SEIS 744 Final Project

Sensor Data Logger

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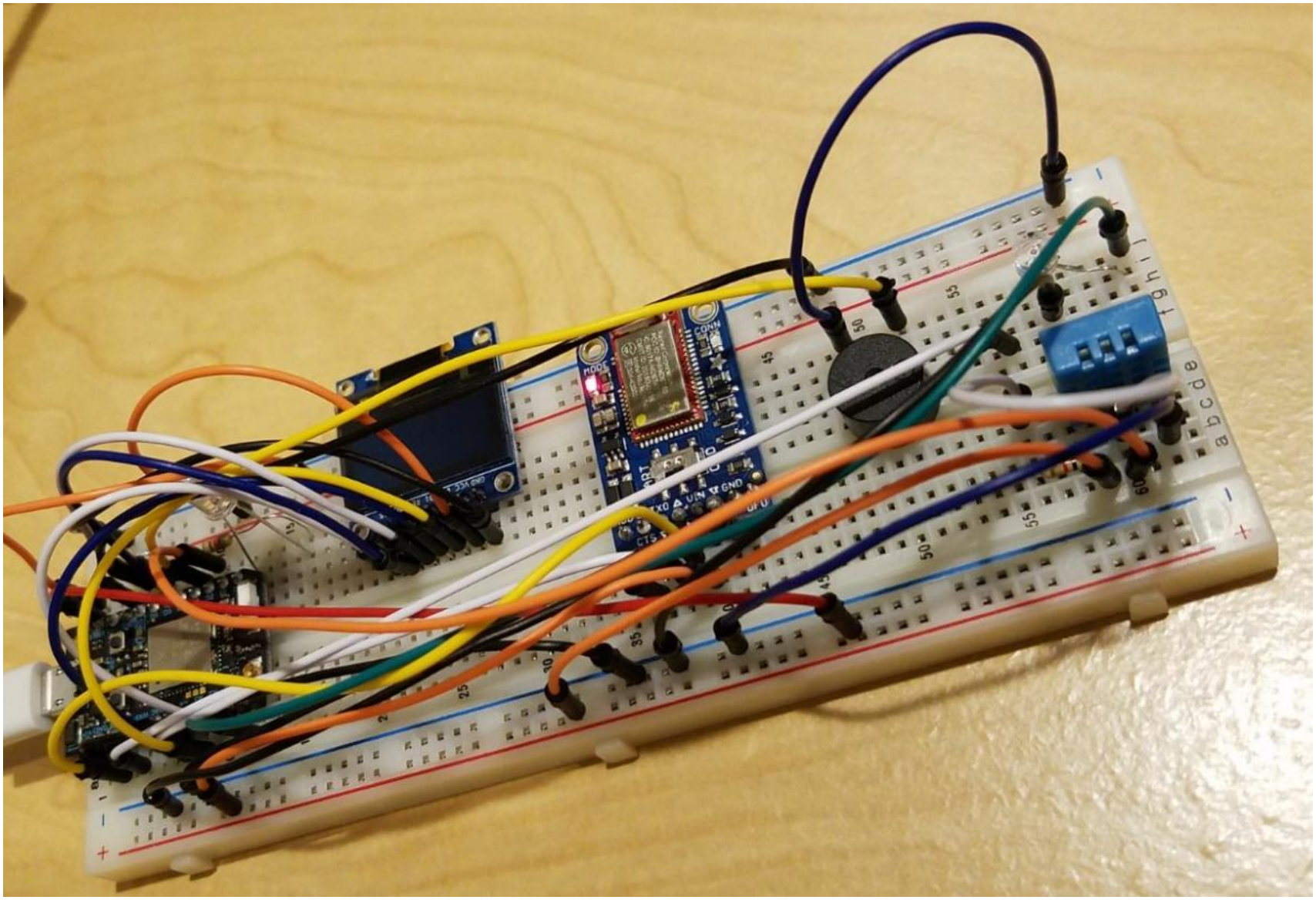
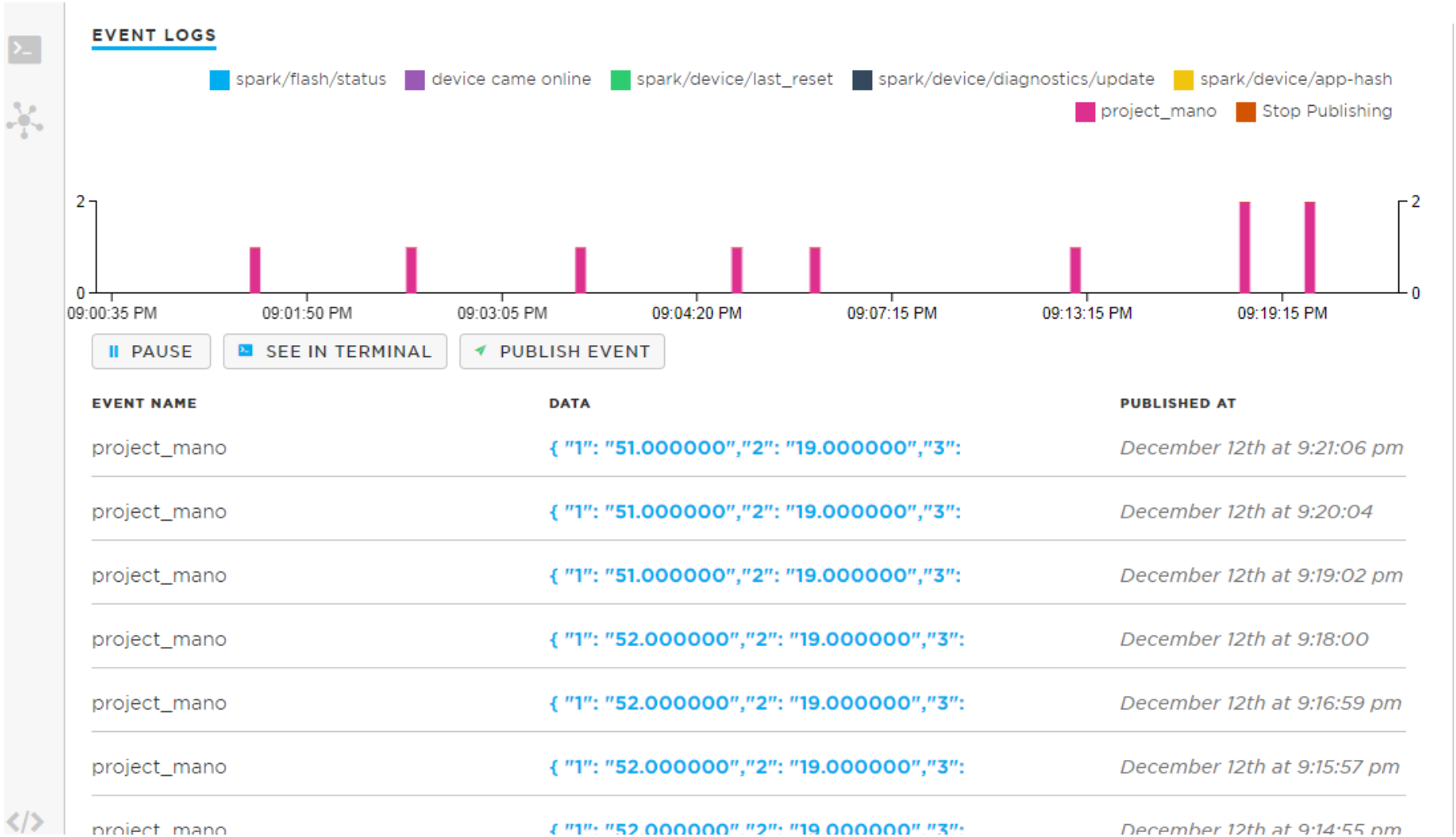
Fall 2017


MODE
CONN
RX0
VIN
GND
CTS
abcde
fghij

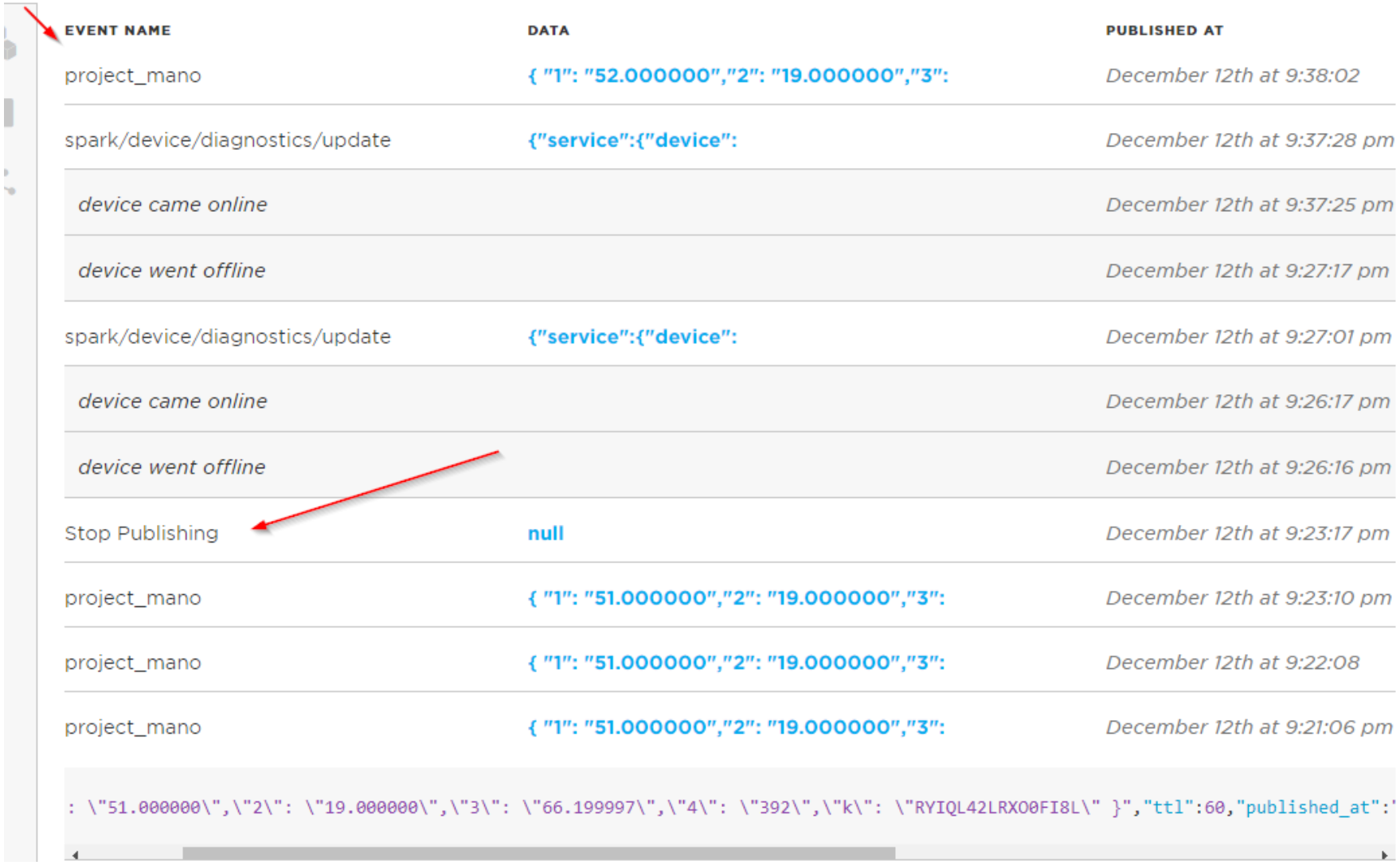
The Objective

- Collect data from DHT Sensor
  - Temperature in C and F and Humidity
- Photo Transistor
  - Intensity of Light
- BLE Module Commands
  - S – Stop publishing
    - Buzzer beeps
    - LED stays on
  - P – Resume publishing
- Publish data in the Particle Cloud
- Webhook to send data to ThingSpeak cloud

Particle Cloud Output



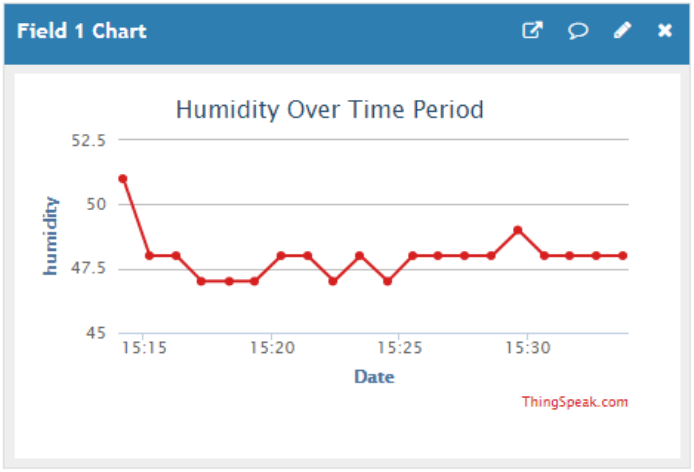
Stopping and Restarting Events

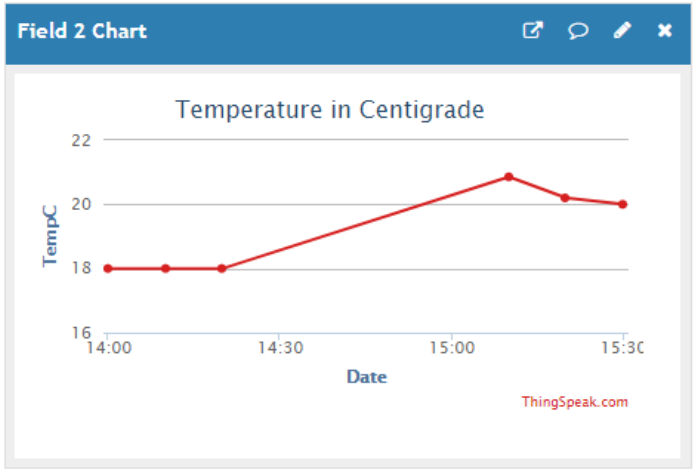


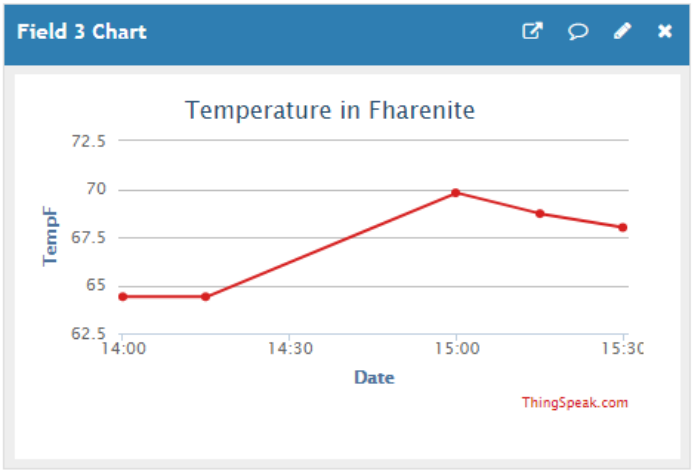
EVENT NAME	DATA	PUBLISHED AT
project_mano	{ "1": "52.000000","2": "19.000000","3":	December 12th at 9:38:02
spark/device/diagnostics/update	{"service":{"device":	December 12th at 9:37:28 pm
device came online		December 12th at 9:37:25 pm
device went offline		December 12th at 9:27:17 pm
spark/device/diagnostics/update	{"service":{"device":	December 12th at 9:27:01 pm
device came online		December 12th at 9:26:17 pm
device went offline		December 12th at 9:26:16 pm
Stop Publishing	null	December 12th at 9:23:17 pm
project_mano	{ "1": "51.000000","2": "19.000000","3":	December 12th at 9:23:10 pm
project_mano	{ "1": "51.000000","2": "19.000000","3":	December 12th at 9:22:08
project_mano	{ "1": "51.000000","2": "19.000000","3":	December 12th at 9:21:06 pm

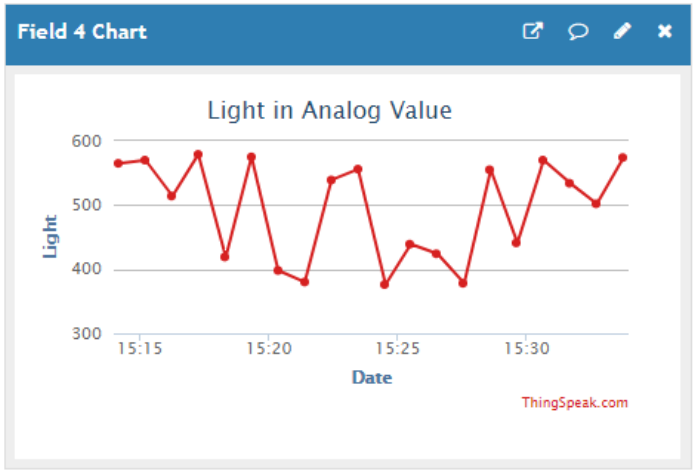
: \"51.000000\",\"2\": \"19.000000\",\"3\": \"66.199997\",\"4\": \"392\",\"k\": \"RYIQL42LRXO0FI8L\" }","ttl":60,"published_at":'

ThingSpeak Output



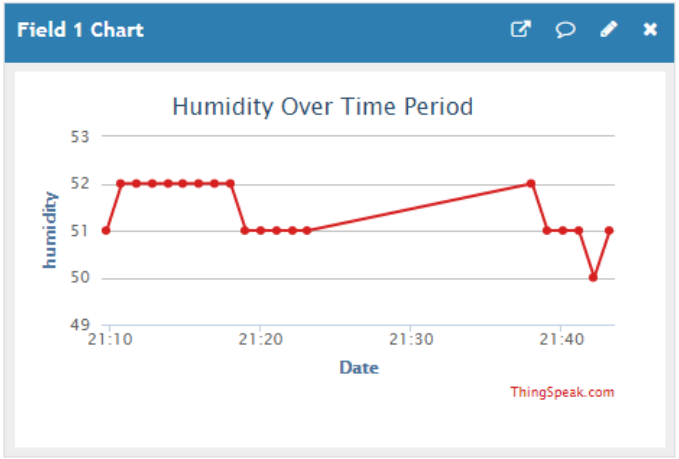


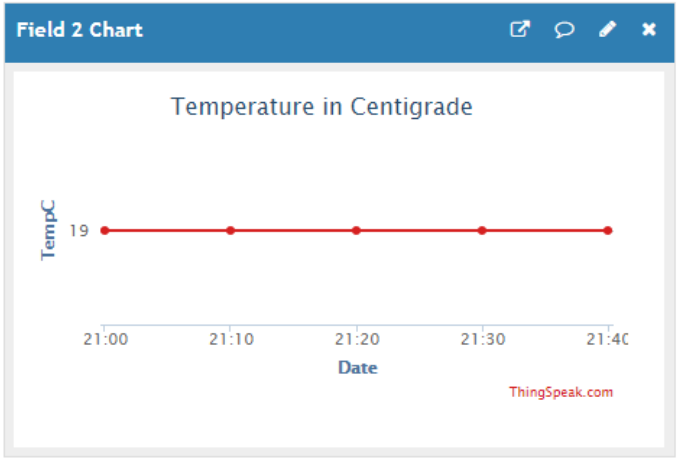


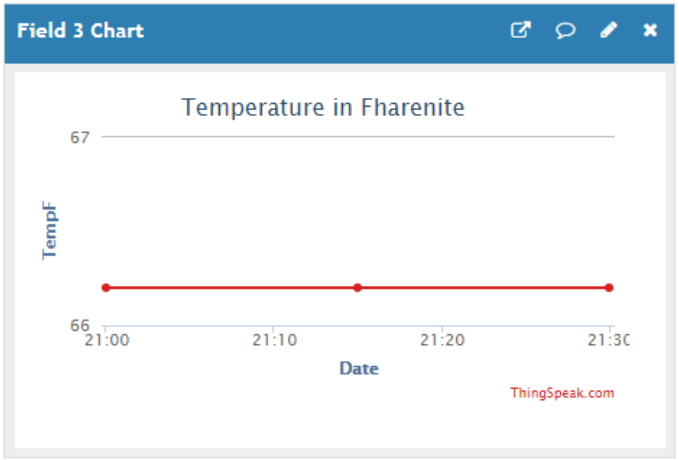


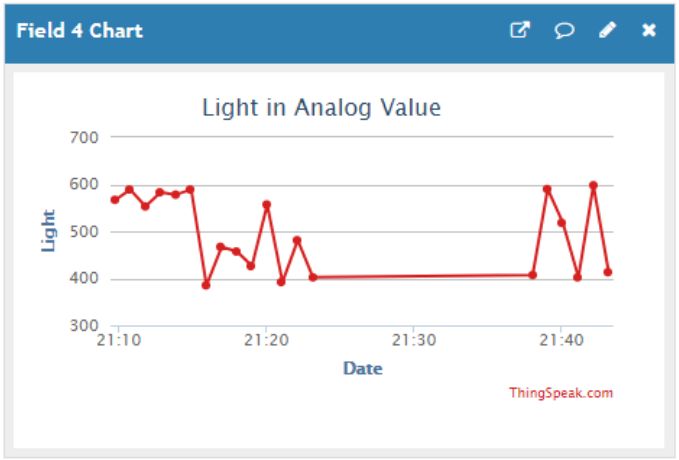
Turned on room heater

Created: 8 days ago
Updated: about a minute ago
Last entry: about a minute ago
Entries: 559

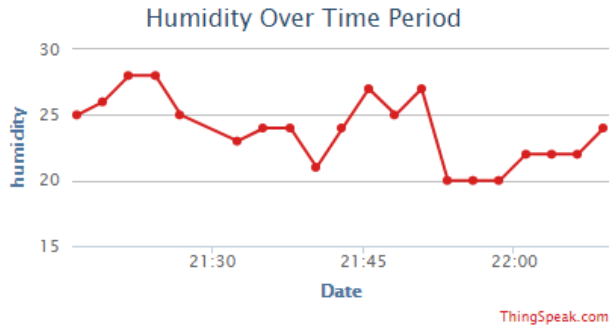




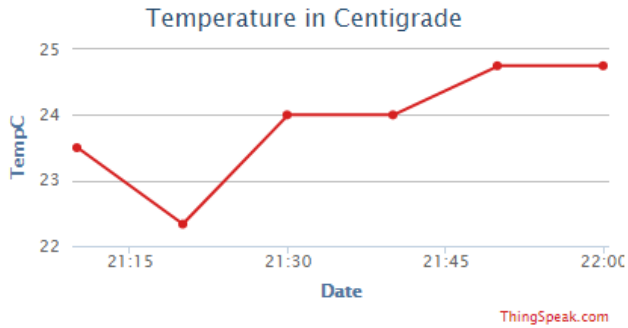




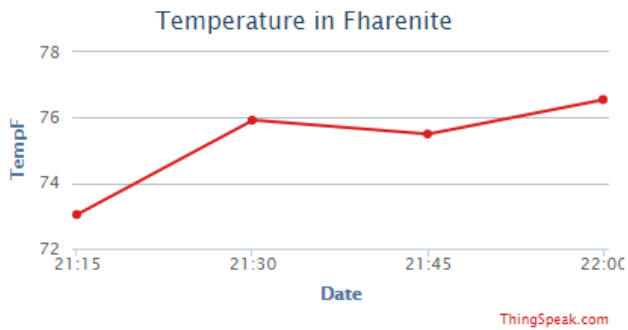
Field 1 Chart



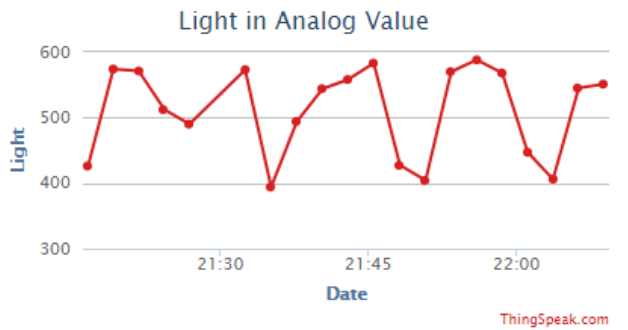
Field 2 Chart



Field 3 Chart



Field 4 Chart



Webhook Template

```
{
  "api_key": "{{k}}",
  "field1": "{{1}}",
  "field2": "{{2}}",
  "field3": "{{3}}",
  "field4": "{{4}}",
  "field5": "{{5}}",
  "field6": "{{6}}",
  "field7": "{{7}}",
  "field8": "{{8}}",
  "lat": "{{a}}",
  "long": "{{o}}",
  "elevation": "{{e}}",
  "status": "{{s}}"
}
```

Code Snippet

```
  // Set Pin Modes
  pinMode(led,OUTPUT);
  pinMode(photoCell,INPUT);
  pinMode(power,OUTPUT);
  digitalWrite(power,HIGH); // Turn on power source for photoCell
  digitalWrite(led,LOW);
  // Connect variables to particle cloud
  // This allows you to save data to particle.io, and run commands against it such as
 // "particle variable Photon get light"
  Particle.variable("light", &light, INT);
  Particle.variable("tempF", &tempF, DOUBLE);
  Particle.variable("tempC", &tempC, DOUBLE);
  Particle.variable("humidity", &humidity, DOUBLE);
  dht.begin();
  Serial.begin(9600);
  delay(10000);
```

```
// evaluate BLE command ..........................
if ( ble.available() )
     c = ble.read();
if (c == 80 ) {// publish
    action = 'P';
    ledToggle("off");
}
else if ( c == 83) {
    action = 'S';
    Particle.publish("Stop Publishing");
    ledToggle("on"); // turn on the LED !!
    tone(buzzerPin , 2551,25); // play a buzzer
}
// else , keep the last command !!
// Publish to thinkspeak
if ((now - lastPublish) > publish_cycle && action == 'P') { // added the action condition
     Particle.publish("project_mano", "{ \"1\": \"" + String(humidity) + "\"," +
     "\"2\": \"" + String(tempC) + "\"," +
     "\"3\": \"" + String(tempF) + "\"," +
     "\"4\": \"" + String(light) + "\"," +
     "\"k\": \"" + key + "\" }", 60, PRIVATE);
  lastPublish = now;
  Serial.println(" - Published!");
} else {
    Serial.println();
}
digitalWrite(led,LOW);
delay(2000); // Wait 2 seconds before next loop
```

Graceful Degradation!

- ***Few Other Experiments were done successfully:***
  - ***Vibration Sensor data Capture***
  - ***Subscribe to Weather data from Weatherunderground and sending directly to ThingSpeak bypassing particle cloud, using ThingSpeak APIs. Certain data like SUN Rise / Set; MOON Rise /Set are captured in a 24 hour period***
- ***Tried to Use the OLED Display Module***
- ***Current Experiment was chosen for Demo***

Sneak pick of the Experiments

Vibration Sensor

```
double vibration; // vibration
int vbsensor = D1;
pinMode(vbsensor,INPUT);
Particle.variable("vibration", &vibration, DOUBLE);
vibration = digitalRead(vbsensor);
```

What I have is a vibration switch. So, it only detects either a vibration – 0 or no vibration – 1. So, additional code needed to interpret the vibration output

Subscribe to weatherunderground

```
Particle.subscribe("hook-response/get_temp_weather", temp,MY_DEVICES);
Particle.subscribe("hook-response/get_conditions_weather", conditions_weather,MY_DEVICES);
Particle.subscribe("hook-response/get_astronomy_time", astronomy_weather,MY_DEVICES);
```

With limited knowledge of JSON , some of the fields from weatherunderground could not be interpreted. So, a partial weather data is being displayed

Publishing to ThingSpeak via API

```
TCPClient client;
ThingSpeak.begin(client);
field_1 = hightemp_float;
field_2 = lowtemp_float;
field_3 = (hightemp_float - lowtemp_float) / 2 ;
field_4 = ageofmoon;
field_5 = moonrise;
field_6 = moonset;
field_7 = sunrise;
field_8 = sunset;
ThingSpeak.writeField(myChannelNumber, 1, field_1, myWriteAPIKey);
delay(15000);
ThingSpeak.writeField(myChannelNumber, 2, field_2, myWriteAPIKey);
delay(15000);
ThingSpeak.writeField(myChannelNumber, 3, field_3, myWriteAPIKey);
delay(15000);
ThingSpeak.writeField(myChannelNumber, 4, field_4, myWriteAPIKey);
delay(15000);
ThingSpeak.writeField(myChannelNumber, 5, field_5, myWriteAPIKey);
delay(15000);
ThingSpeak.writeField(myChannelNumber, 6, field_6, myWriteAPIKey);
delay(15000);
ThingSpeak.writeField(myChannelNumber, 7, field_7, myWriteAPIKey);
delay(15000);
ThingSpeak.writeField(myChannelNumber, 8, field_8, myWriteAPIKey);
```

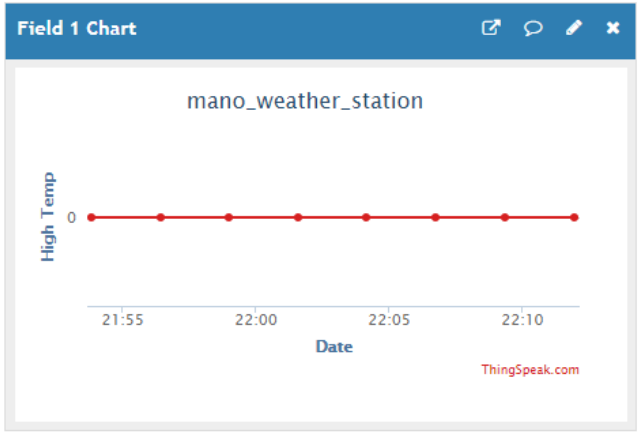
Channels Created in ThingSpeak

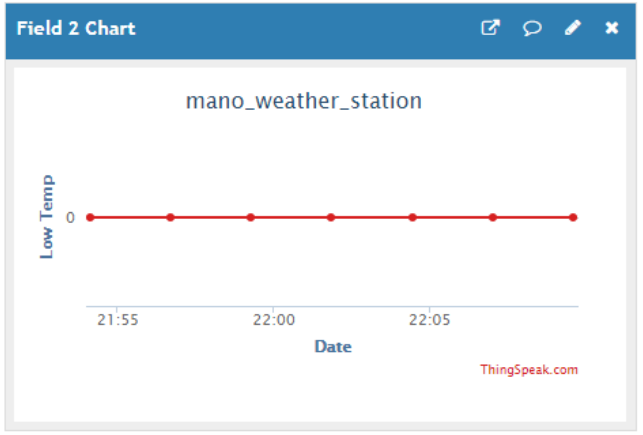
My Channels

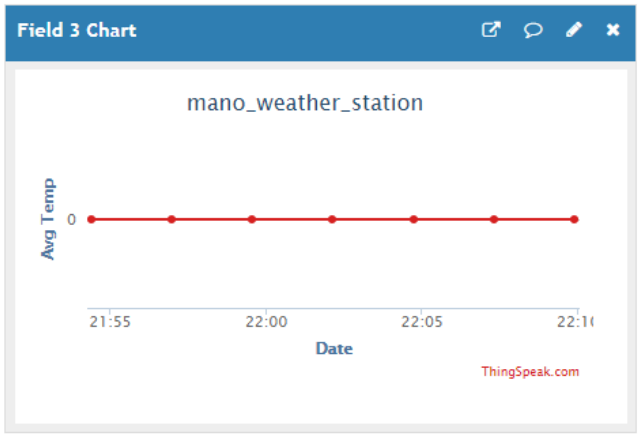
New Channel

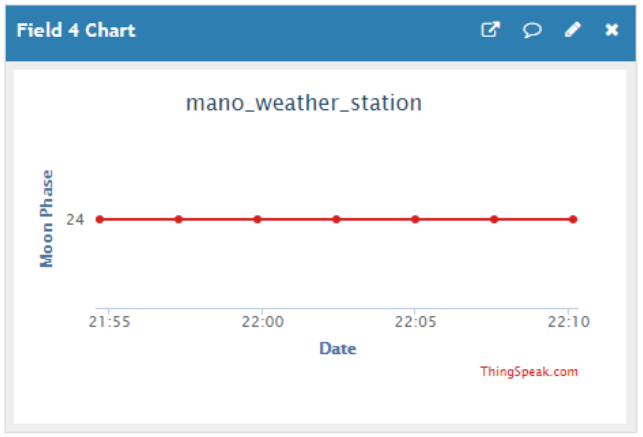
Name	Created	Updated At
temp Private Public Settings Sharing API Keys Data Import / Export	2017-11-09	2017-12-02 03:58
photovalue Private Public Settings Sharing API Keys Data Import / Export	2017-11-28	2017-12-02 18:45
project_mano Private Public Settings Sharing API Keys Data Import / Export	2017-12-05	2017-12-13 03:42
mano_weather_station Private Public Settings Sharing API Keys Data Import / Export	2017-12-11	2017-12-13 02:50

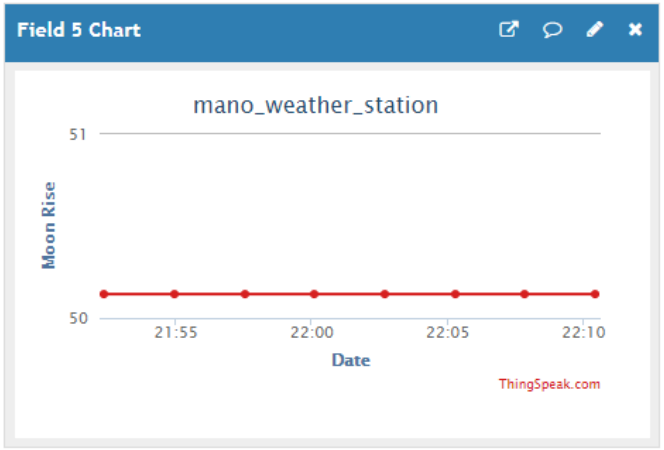
Weather Station Displays

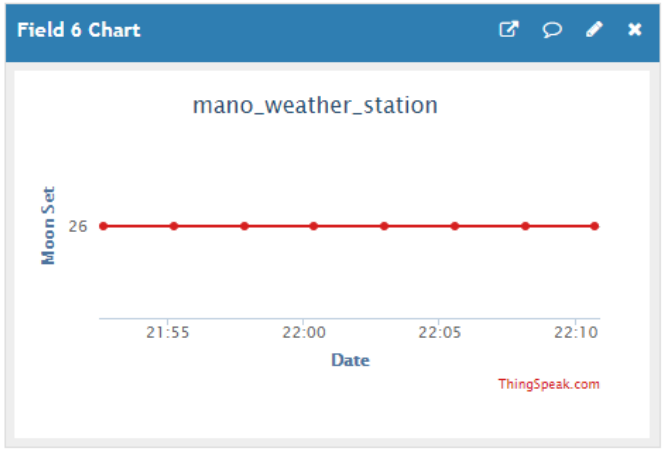


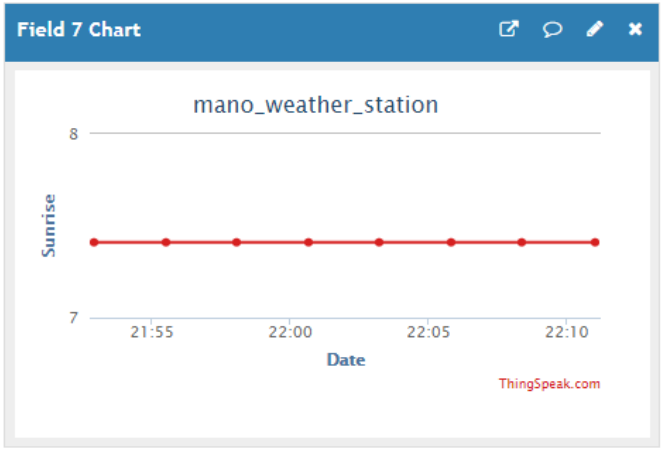


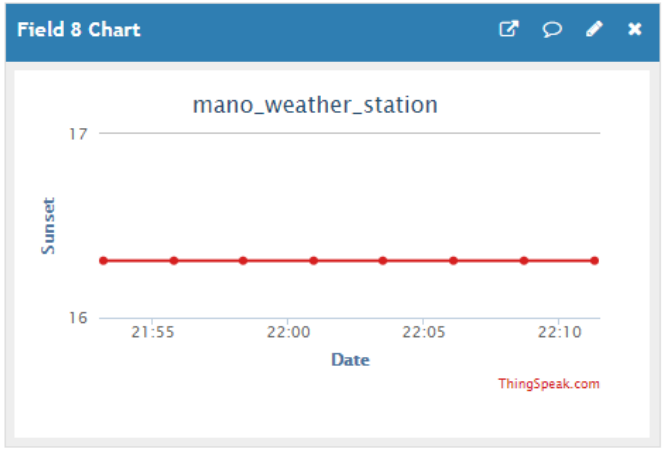












OLED Display Setup

Could not make it to work ! Needed a wiring diagram. Objective was to display some weather related info that was subscribed from weatherunderground.

Conclusion and Lesson Learned

This course has been a very interesting, fun filled and creative one!

Development of this project will continue – capture all data from ThingSpeak cloud and will be analyzed to build a proof of concept in bigdata analytics

More experiments should have been done for subscribing to an event

More integration into IFTTT need to be explored and incorporated

Many codes were taken from the web and customized / integrated

Sincerely Thanks John and Justin for their encouragement and help in building this project and making this course is an exciting one !

Thank You All !

github : https://github.com/manomix/SEIS_744_Fall2017_Project