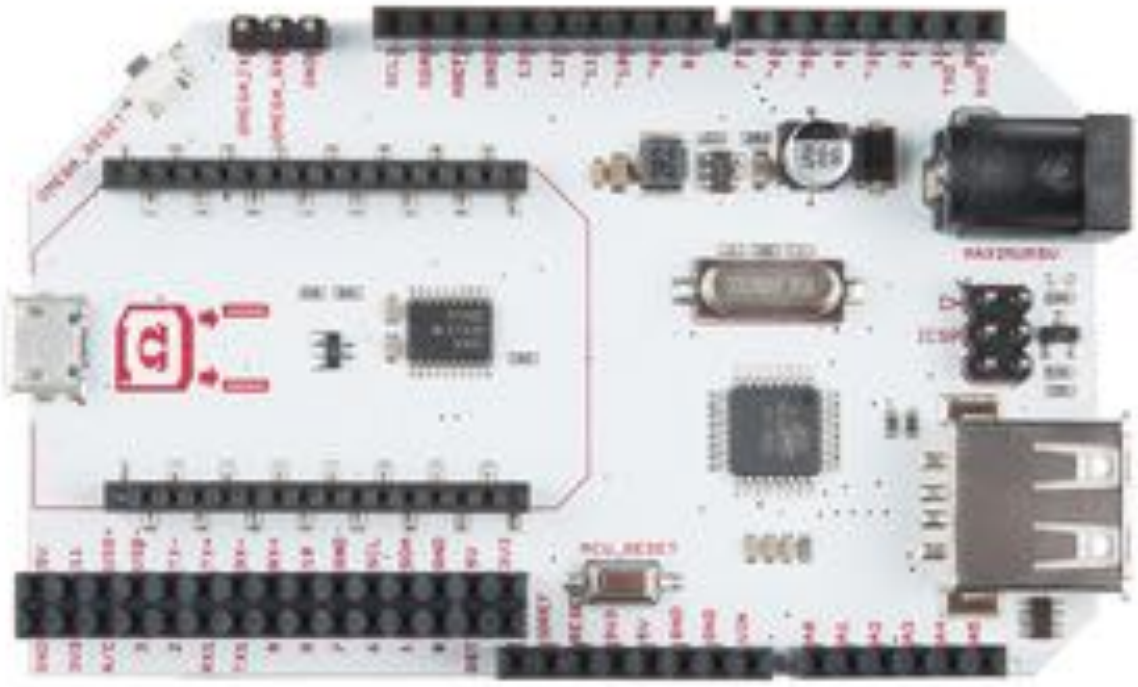
solder pins on BME680

(c) Onion omega Arduino dock (https://www.sparkfun.com/products/14438)

Onion omega Arduino dock has a Atmega 328 , serial port of Atmega328 is connected to serial port one of onion omega.

Figure :- 4 Onion Omega Arduino dock

Figure :- 5 Arduino dock another view

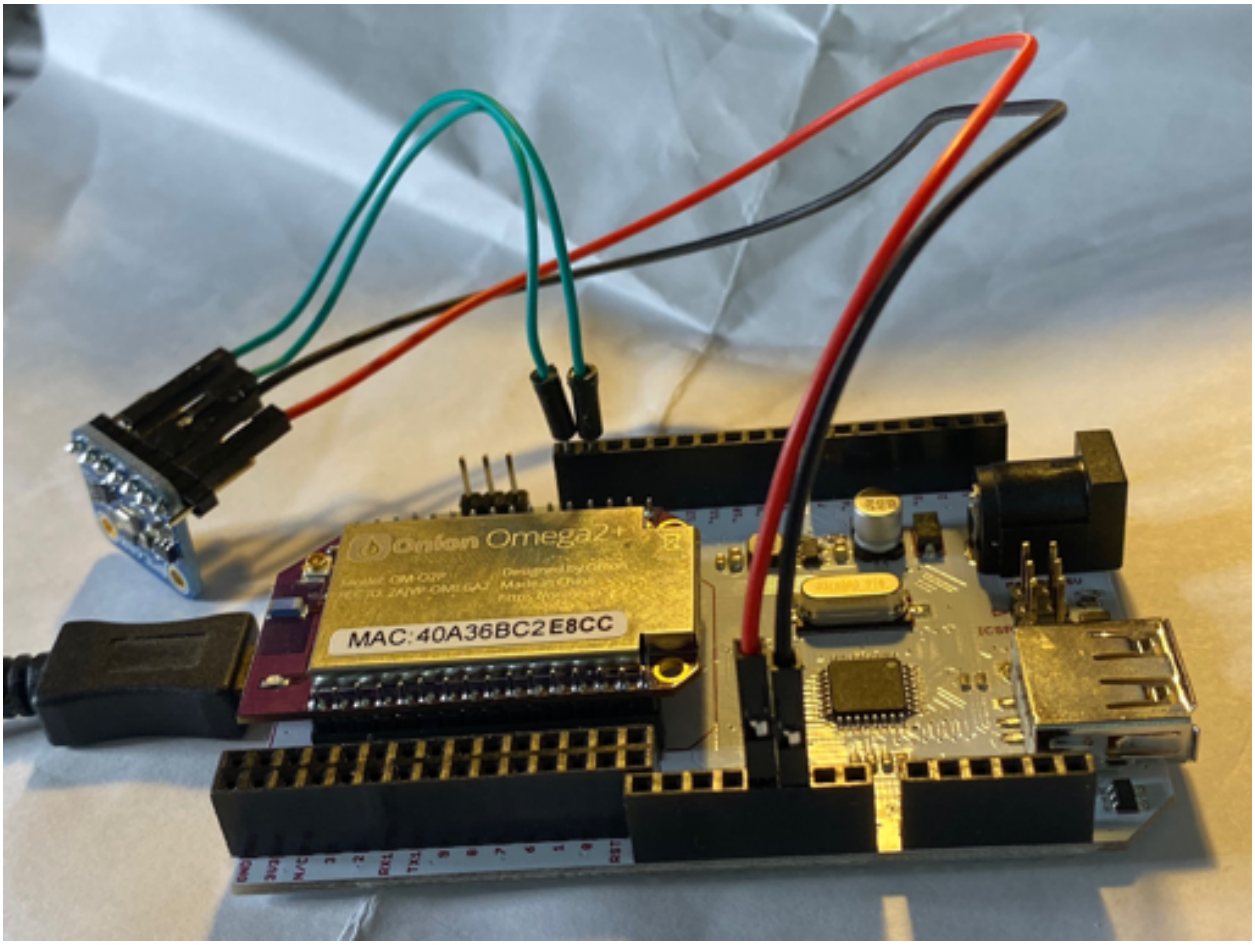


(d) jumper wires (https://www.sparkfun.com/products/12794)

connect 5v of Arduino dock to VIN of BME680 and GND of Arduino dock to GND of BME680, connect SCK of BME680 to SCL of Arduino dock and then connect SDA of Arduino dock to SDI of BME680.

Here is picture of Onion omega2+ installed on onion omega Arduino dock , also BME680 is connected to Atmega328 pins using four jumper wires

Figure :- 6 complete hardware setup

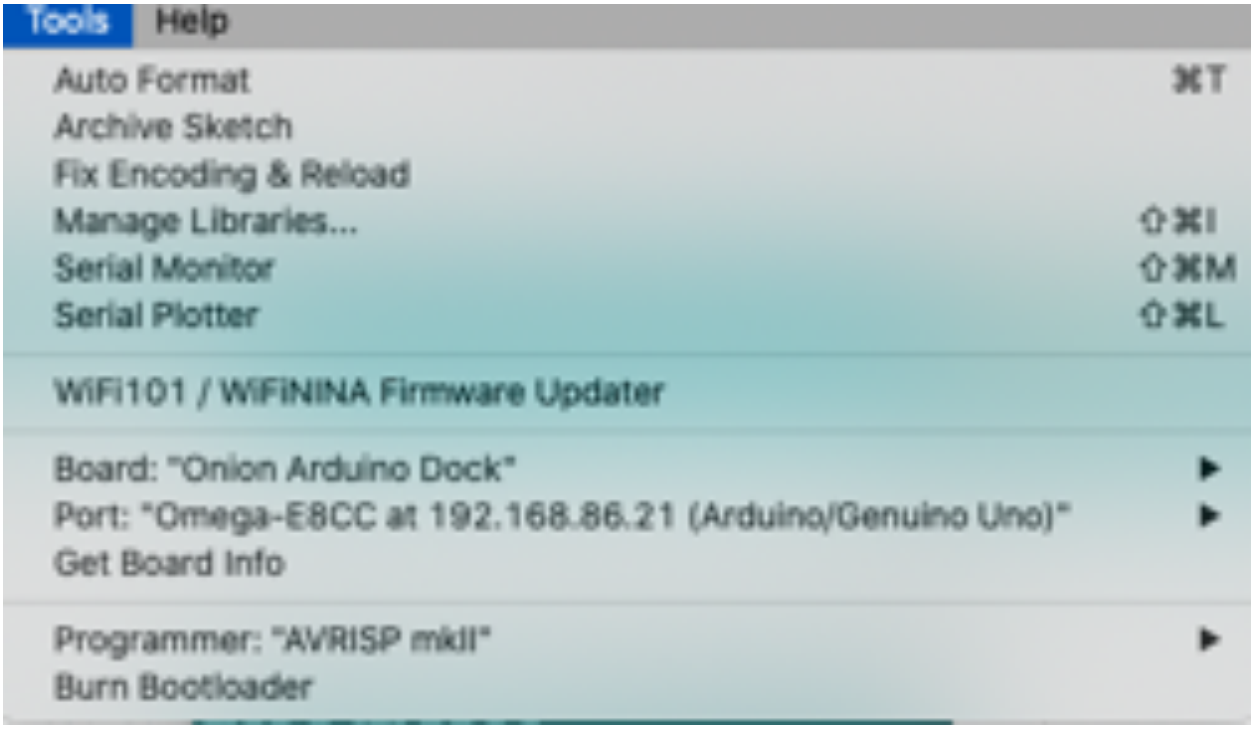


install Arduino package for Onion omega2+ (Please see https://docs.onion.io/omega2-docs/flash-arduino-dock-wirelessly.html)

install Adafruit BME680 library into Arduino IDE (for detail see https://learn.adafruit.com/adafruit-bme680-humidity-temperature-barometic-pressure-voc-gas?view=all#arduino-wiring-test)

After installation in examples section, open up Arduino sketch/program bmp680test and choose onion Arduino dock in Arduino IDE Tools menu, (please see picture below) also choose port in tools menu to Omega-XXXX at ip-address , Omega-XXXX will vary in your case, in my setup it is E8CC (Mac address of omega2+ module)

Figure :- 7 tools menu options to choose



if you do not install Arduino dock support in onion omega embedded Linux, then port will not appear in Arduino IDE tools menu.

click on upload button in Arduino IDE and code will be flashed to Atmega328 in Arduino dock.

to view weather data use following command on onion omega embedded linux

cat /dev/ttyS1 9600

and you'll see following

```
Temperature = 26.55 *C

Pressure = 996.51 hPa

Humidity = 50.67 %

Gas = 379.22 KOhms

Approx. Altitude = 140.32 m
```

Here are steps to get this weather data displayed in web browser (to install uhttp support in onion omega2+ module) please visit https://docs.onion.io/omega2-docs/installing-and-using-php.html,

once php is installed create a file index.php in directory /www/php add the following content

```
<?php
$output = shell_exec('head -n 12 /dev/ttyS1');
echo "<pre>$output</pre>";
?>
```

use a browser and navigate to URL http://omega-XXXX.local/php/index.php , in my case for example XXXX is (http://omega-e8cc.local/php/index.php) , it will be (XXXX) different in your setup

here is picture of output in chrome web browser

Figure :– 8 weather data in chrome browser

or see below

Figure :– 9 weather data in chrome browser zoomed in

coming up, wireless sensor for gathering weather data in field (outside of home), this setup displays weather data in a room.