

Device to Database

ITP Spring 2019 - Week 1

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Syllabus <http://bit.ly/itp-d2d>

What is IoT?



Internet of Shit

@internetofshit

Following

why doesn't it just close the door itself if it's so smart



The Verge ✅ @verge

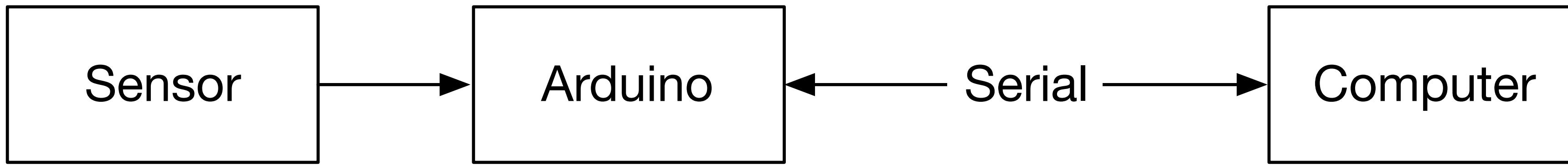
Samsung's new fridge will ping your phone if you leave the door open theverge.com/2019/1/7/18169...

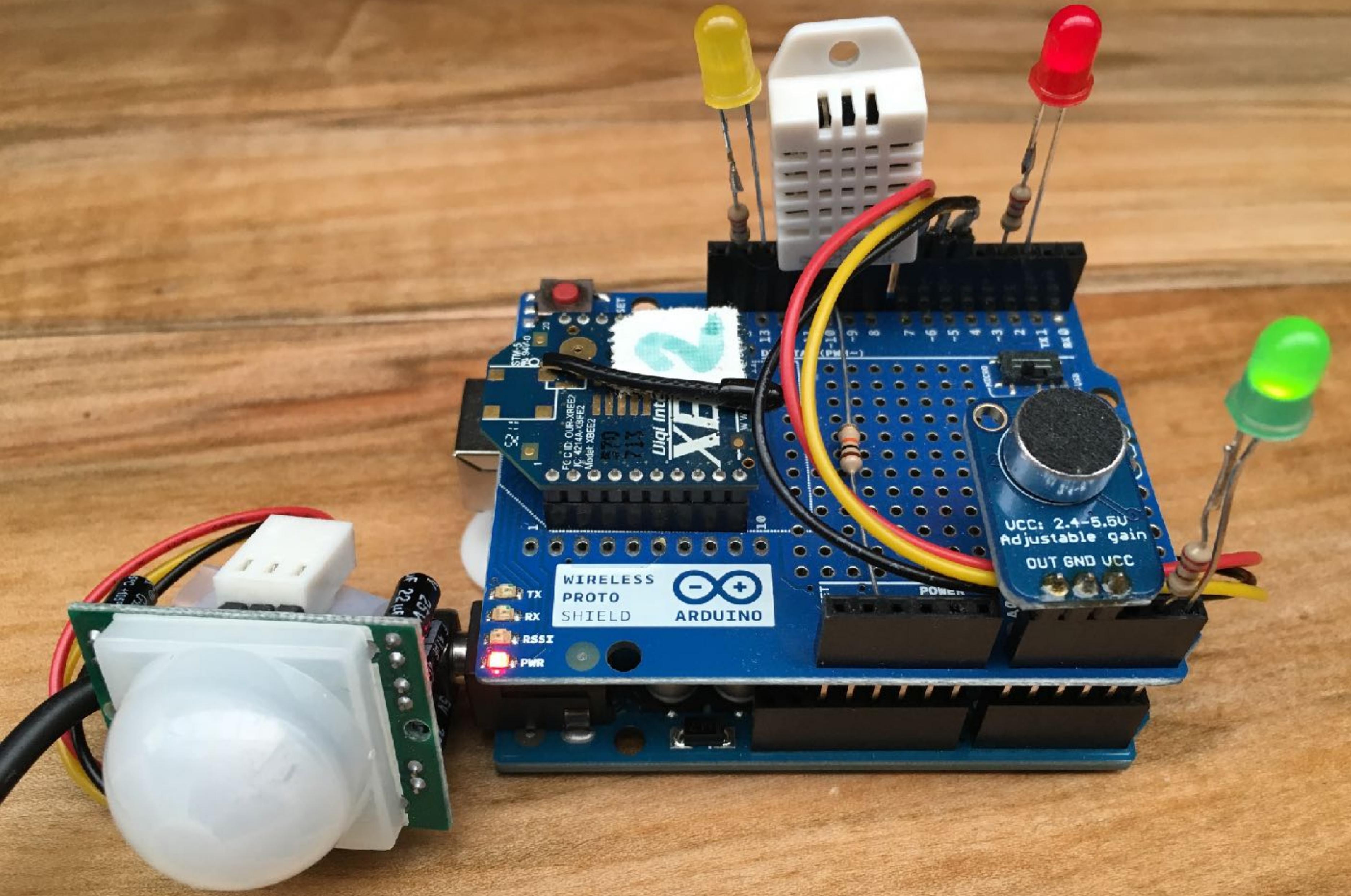
4:42 PM - 13 Jan 2019

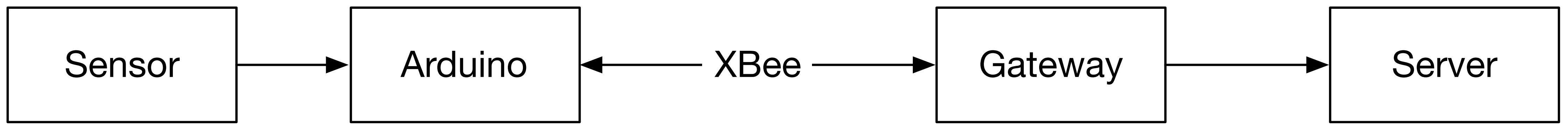
39,431 Retweets 107,047 Likes



Transport







Solution

BITS MONITOR				
ROOM STATUS				
Malvern	Paoli	Berwyn	Radnor	Cafe
75.92	77.00	73.58	74.30	77.72
8	3	6	4	6
30th Street	Strafford	Studio	Device Bar	Merion
72.14	67.82	74.48	77.90	75.02
3	12	6	7	5

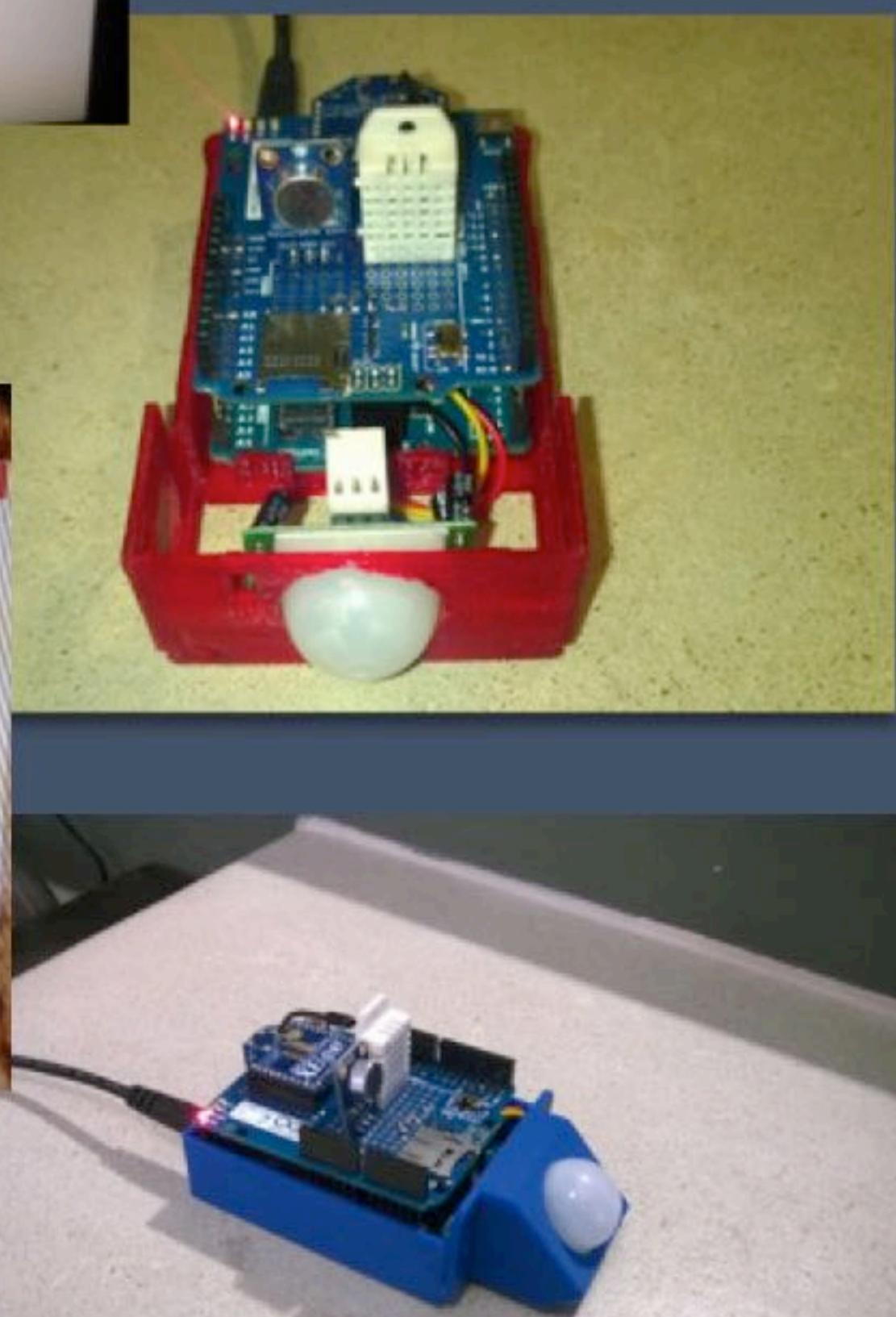
RAW ROOM DATA					
Name	Motion	Humidity	Temperature F	Sound	Captured
4	0	11.10	74.12	5	2015-03-24T21:45:05.2008678-04:00
11	0	12.20	75.02	6	2015-03-24T21:45:04.8966528-04:00

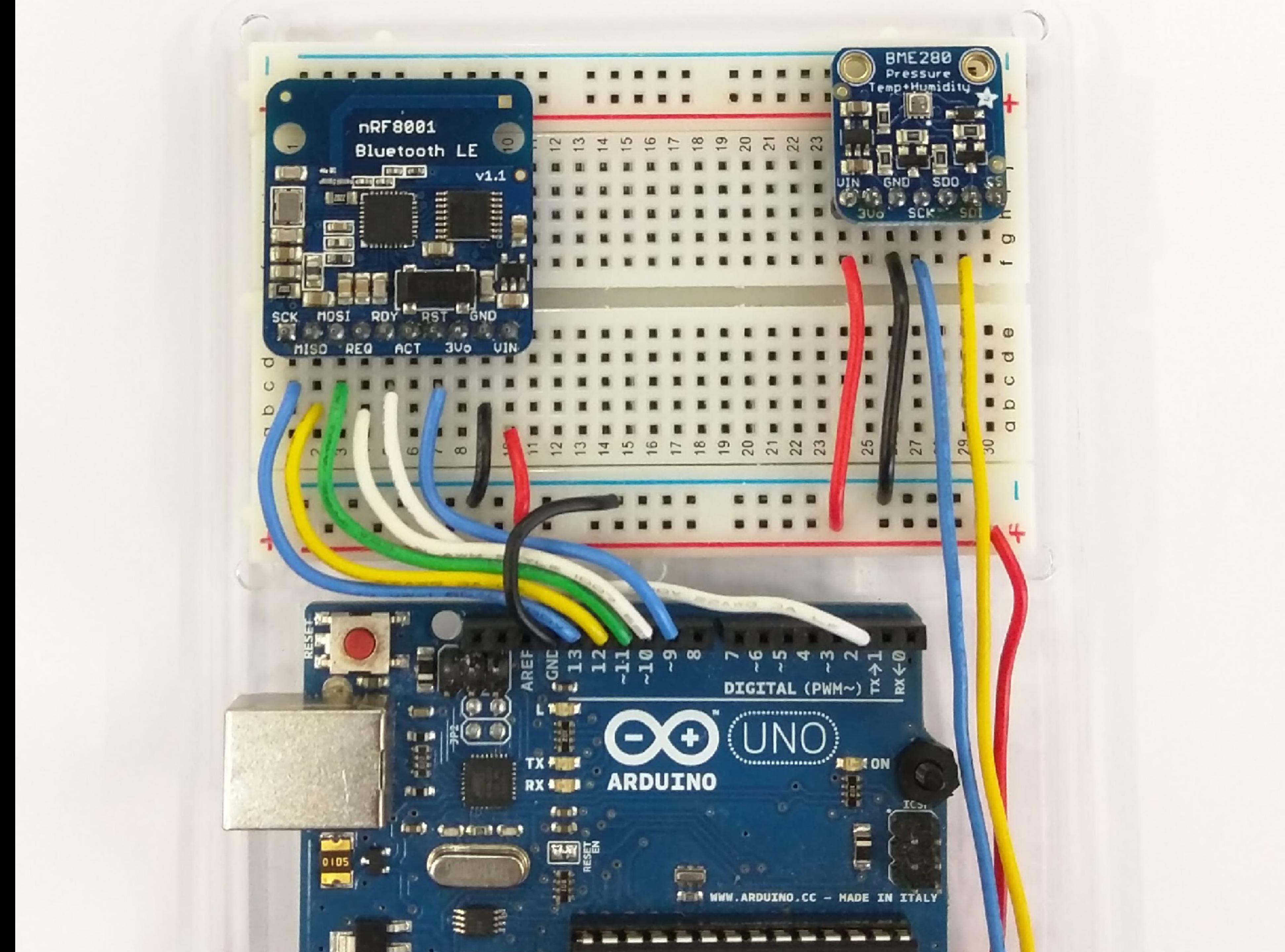


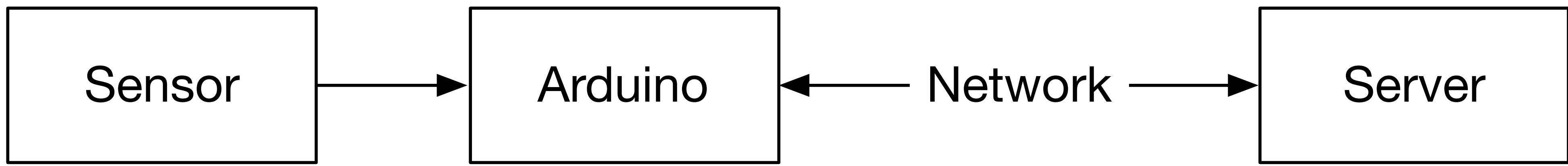
The image shows a computer monitor displaying a web application titled "BITS MONITOR". The main content area contains several performance metrics represented as colored boxes. Most boxes are red, indicating a state of concern or error. One box is green, indicating a normal or healthy state. The values displayed are: 77.00, 73.22, 73.76, 76.64, 76.28, 70.34, 72.68, 75.74, and 75.02. The background of the application has a blurred gradient effect transitioning from blue to yellow.

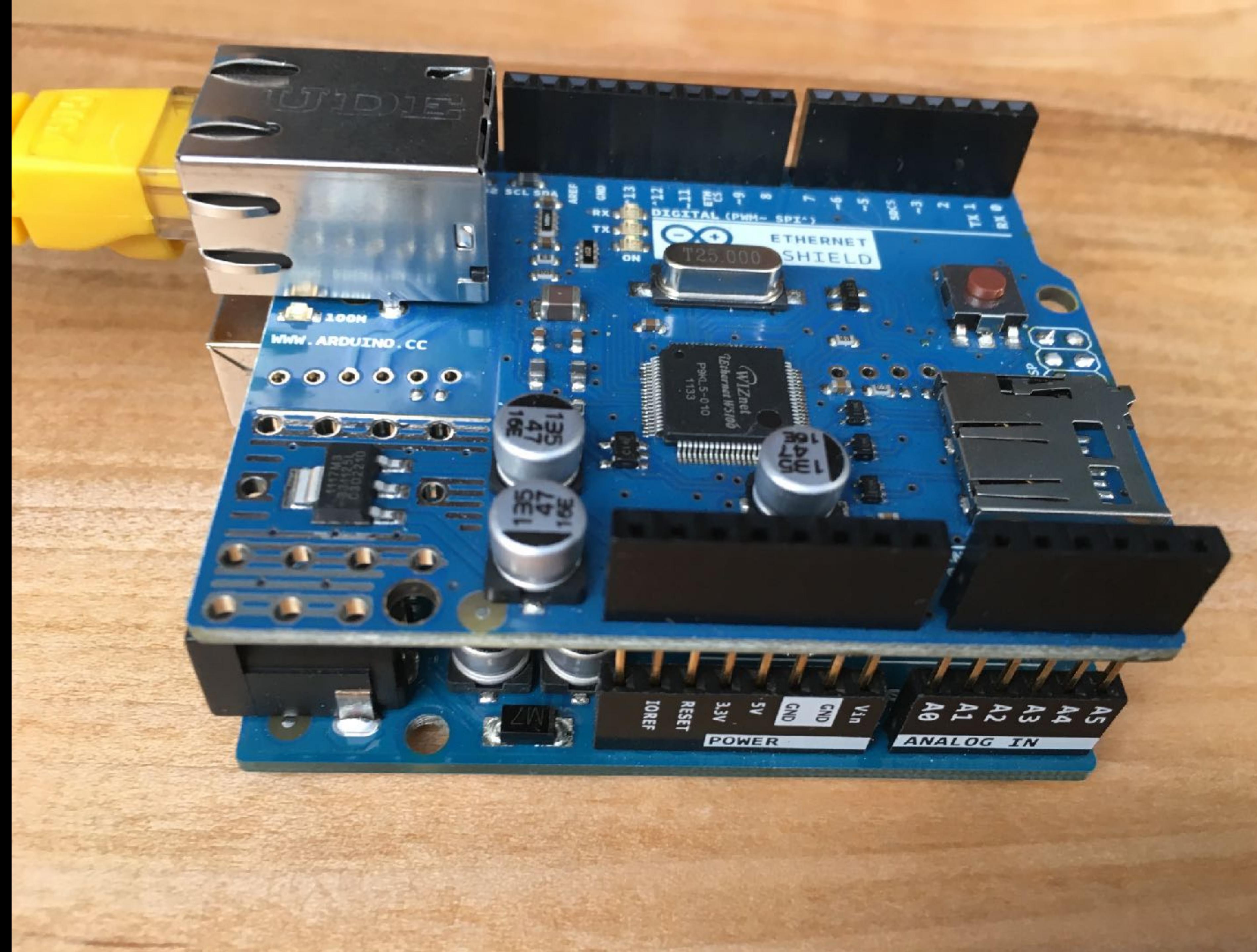
BigBrotherGateway

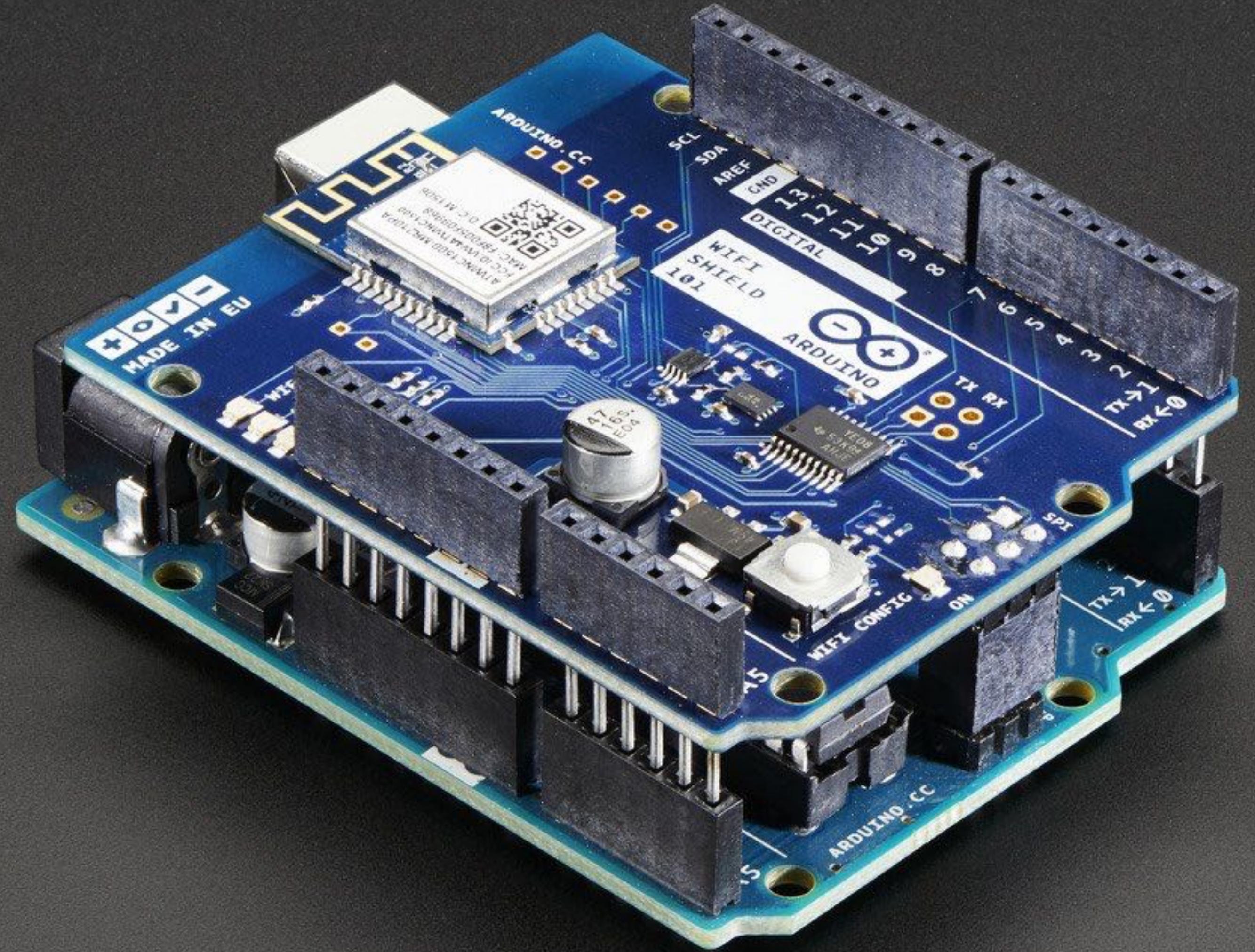
```
Payload:{"Unit":"6","Motion":0,"Humidity":43.20,"TemperatureF":78.16,"Soun  
Payload:{"Unit":10,"Motion":0,"Humidity":35.40,"TemperatureF":76.18,"Soun  
Payload:{"Unit":2,"Motion":0,"Humidity":43.00,"TemperatureF":72.14,"Soun  
Payload:{"Unit":1,"Motion":0,"Humidity":37.60,"TemperatureF":76.64,"Soun  
Payload:{"Unit":9,"Motion":0,"Humidity":48.30,"TemperatureF":72.86,"Soun  
Payload:{"Unit":5,"Motion":0,"Humidity":37.20,"TemperatureF":76.46,"Soun  
Payload:{"Unit":11,"Motion":0,"Humidity":33.80,"TemperatureF":75.56,"Soun  
Payload:{"Unit":7,"Motion":0,"Humidity":36.80,"TemperatureF":76.28,"Soun  
Payload:{"Unit":4,"Motion":0,"Humidity":37.80,"TemperatureF":73.76,"Soun  
Payload:{"Unit":8,"Motion":0,"Humidity":43.20,"TemperatureF":78.16,"Soun  
Payload:{"Unit":10,"Motion":0,"Humidity":35.40,"TemperatureF":76.18,"Soun  
Payload:{"Unit":2,"Motion":0,"Humidity":43.00,"TemperatureF":72.14,"Soun  
Payload:{"Unit":1,"Motion":0,"Humidity":37.60,"TemperatureF":76.64,"Soun  
Payload:{"Unit":9,"Motion":0,"Humidity":48.30,"TemperatureF":72.86,"Soun  
Payload:{"Unit":5,"Motion":0,"Humidity":37.20,"TemperatureF":76.46,"Soun  
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Payload:{"Unit":8,"Motion":0,"Humidity":43.30,"TemperatureF":78.16,"Soun  
Payload:{"Unit":10,"Motion":0,"Humidity":35.40,"TemperatureF":76.28,"Soun  
Payload:{"Unit":2,"Motion":0,"Humidity":43.00,"TemperatureF":72.14,"Soun  
Payload:{"Unit":1,"Motion":0,"Humidity":37.60,"TemperatureF":76.64,"Soun  
Payload:{"Unit":9,"Motion":0,"Humidity":48.30,"TemperatureF":72.86,"Soun  
Payload:{"Unit":5,"Motion":0,"Humidity":37.20,"TemperatureF":76.46,"Soun
```







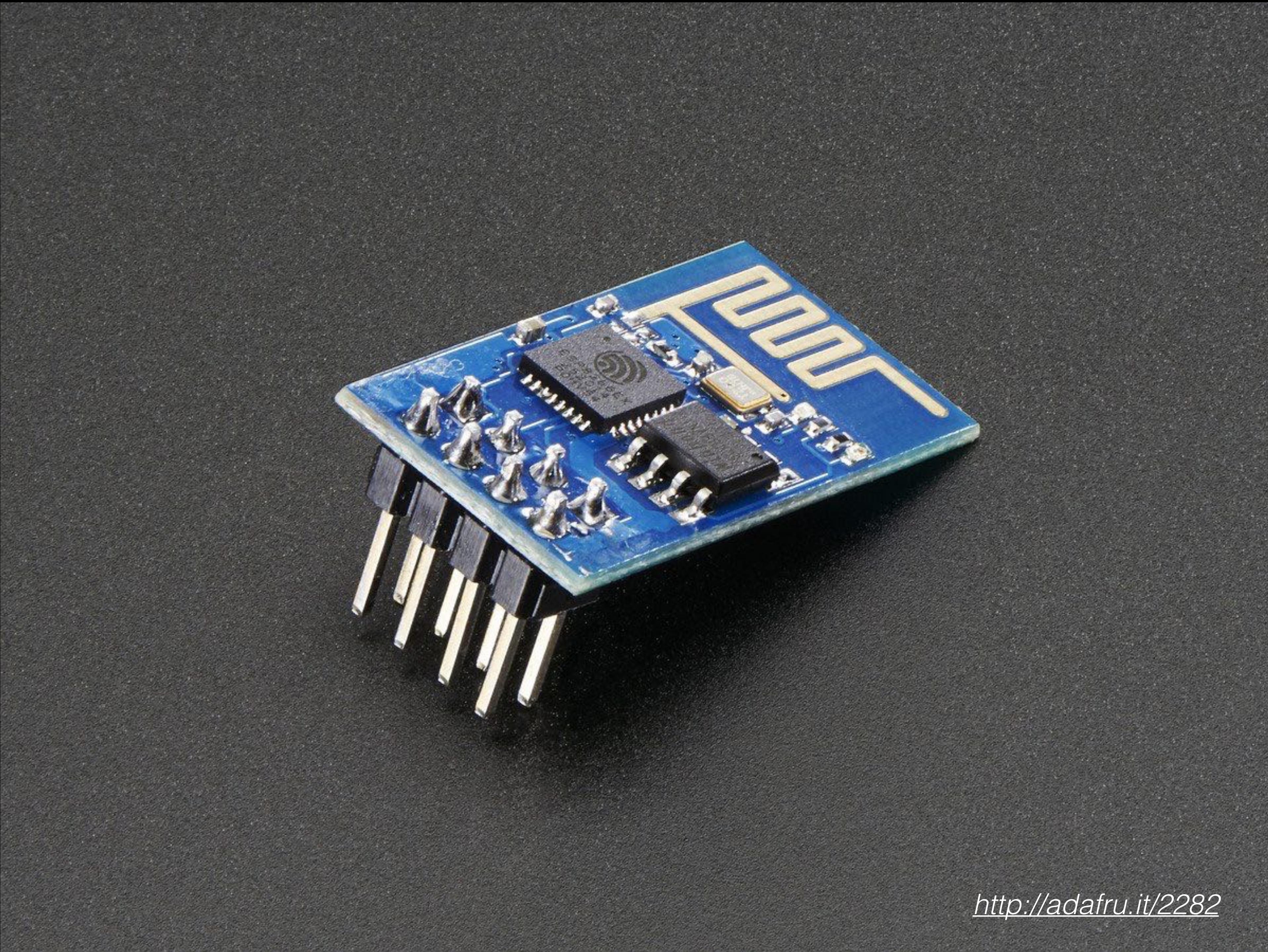




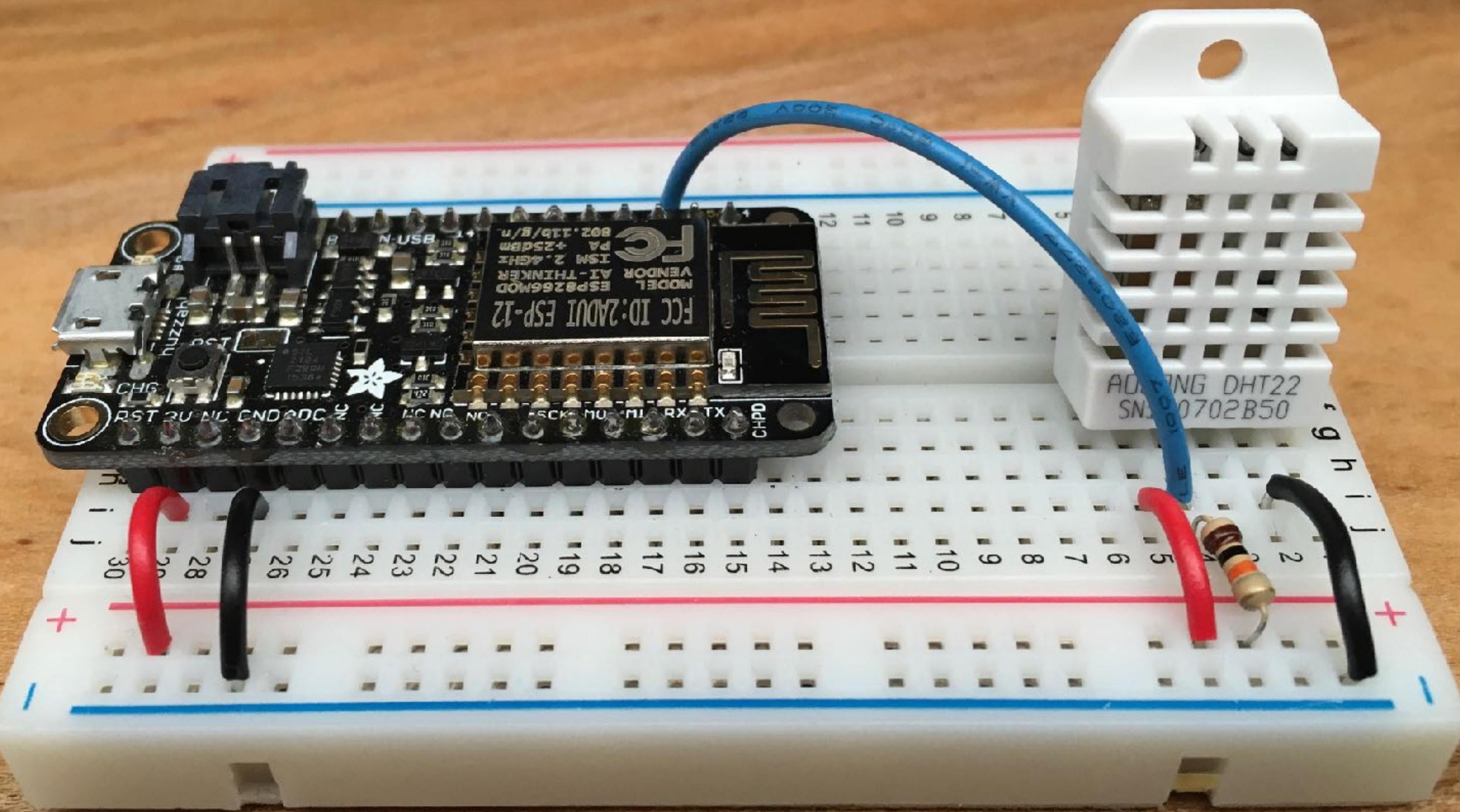
<http://adafru.it/2891>



<http://adafru.it/3055>



<http://adafru.it/2282>



THE ARDUINO MKR FAMILY



MKR 1000



MKR FOX1200



MKR WAN 1300



MKR GSM 1400



MKR NB 1500
(NB-IoT & CAT-M1)



MKR WIFI 1010



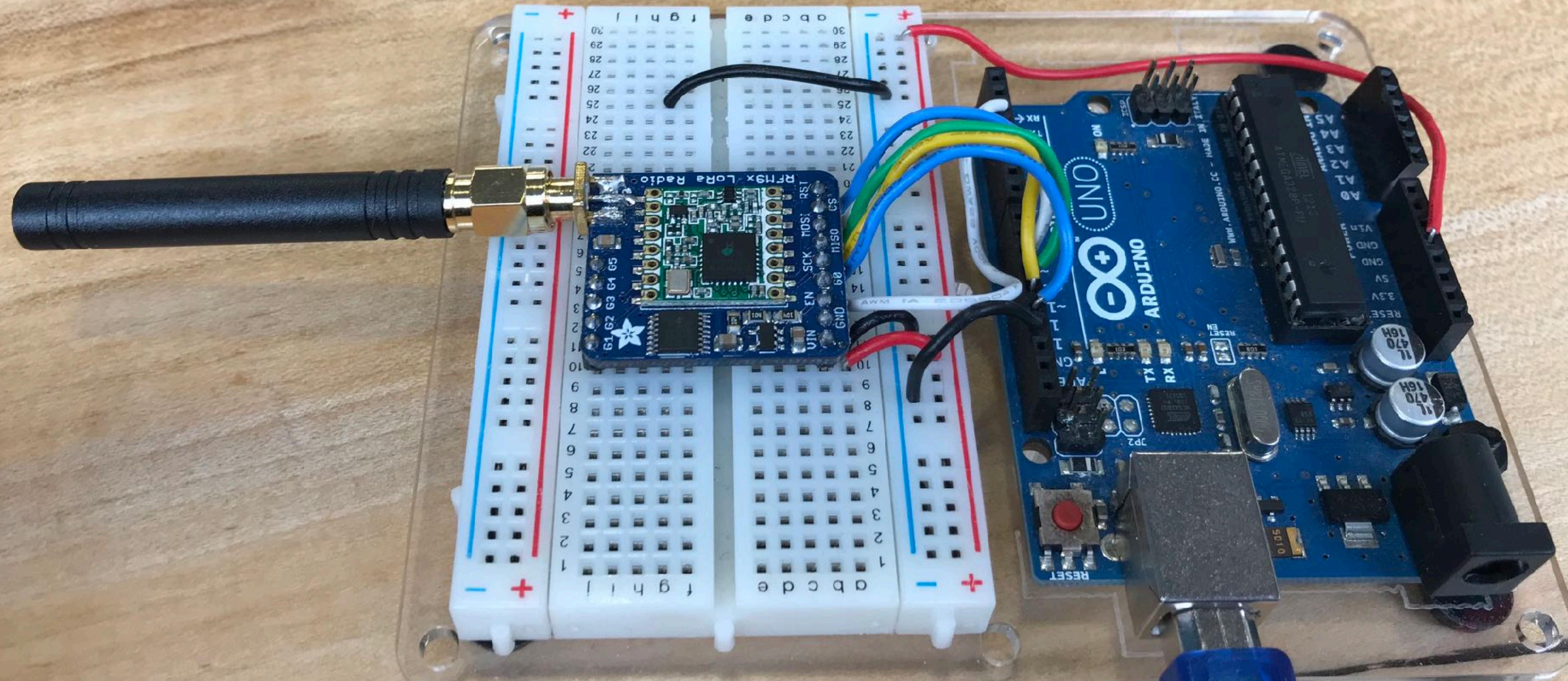
Long Range

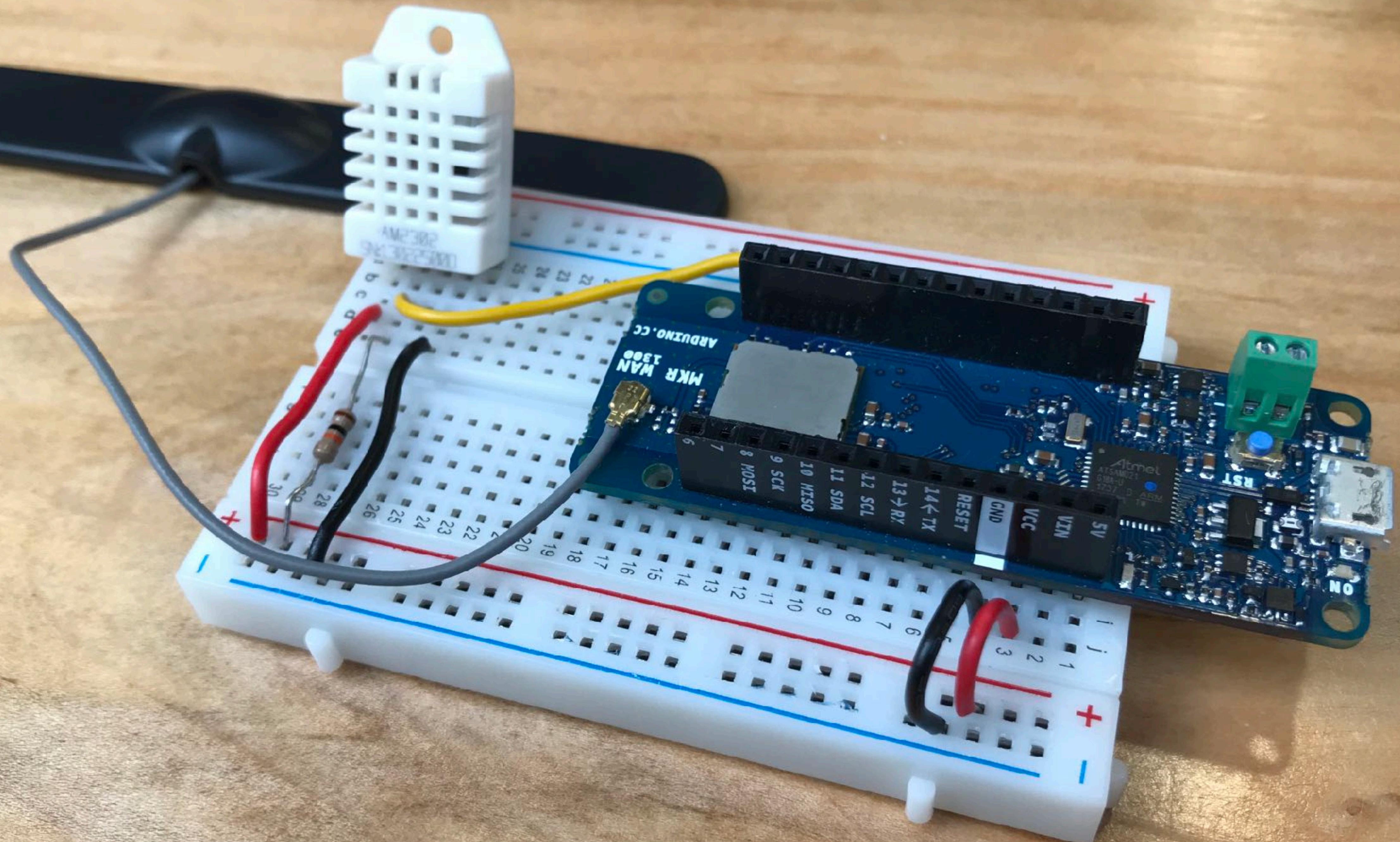


ISM Band

Industrial Scientific Medical (ISM)

**Long Range
Low Power
Low Cost
Secure
Low Bandwidth
Coverage Everywhere**





▲ 16:16:25 6 7 confirmed dev id: [mkrwan](#) payload: 01 67 00 F2 02 68 6B relative_humidity_2: 53.5 temperature_1: 24.2

Uplink

Payload

```
01 67 00 F2 02 68 6B
```

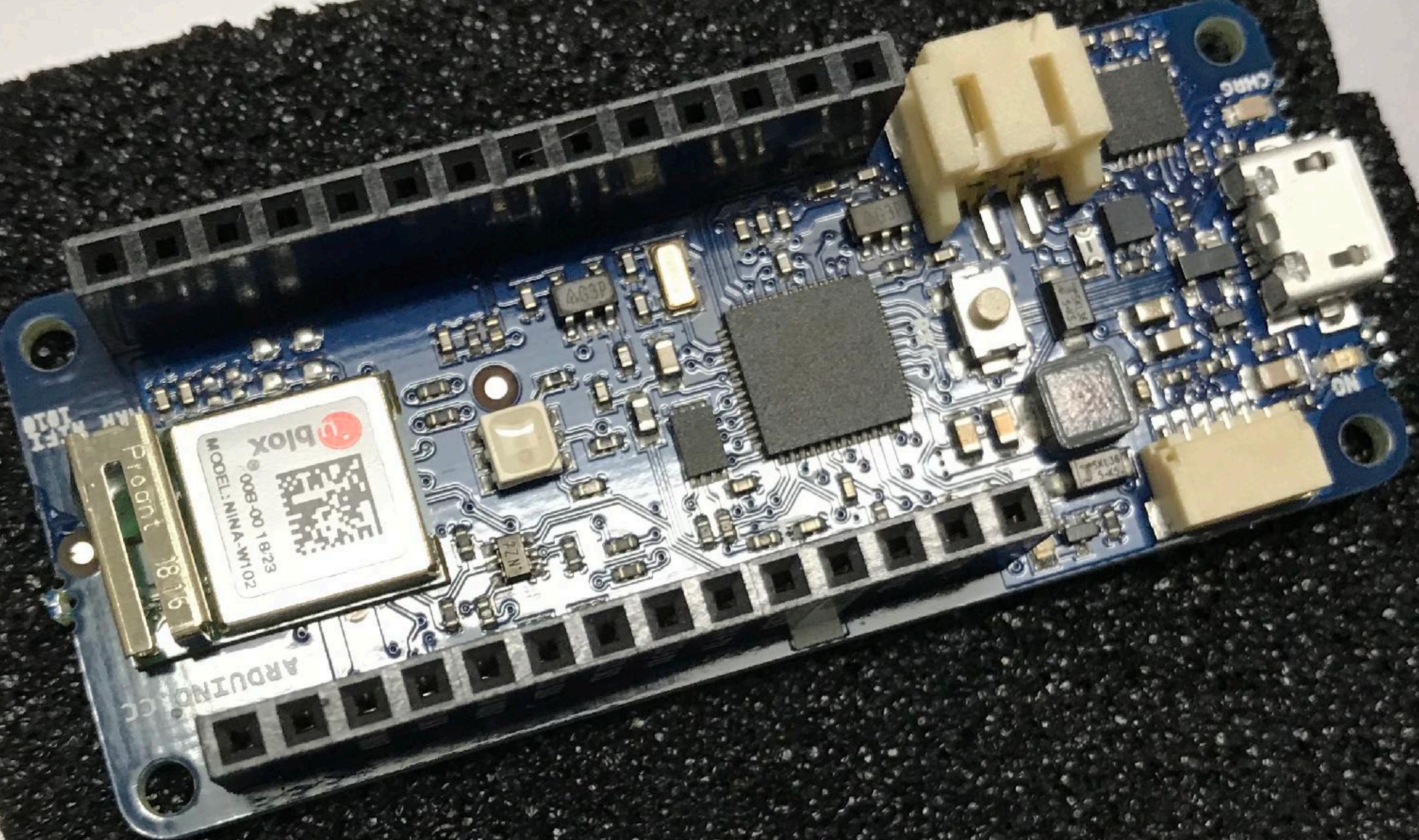


Fields

```
{
  "relative_humidity_2": 53.5,
  "temperature_1": 24.2
}
```

Metadata

```
{
  "time": "2018-09-18T20:16:25.740969564Z",
  "frequency": 905.3,
  "modulation": "LORA",
  "data_rate": "SF10BW125",
  "coding_rate": "4/5",
  "gateways": [
    {
      "gtw_id": "ttn-ithaca-00-08-00-4a-3e-83",
      "location": "Ithaca, NY"
    }
  ]
}
```



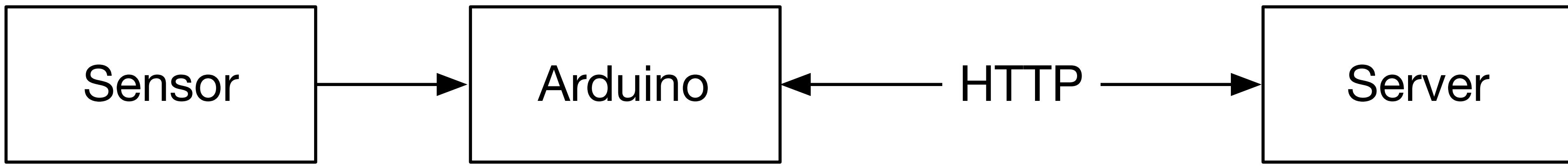
Protocols

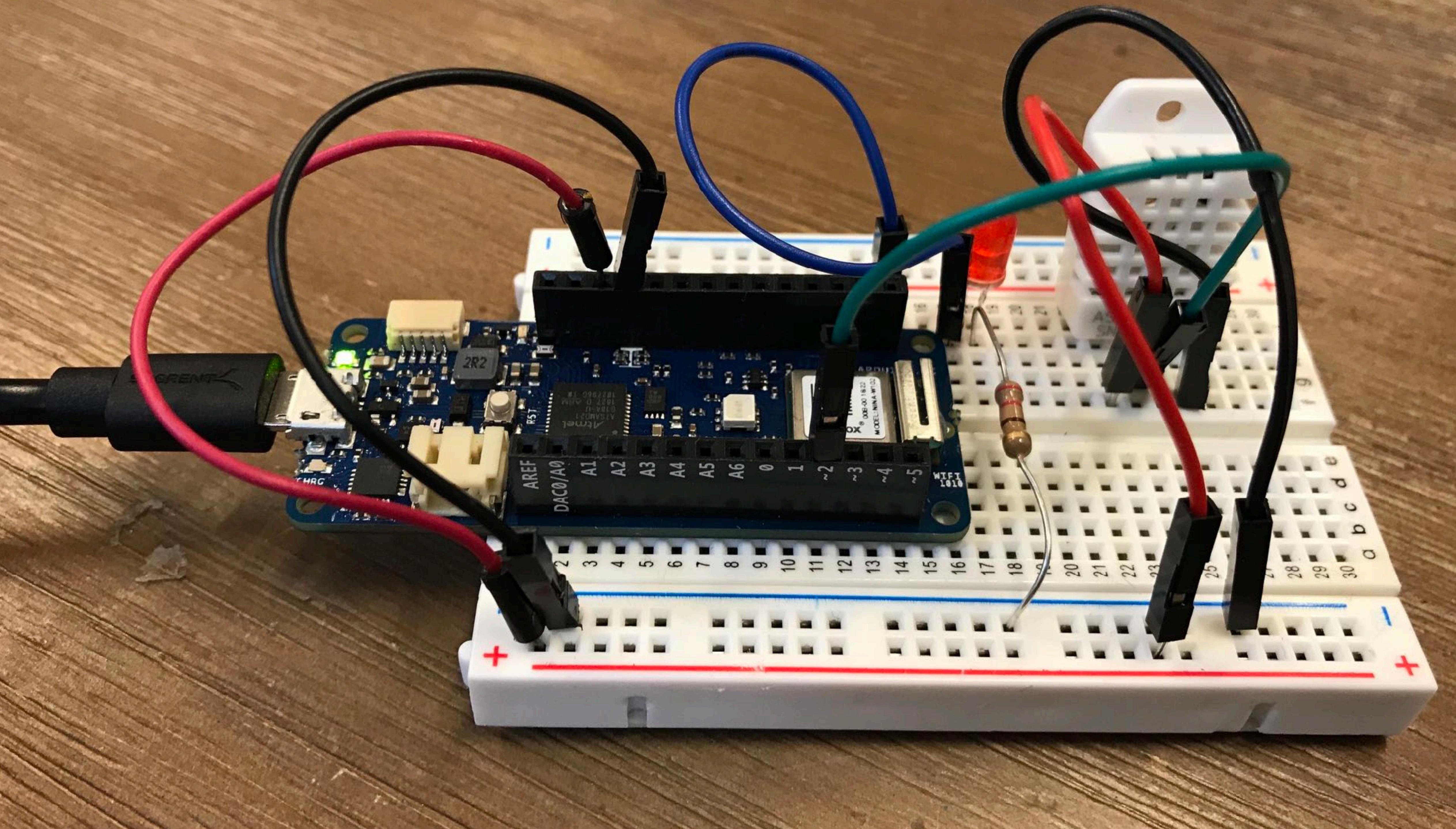
HTTP

CoAP

MQTT

Sending Data via HTTP





```
WiFi firmware version 1.0.0
Attempting to connect to SSID: workshop
Connected to WiFi
IP Address: 192.168.1.31
72.50°F 21.30% RH
making POST request
Status code: 200
Response: {"temperature":"72.50","humidity":"21.30","timeStamp":1548702273616,"remoteAddress":"174
Wait ten seconds
```

Autoscroll Show timestamp

Both NL & CR

9600 baud

Clear output

The screenshot shows a web-based code editor interface for a project titled "iot-data". The URL is <https://glitch.com/edit/#!/iot-data?path=server.js:39:0>. The main area displays the "server.js" file content, which is a Node.js application using Express to serve files and handle POST requests to log data. The sidebar on the left shows the project structure with files like assets, .env, README.md, data.json, package.json, and server.js.

```
const express = require('express');
const app = express();
const bodyParser = require("body-parser");
const fs = require('fs');

app.use(express.static('public'));
app.use(bodyParser.urlencoded({
  extended: true
}));
app.use(bodyParser.json());

app.get('/', function(request, response) {
  response.sendFile(__dirname + '/data/data.json');
});

app.post("/", function (request, response) {
  // post data
  let data = request.body;
  // add a timestamp
  let dt = new Date();
  data.timeStamp = dt.getTime();
  // add the remote address
  let remoteAddress = request.headers['x-forwarded-for'] || request.connection.remoteAddress;
  data.remoteAddress = remoteAddress;

  fs.appendFile(__dirname + '/data/data.json', JSON.stringify(data) + '\n', err => {
    if(err) { throw err };
    response.send(data);
  });
});
```



https://iot-data.glitch.me



https://iot-data.glitch.me

```
{"temperature": "73.04", "humidity": "20.80", "timestamp": 1548704353565}
{"temperature": "73.04", "humidity": "20.80", "timestamp": 1548704364677}
{"temperature": "73.22", "humidity": "20.90", "timestamp": 1548704375742}
{"message": "HELLO", "timestamp": 1548704379403}
{"temperature": "73.22", "humidity": "20.90", "timestamp": 1548704386815}
{"temperature": "73.04", "humidity": "20.80", "timestamp": 1548704397955}
```

Particle (formerly Spark) | E X

Don

https://www.particle.io

Particle

STORE BUILD DASHBOARD

Build your Internet of Things.

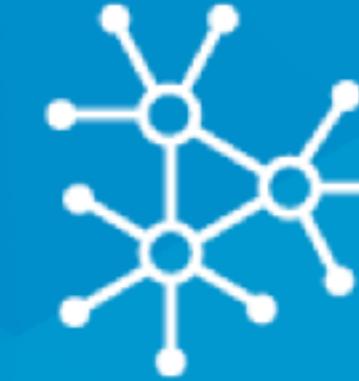
Particle is a prototype-to-production platform for developing an Internet of Things product.

GET STARTED WITH A DEV KIT



PROTOTYPE

Build a prototype in minutes with cloud-connected hardware development kits



SCALE

Go from a single prototype to millions of units with a cloud platform built to scale

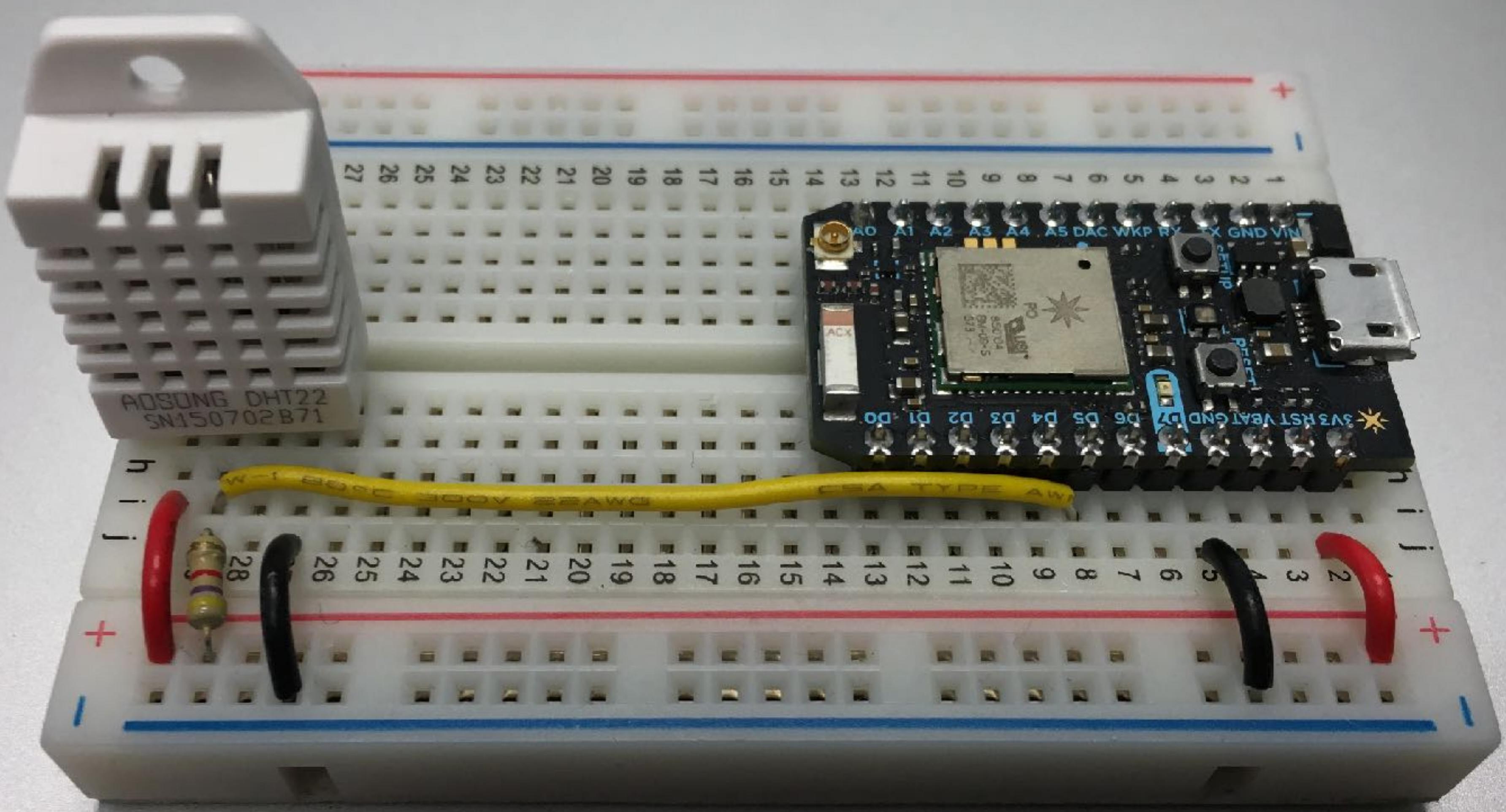


MANAGE

Manage your products in the field: deploy firmware, collect data, and more



GO MOBILE WITH 3G!

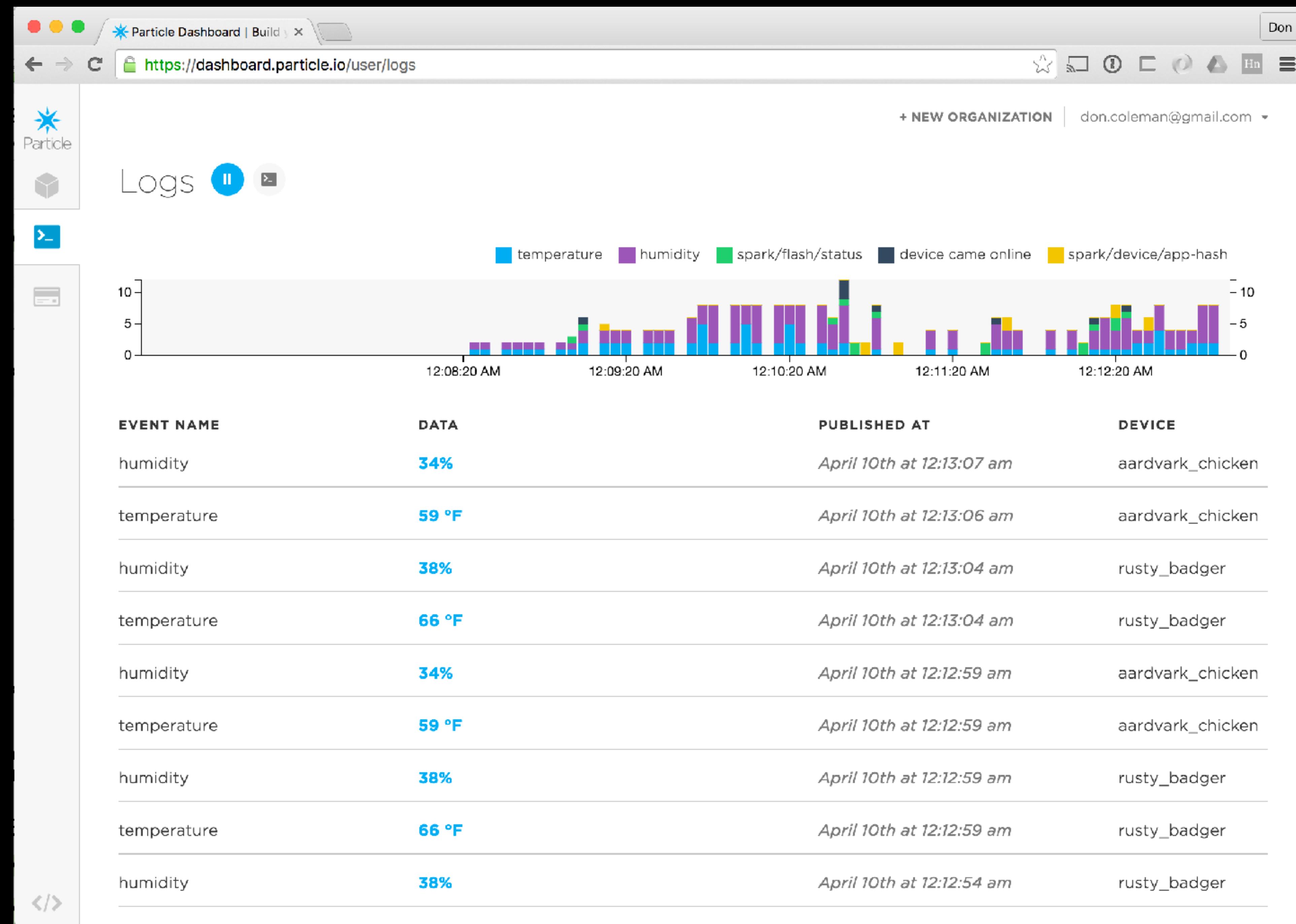


Particle Build

https://build.particle.io/build/56c92b531ad86c6543001040

dht-temperature.ino

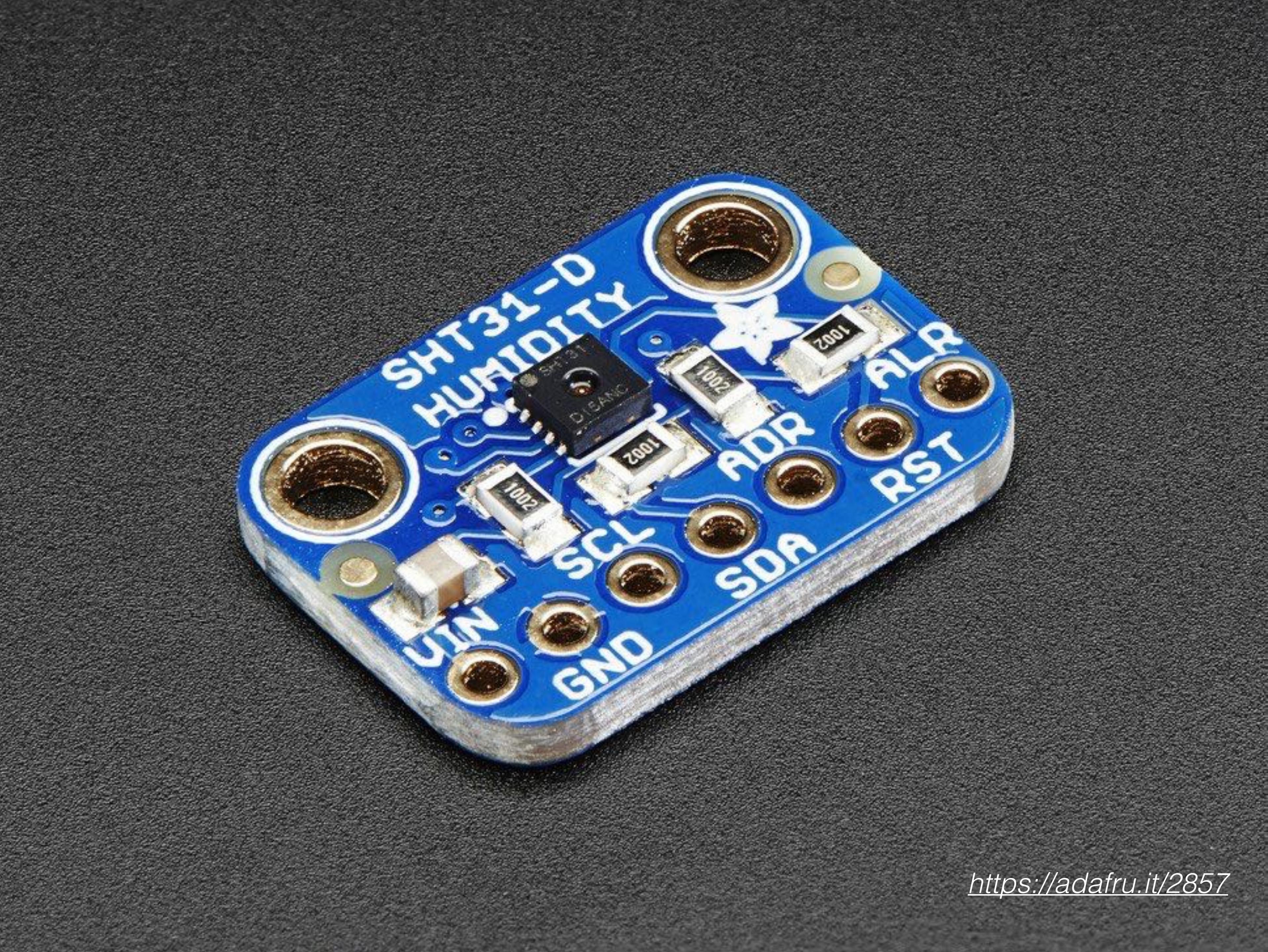
```
1 // This #include statement was automatically added by the Particle IDE.
2 #include "Adafruit_DHT/Adafruit_DHT.h"
3
4 // DHT parameters
5 #define DHTPIN 5
6 #define DHTTYPE DHT22
7
8 int temperature;
9 int humidity;
10
11 DHT dht(DHTPIN, DHTTYPE);
12
13 void setup() {
14     dht.begin();
15 }
16
17 void loop() {
18
19     temperature = dht.getTempFarenheit();
20     humidity = dht.getHumidity();
21
22     // Publish data
23     Spark.publish("temperature", String(temperature) + " °F");
24     Spark.publish("humidity", String(humidity) + "%");
25     delay(5*1000);
26
27 }
```







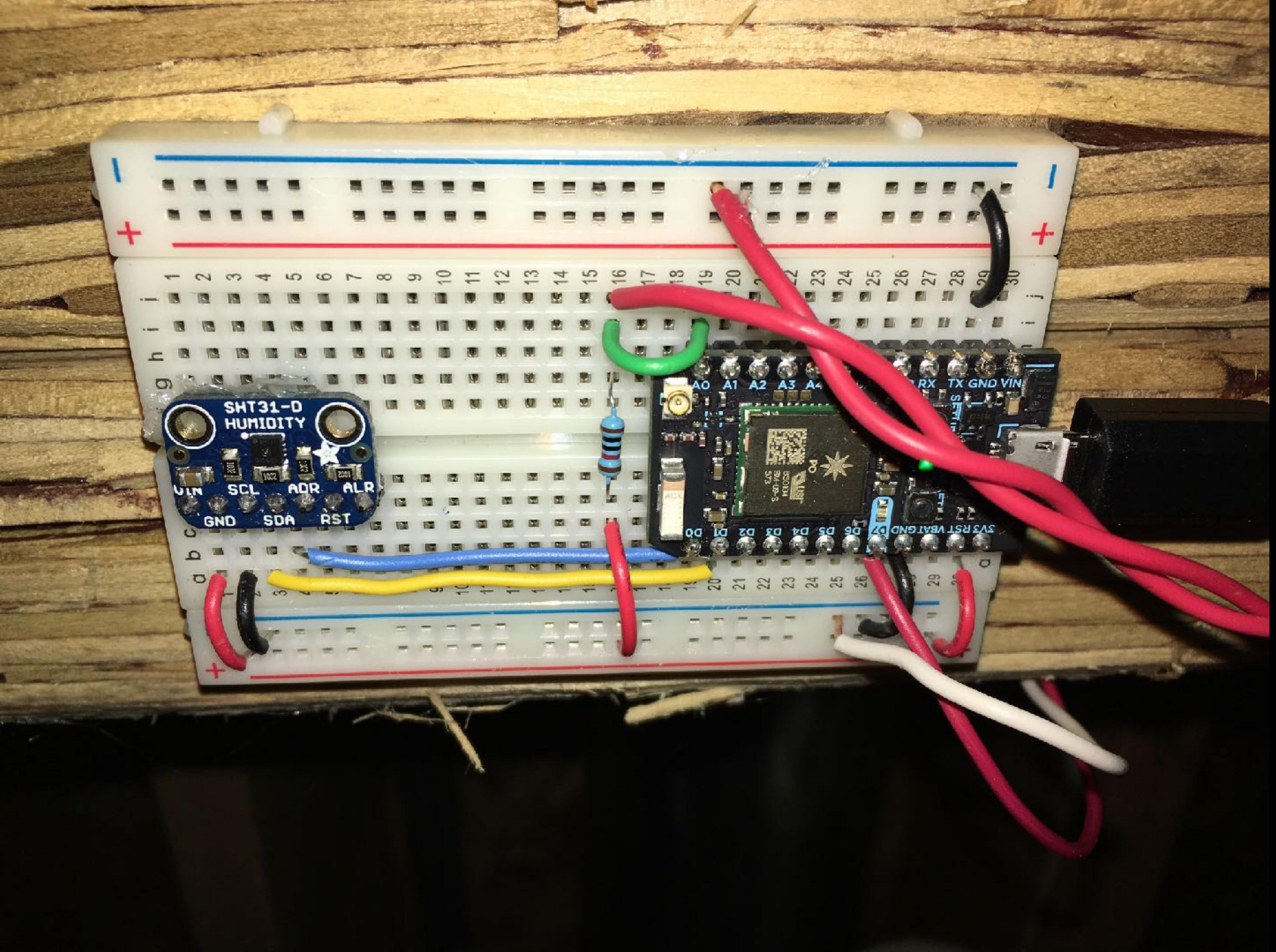
<https://adafru.it/2935>

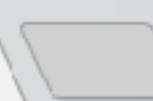


<https://adafru.it/2857>



<https://adafru.it/372>





Integrations > View Webhook



Webhook

Event:

farmbasement

Target:

sparkfun.com

ID:

57c107379a46417b1d6079a7

Created:

August 26th, 201

INTEGRATION INFO

Event Name

The Particle event name that triggers the webhook

farmbase

Full URL

The target endpoint that is hit when the webhook is triggered

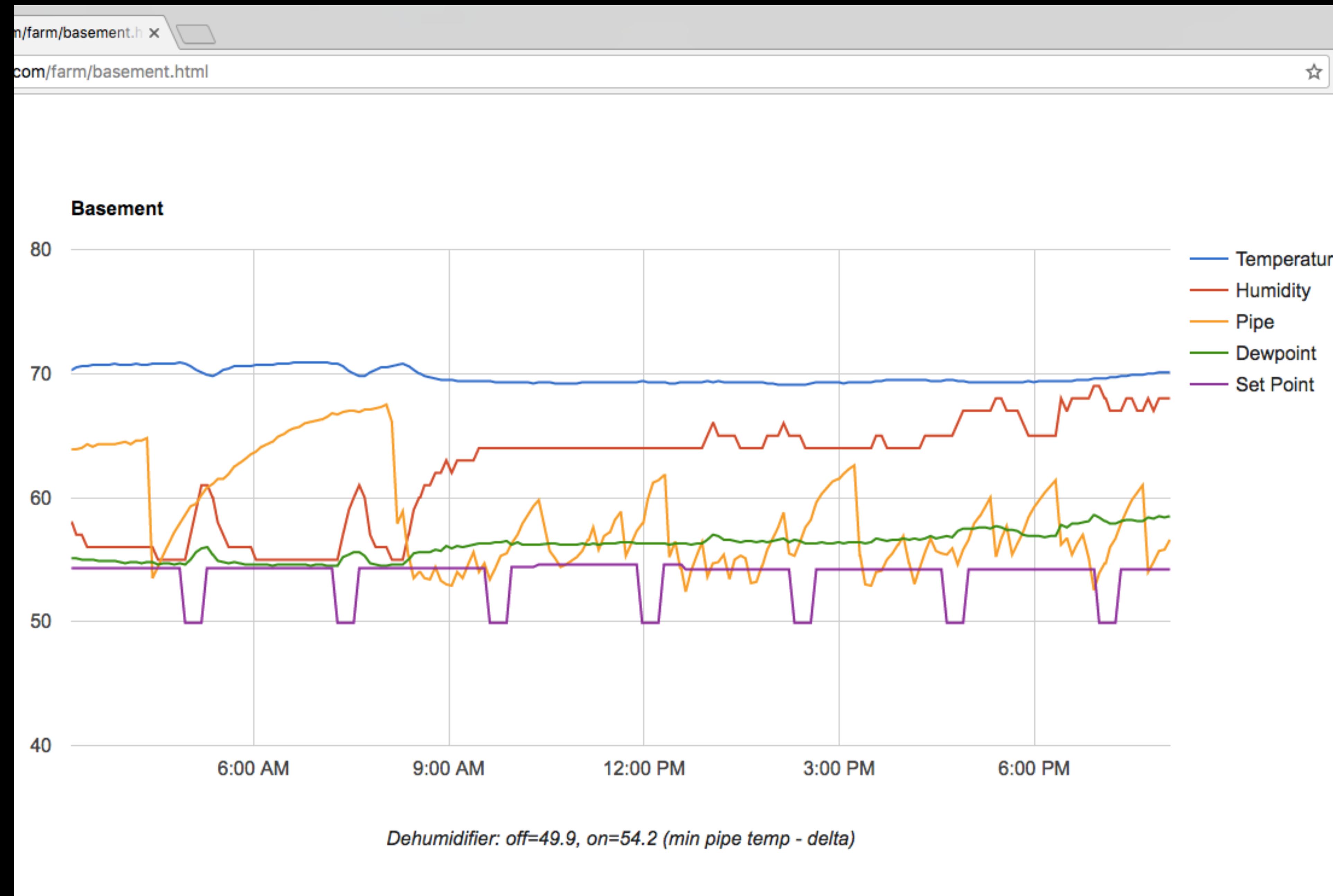
http://data

XQ5

Request Type

The standard web request method used when the webhook is triggered

POST

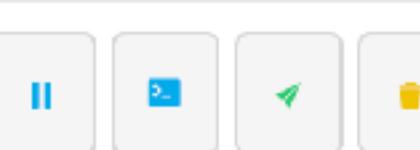








Events



Search for events

ADVANCED

NAME	DATA	DEVICE	PUBLISHED AT
hook-response/rootcellar/0	1 success	particle-internal	1/28/19 at 1:41:37 pm
hook-sent/rootcellar		particle-internal	1/28/19 at 1:41:37 pm
rootcellar	{"t":36.8,"h":50,"dp":19.0,"ot":27.1,"...}	rootcellar	1/28/19 at 1:41:36 pm
hook-response/farmbasement/0	1 success	particle-internal	1/28/19 at 1:41:20 pm
hook-sent/farmbasement		particle-internal	1/28/19 at 1:41:19 pm
farmbasement	{"t":43.7,"h":39,"pt":46.6,"dp":21.8,"...}	farmbasement	1/28/19 at 1:41:19 pm

farmbasement

Published by 320035000247353138383138 on 1/28/19 at 1:41:19 pm

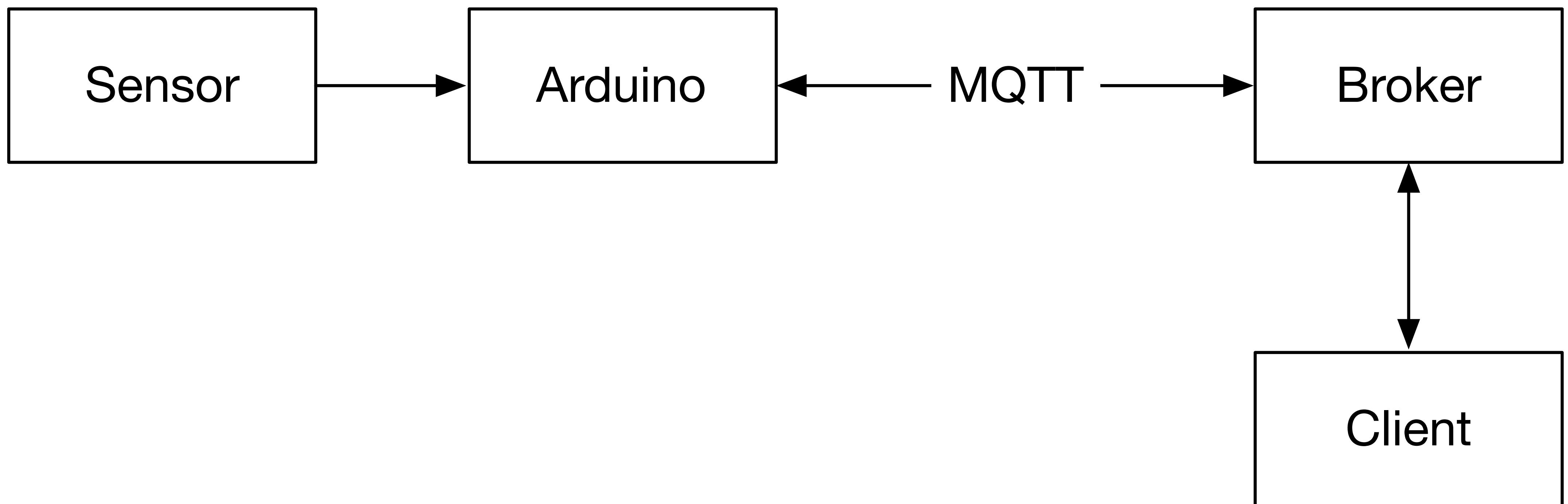
PRETTY **RAW**

▼ {

"t" : 43.7
"h" : 39
"pt" : 46.6
"dp" : 21.8
"d" : 0
"mpt" : 45
"dlt" : -3.6

}

MQTT



MQTT Overview

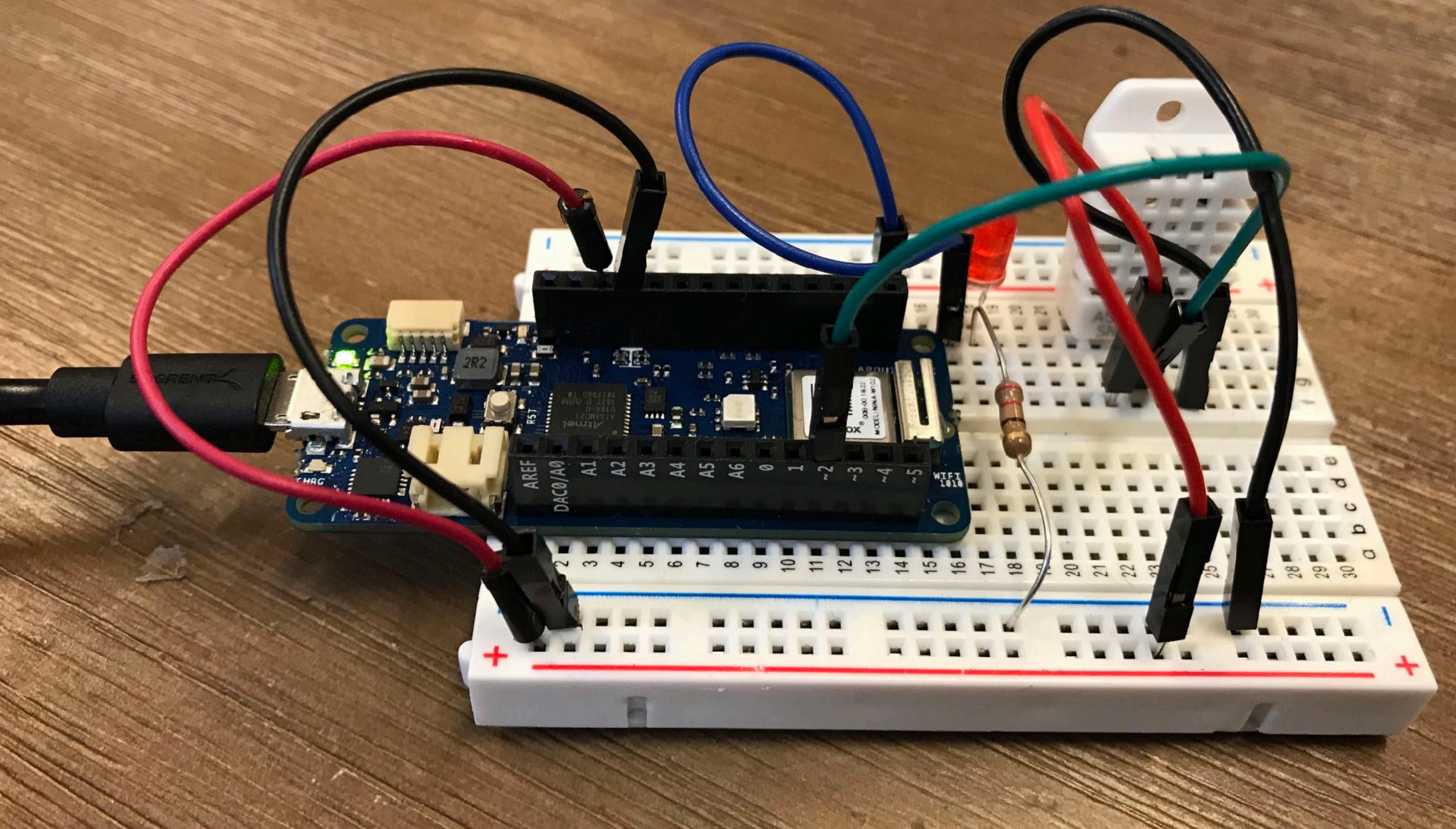
location/device/sensor

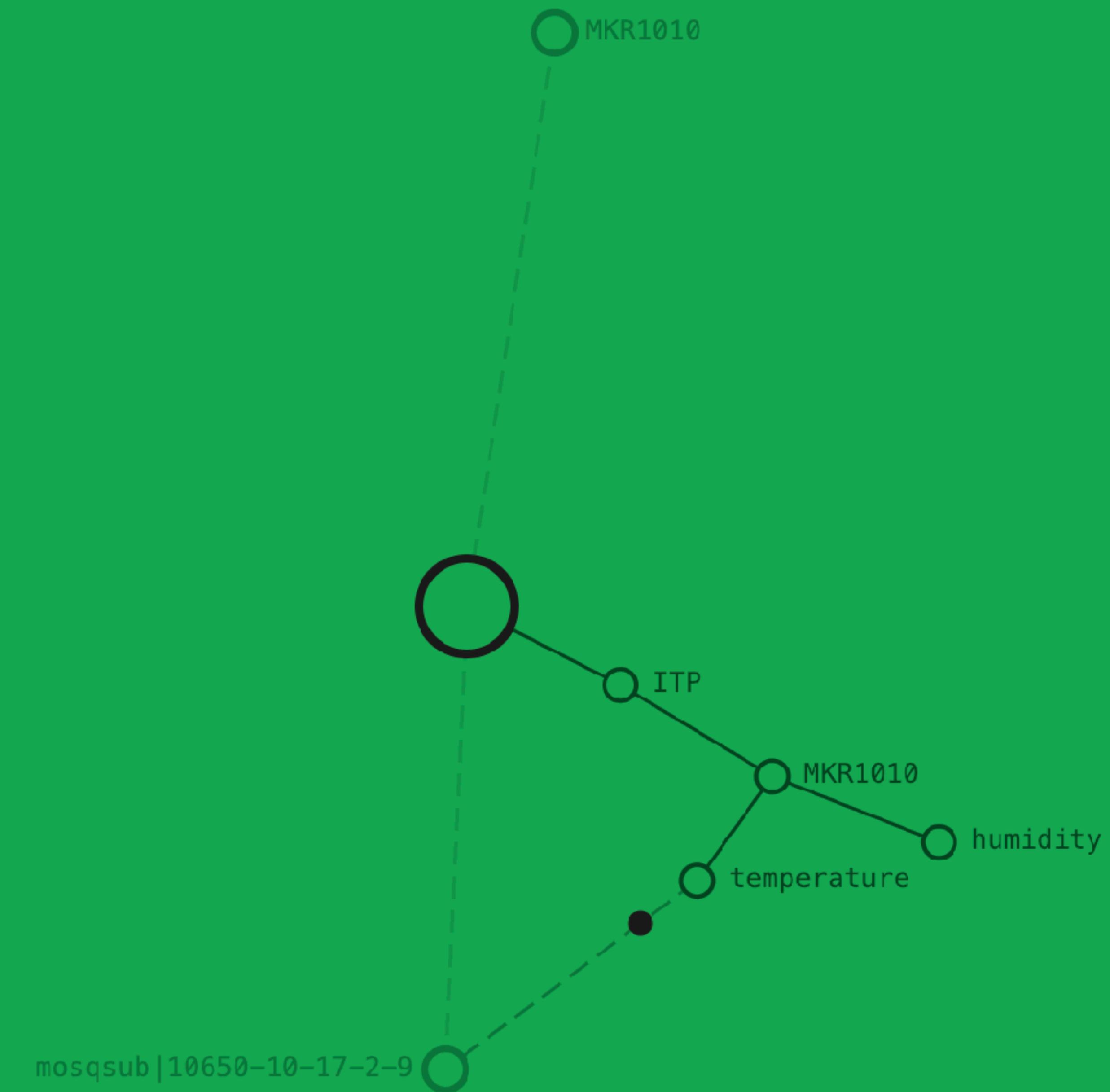
workshop/device1/temperature

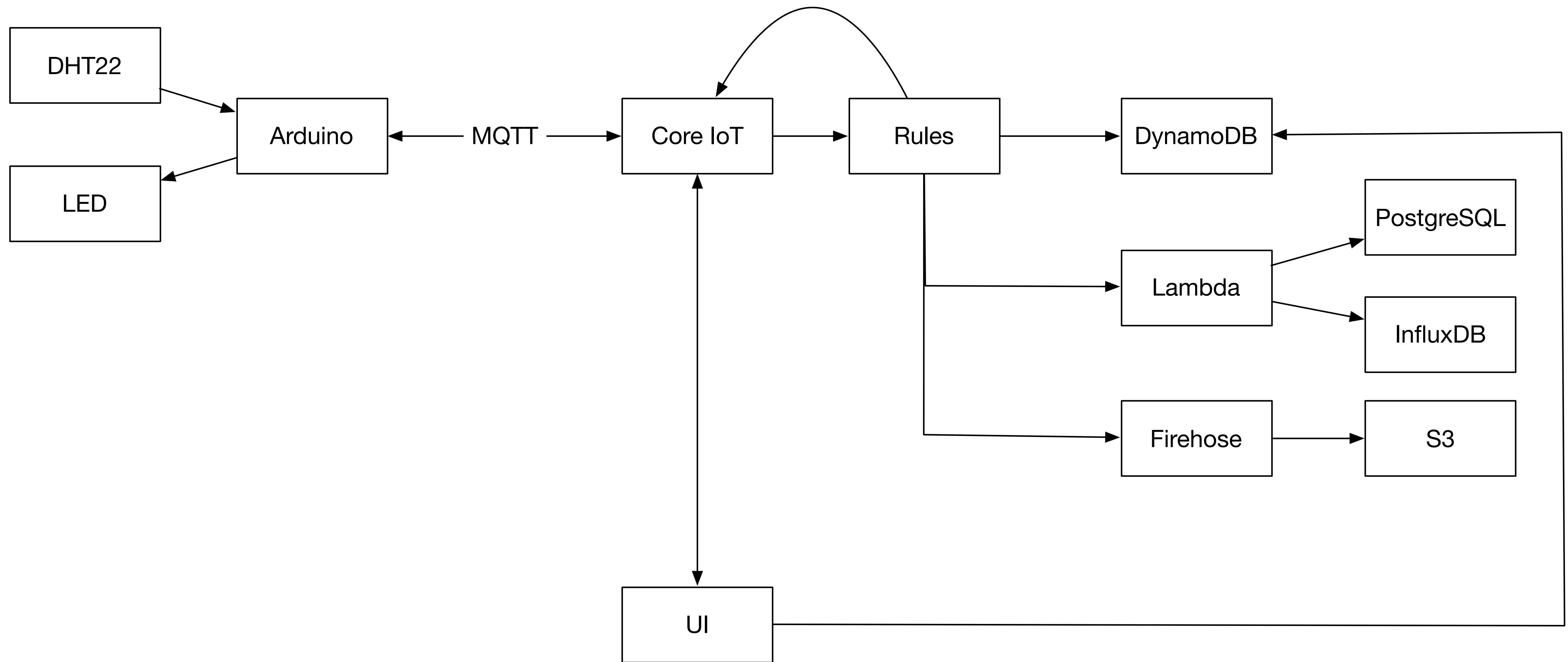
workshop/device1/humidity

Write to a topic

Subscribe to a topic







Next Week