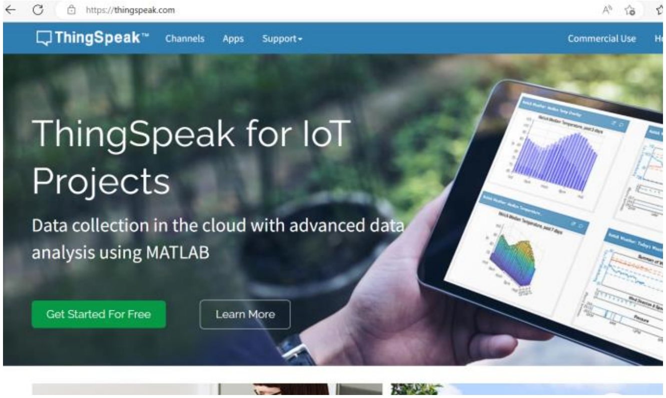
ThingSpeak Lab. January 2024

Instructions

Part A: Getting Setup in ThingSpeak and reading/writing to it using the Browser

1. **Go to ThingSpeak and click on Get Started for Free Create new account.**

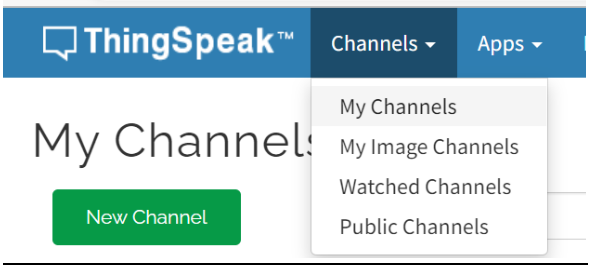

https://thingspeak.com
ThingSpeak™
Channels
Apps
Support
Commercial Use
ThingSpeak for IoT Projects
Data collection in the cloud with advanced data analysis using MATLAB
Get Started For Free
Learn More

2. **Create a new Channel by selecting**

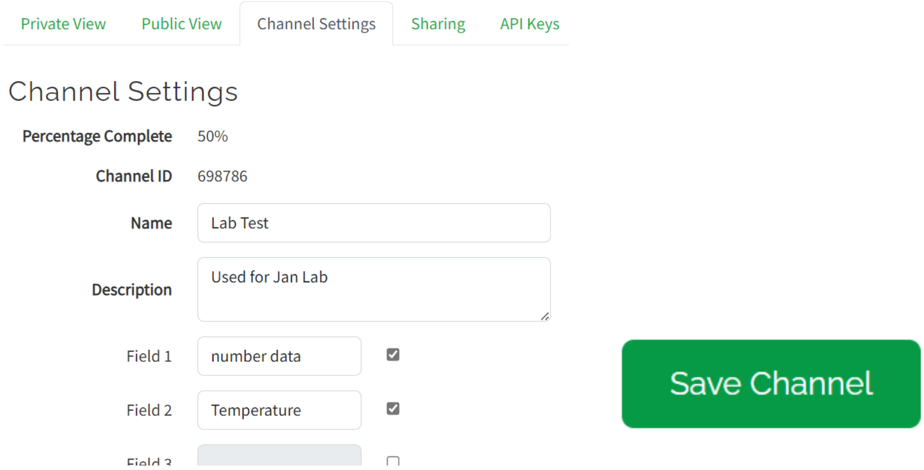
   Channels,
   My Channels,

   and then

   New Channel



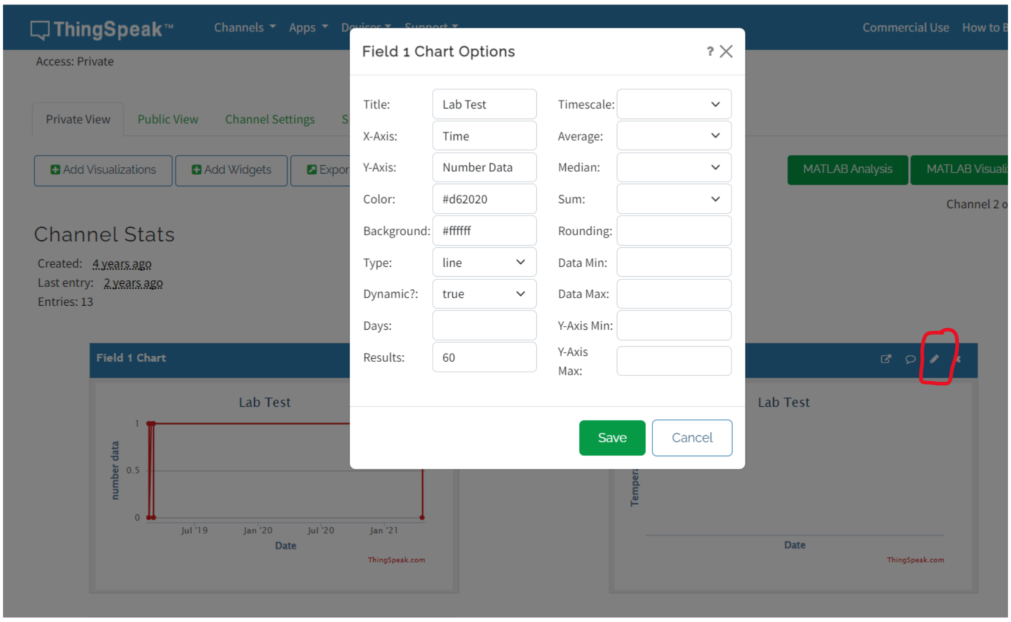
3. Give the channel a name and description (see below) and give Field 1 the name number data and Field 2 Temperature. Click Save Channel. You can also add a location if you wish.



Channel Settings

Percentage Complete	50%
Channel ID	698786
Name	Lab Test
Description	Used for Jan Lab
Field 1	number data ☑
Field 2	Temperature ☑
Field 3	☐

4. Configure Channel visualisation.
   Go to Private view. Click on pencil icon (circled in red below) to edit visualisation.



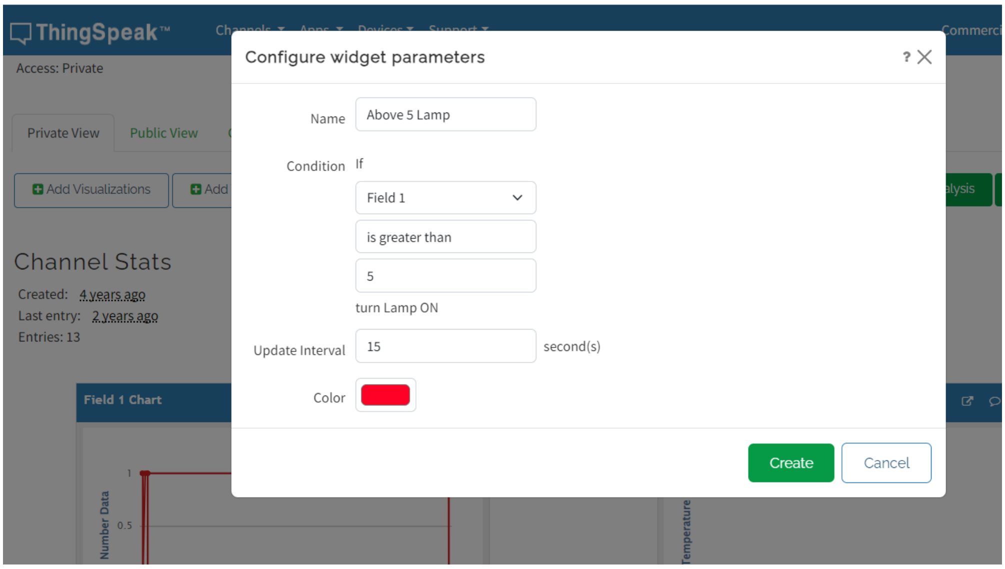
Channel Stats

Created: 4 years ago
Last entry: 2 years ago
Entries: 13

Field 1 Chart Options

Title:	Lab Test	Timescale:	
X-Axis:	Time	Average:	
Y-Axis:	Number Data	Median:	
Color:	#d62020	Sum:	
Background:	#ffffff	Rounding:	
Type:	line	Data Min:	
Dynamic?:	true	Data Max:	
Days:		Y-Axis Min:	
Results:	60	Y-Axis Max:	

5. Add Widgets. Click add widget, choose lamp.



Channel Stats

Created: 4 years ago
Last entry: 2 years ago
Entries: 13

Configure widget parameters

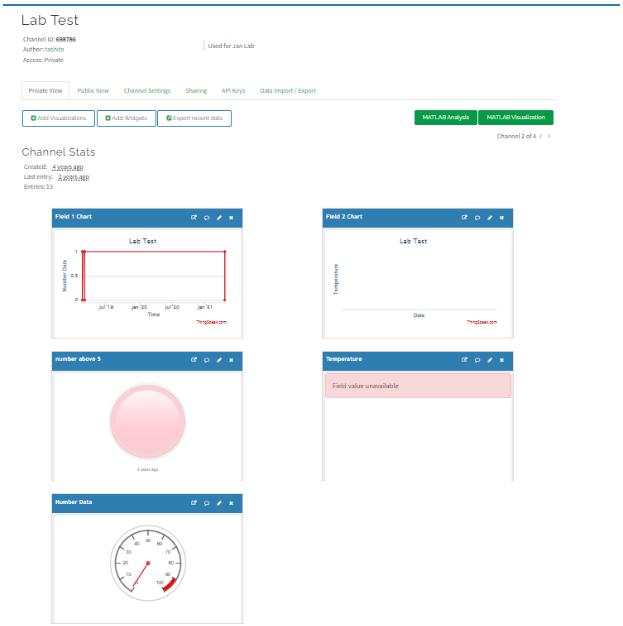
Name: Above 5 Lamp

Condition: If
Field 1
is greater than
5
turn Lamp ON

Update Interval: 15 second(s)

Color: 🟥

You can also add a numeric and gauge.



Lab Test

Channel ID: 698786
Author: tashita
Access: Private

Used for Jan Lab

Channel Stats

Created: 4 years ago
Last entry: 2 years ago
Entries: 13

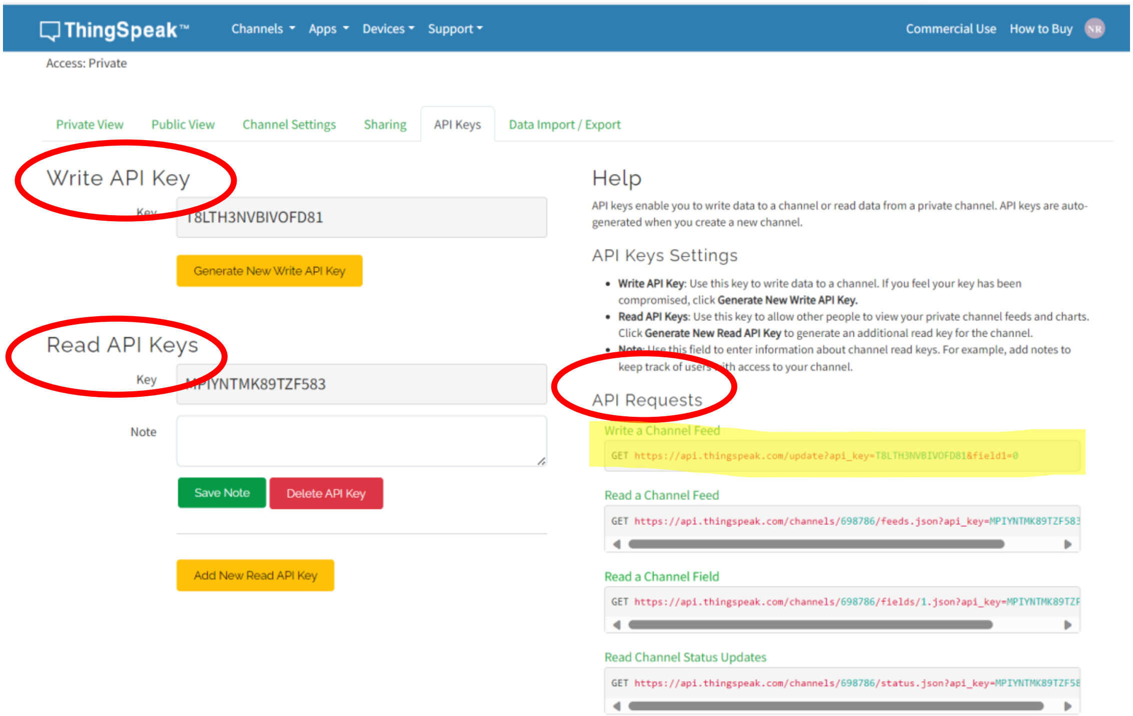
Part B Reading & Writing to ThingSpeak from Browser.

6.

To write data to ThingSpeak we need
Write API Key
Channel ID

To read data from ThingSpeak we need
Read API Key
Channel ID

Go to API Keys for API Read and Write keys and commands



Access: Private

Write API Key

Key T8LTH3NVBIVOFD81

Read API Keys

Key MPIYNTMK89TZF583

Note

Help

API keys enable you to write data to a channel or read data from a private channel. API keys are auto-generated when you create a new channel.

API Keys Settings

- **Write API Key**: Use this key to write data to a channel. If you feel your key has been compromised, click **Generate New Write API Key.**
- **Read API Keys**: Use this key to allow other people to view your private channel feeds and charts. Click **Generate New Read API Key** to generate an additional read key for the channel.
- **Note**: Use this field to enter information about channel read keys. For example, add notes to keep track of users with access to your channel.

API Requests

Write a Channel Feed

```
GET https://api.thingspeak.com/update?api_key=T8LTH3NVBIVOFD81&field1=0
```

Read a Channel Feed

```
GET https://api.thingspeak.com/channels/698786/feeds.json?api_key=MPIYNTMK89TZF583
```

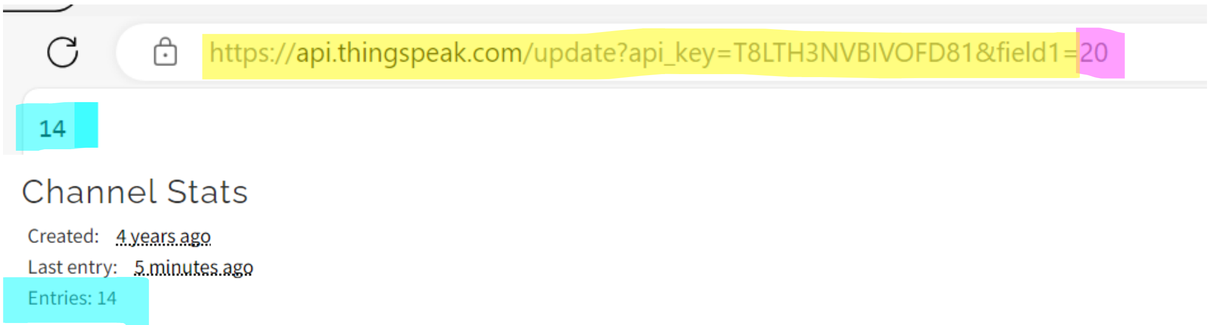
Read a Channel Field

```
GET https://api.thingspeak.com/channels/698786/fields/1.json?api_key=MPIYNTMK89TZF
```

Read Channel Status Updates

```
GET https://api.thingspeak.com/channels/698786/status.json?api_key=MPIYNTMK89TZF58
```

Copy the API Request to Write a Channel Feed. Remove GET and paste into browser. (Note I changed the value to write from 0 to 20). See below the browser and the ThingSpeak channel. The response to the browser is 14 as there have been 14 data elements written to the channel.



https://api.thingspeak.com/update?api_key=T8LTH3NVBIVOFD81&field1=20

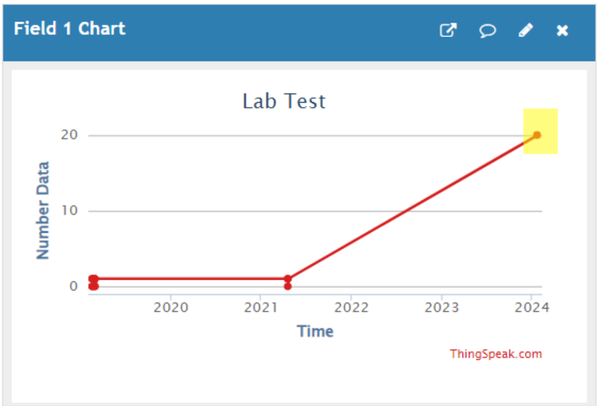
14

Channel Stats

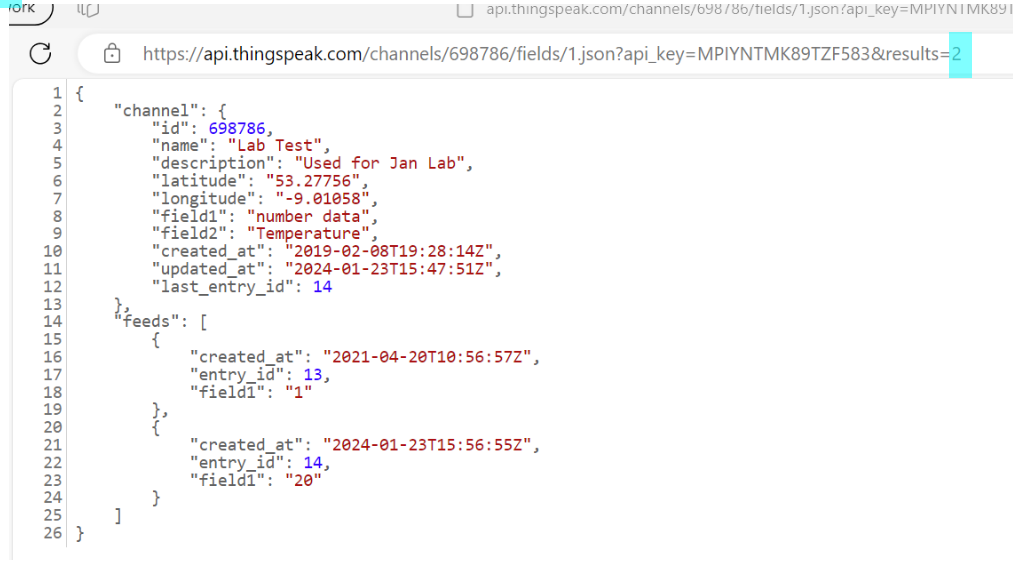
Created: 4 years ago

Last entry: 5 minutes ago

Entries: 14



Copy the Read a Channel Field command and remove GET. Paste into Browser to see the last 2 pieces of data written to it. See below.



https://api.thingspeak.com/channels/698786/fields/1.json?api_key=MPIYNTMK89TZF583&results=2

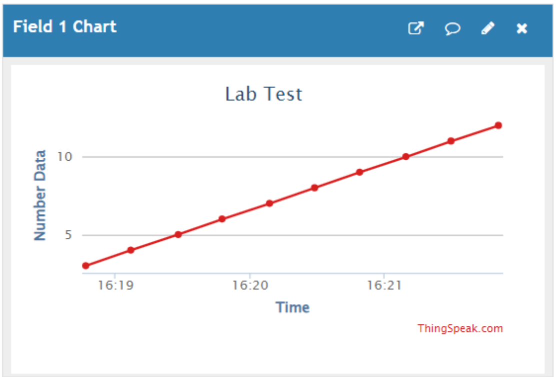
```
{
    "channel": {
        "id": 698786,
        "name": "Lab Test",
        "description": "Used for Jan Lab",
        "latitude": "53.27756",
        "longitude": "-9.01058",
        "field1": "number data",
        "field2": "Temperature",
        "created_at": "2019-02-08T19:28:14Z",
        "updated_at": "2024-01-23T15:47:51Z",
        "last_entry_id": 14
    },
    "feeds": [
        {
            "created_at": "2021-04-20T10:56:57Z",
            "entry_id": 13,
            "field1": "1"
        },
        {
            "created_at": "2024-01-23T15:56:55Z",
            "entry_id": 14,
            "field1": "20"
        }
    ]
}
```

You can look at all the commands.

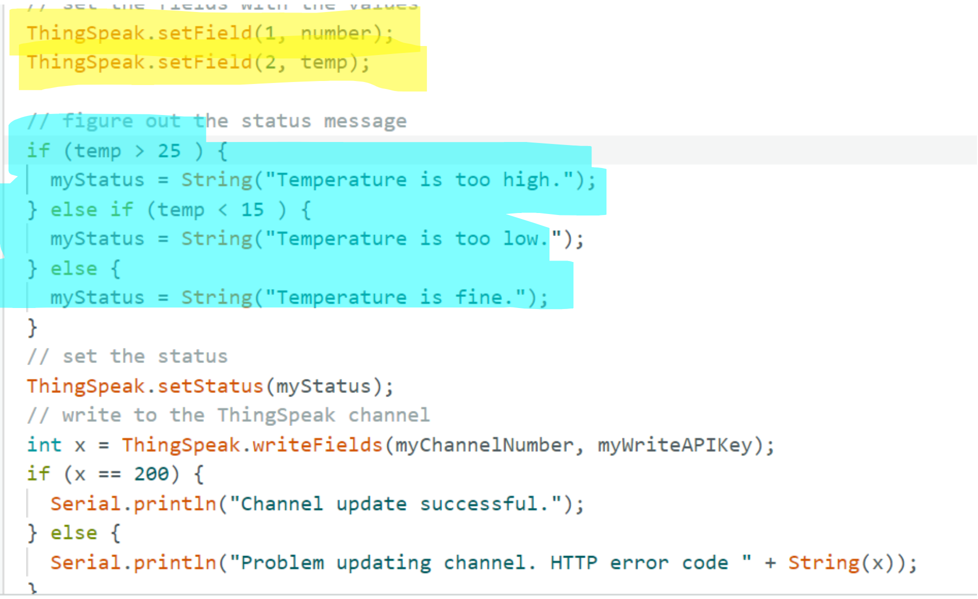
Part B Write to ThingSpeak from ESP32.

7. Intall ThingSpeak Library from Mathworks.
   Load the Examples/ThingSpeak/ESP32/WriteSingleField

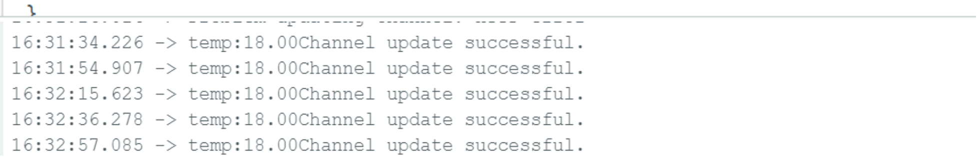
   populate secrets.h
   Upload code.



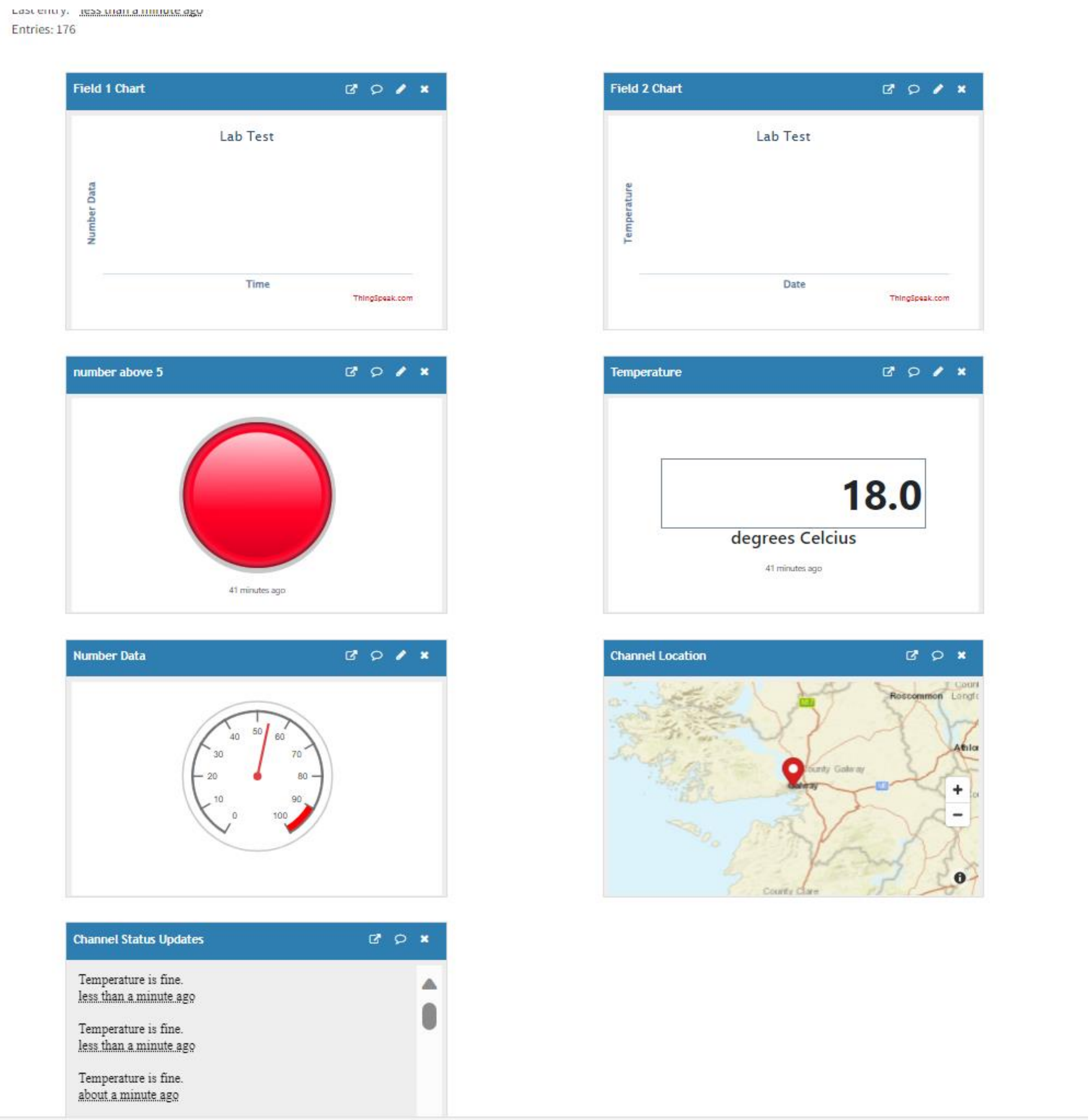
8. In this step you will use example WriteMultipleFields and write the number data to Field 1 and temperature data from the DHT11 to Field 2.
   Integrate the DHT11 code into the WriteMultipleFields example and set Field 1 to number and Field 2 to temp. (Note you will have to create this variable). Make the status too hot for temperatures greater than 25, too cold for temperatures less than 15 and fine otherwise.



```
// set the fields with the values
ThingSpeak.setField(1, number);
ThingSpeak.setField(2, temp);

// figure out the status message
if (temp > 25 ) {
  myStatus = String("Temperature is too high.");
} else if (temp < 15 ) {
  myStatus = String("Temperature is too low.");
} else {
  myStatus = String("Temperature is fine.");
}
// set the status
ThingSpeak.setStatus(myStatus);
// write to the ThingSpeak channel
int x = ThingSpeak.writeFields(myChannelNumber, myWriteAPIKey);
if (x == 200) {
  Serial.println("Channel update successful.");
} else {
  Serial.println("Problem updating channel. HTTP error code " + String(x));
}
```



```
16:31:34.226 -> temp:18.00Channel update successful.
16:31:54.907 -> temp:18.00Channel update successful.
16:32:15.623 -> temp:18.00Channel update successful.
16:32:36.278 -> temp:18.00Channel update successful.
16:32:57.085 -> temp:18.00Channel update successful.
```



Last entry: less than a minute ago
Entries: 176

Temperature is fine.
less than a minute ago

Temperature is fine.
less than a minute ago

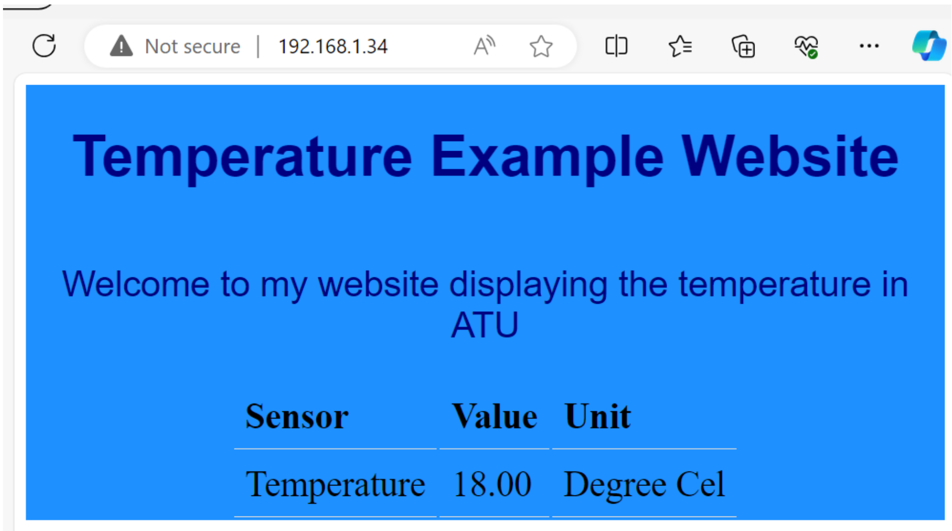
Temperature is fine.
about a minute ago

9\.

Part C Integrate writing temperature to ThingSpeak with Temperature Server Example. Add the ThingSpeak chart to your Webpage.

10. Download the Folder from ThingSpeak Code For Lab from Moodle->ESP32Labs & Resources.

Open the .ino file and add your Wifi details. Upload the code. It should serve the following Webpage.



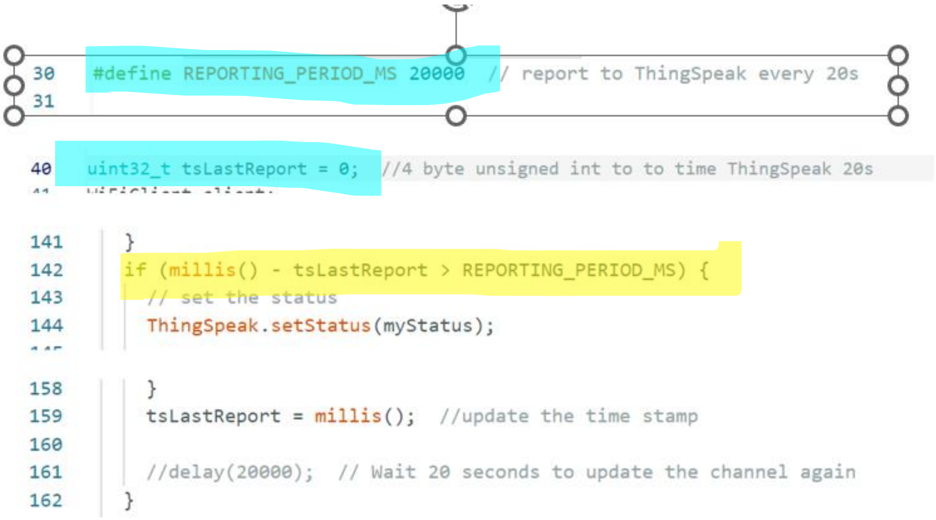
Temperature Example Website

Welcome to my website displaying the temperature in ATU

Sensor	Value	Unit
Temperature	18.00	Degree Cel

To this file you will integrate the code to write to ThingSpeak.
Add the secrets.h file to the folder.
Add all the necessary code from the WriteMultipleFields you did in Part B.
This will take care with your coding.

Note: ensure you update ThingSpeak no more frequently than every 20s.
See code snippets below.
Setup the time period with REPORTING_PERIOD_MS and the variable used to measure the time periods tsLastReport.
Put all ThingSpeak update code inside the if statement

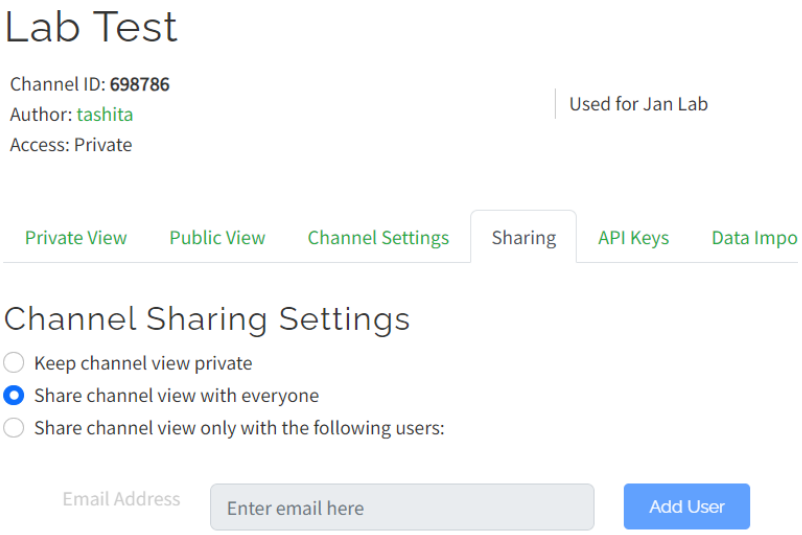


```
#define REPORTING_PERIOD_MS 20000  // report to ThingSpeak every 20s

uint32_t tsLastReport = 0;  //4 byte unsigned int to to time ThingSpeak 20s
```

```
}
if (millis() - tsLastReport > REPORTING_PERIOD_MS) {
  // set the status
  ThingSpeak.setStatus(myStatus);
```

```
  }
  tsLastReport = millis();  //update the time stamp

  //delay(20000);  // Wait 20 seconds to update the channel again
}
```

To incorporate the Thingspeak chart onto your webpage. Make the channel public. See below.



Lab Test

Channel ID: **698786**
Author: tashita
Access: Private

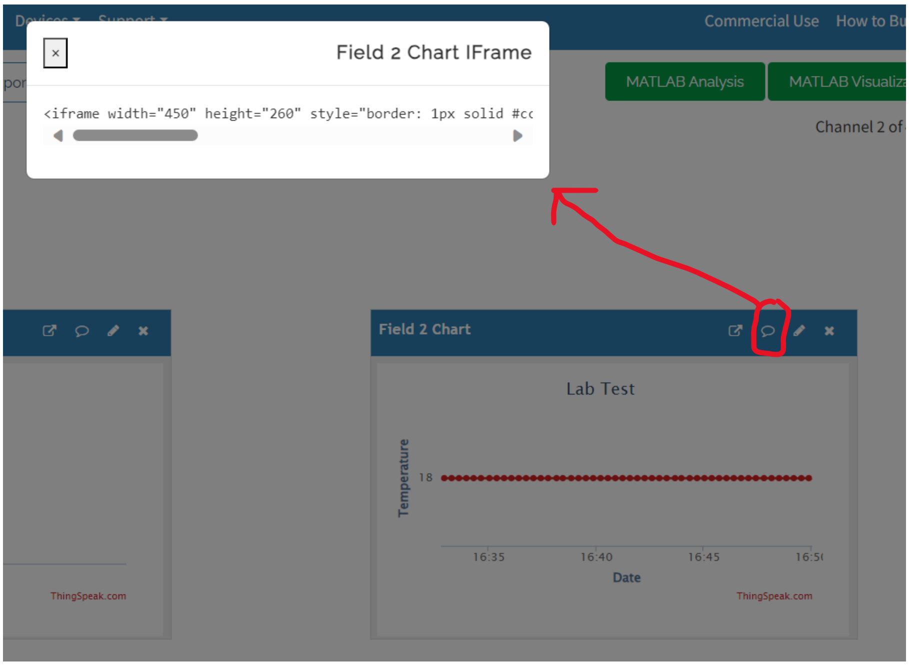
Used for Jan Lab

Channel Sharing Settings

○ Keep channel view private
● Share channel view with everyone
○ Share channel view only with the following users:

Email Address: Enter email here

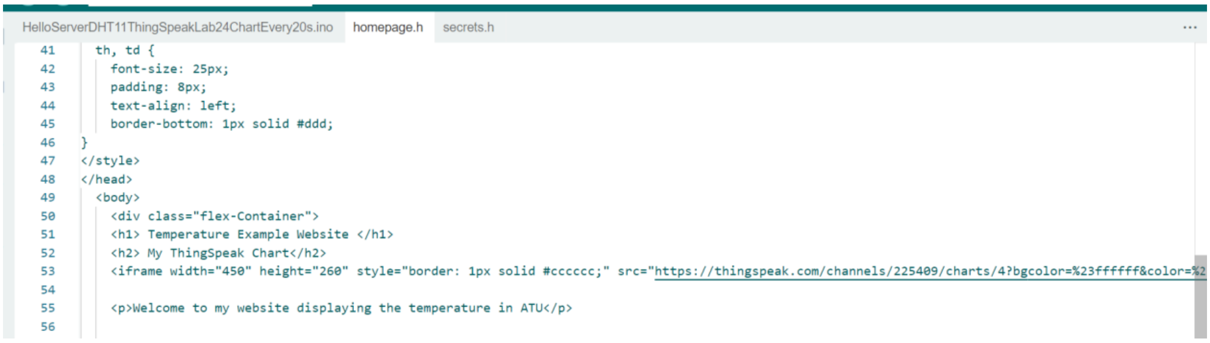
Copy the iframe from Field 2



Field 2 Chart IFrame

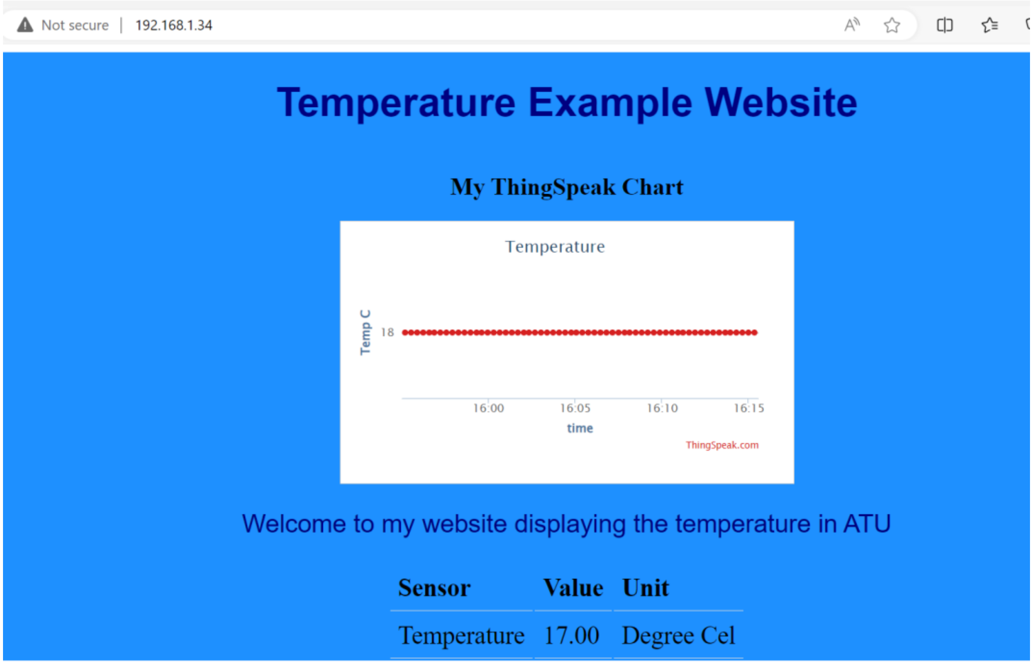
```
<iframe width="450" height="260" style="border: 1px solid #cc
```

Copy it intoyour webpage in homepage.h



```
  th, td {
    font-size: 25px;
    padding: 8px;
    text-align: left;
    border-bottom: 1px solid #ddd;
}
</style>
</head>
  <body>
    <div class="flex-Container">
    <h1> Temperature Example Website </h1>
    <h2> My ThingSpeak Chart</h2>
    <iframe width="450" height="260" style="border: 1px solid #cccccc;" src="https://thingspeak.com/channels/225409/charts/4?bgcolor=%23ffffff&color=%2

    <p>Welcome to my website displaying the temperature in ATU</p>

```

You should get a webpage something like below:



Temperature Example Website

My ThingSpeak Chart

Welcome to my website displaying the temperature in ATU

Sensor	Value	Unit
Temperature	17.00	Degree Cel