香港教育大學
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The Education University of Hong Kong
2022-2023 Quality Education Fund Thematic Network - Tertiary Institutes
STEM Project Team

Professional Development Program (3)

Facilitating Scientific Inquiry with Micro:bit and Internet of Things (IoT) Workshop

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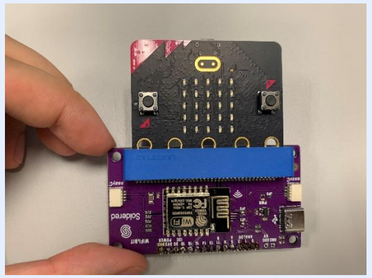
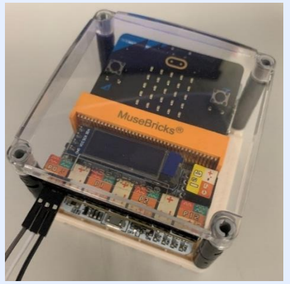
Micro:bit IoT Board Comparison





	Esp-01 Wifi module	iot:bit	WiFi:bit	MuseLab
Price (HKD)	6	130	159	646
Difficulty	Advance	Medium	Medium	Easy
Coding platform	Makecode	Makecode	Makecode	Makecode + Scratch + Snap!
IoT Platform Support	ThingSpeak	ThingSpeak, IFTTT, MQTT, KidsIot	ThingSpeak	Cisco, Amazon Alexa, Google Home, IFTTT, ThingSpeak
Source	Esp-01: Taobao or any local STEM material vendors	ELECFREAKS	ETC Educational Technology Connection (HK) Ltd	華輝無綫電行有限公司 – 門市

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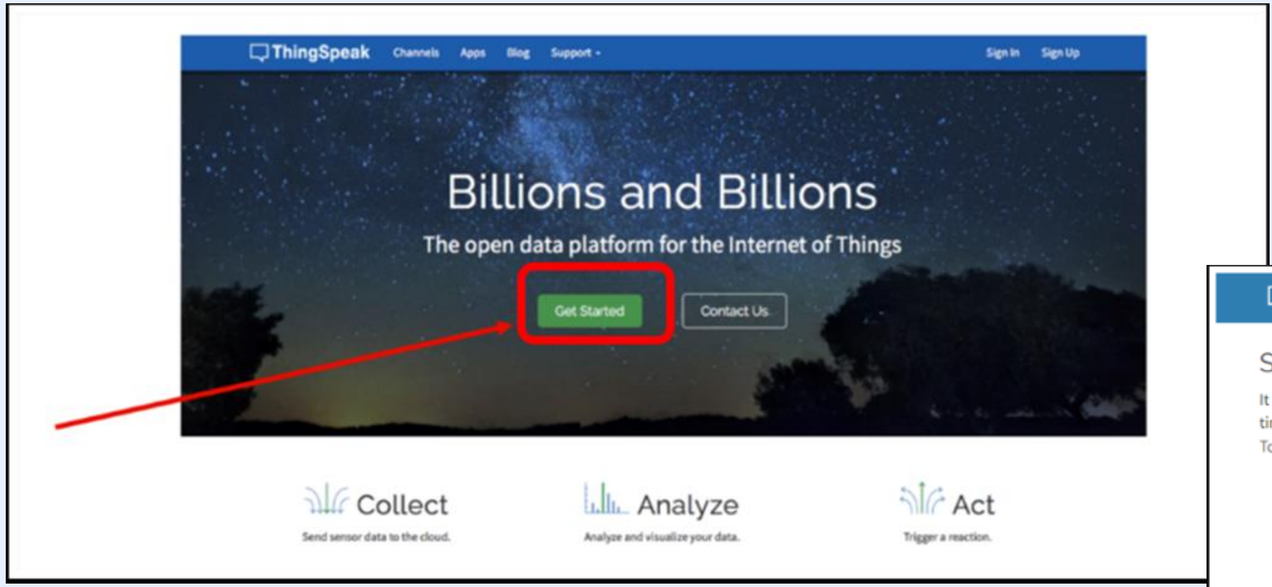
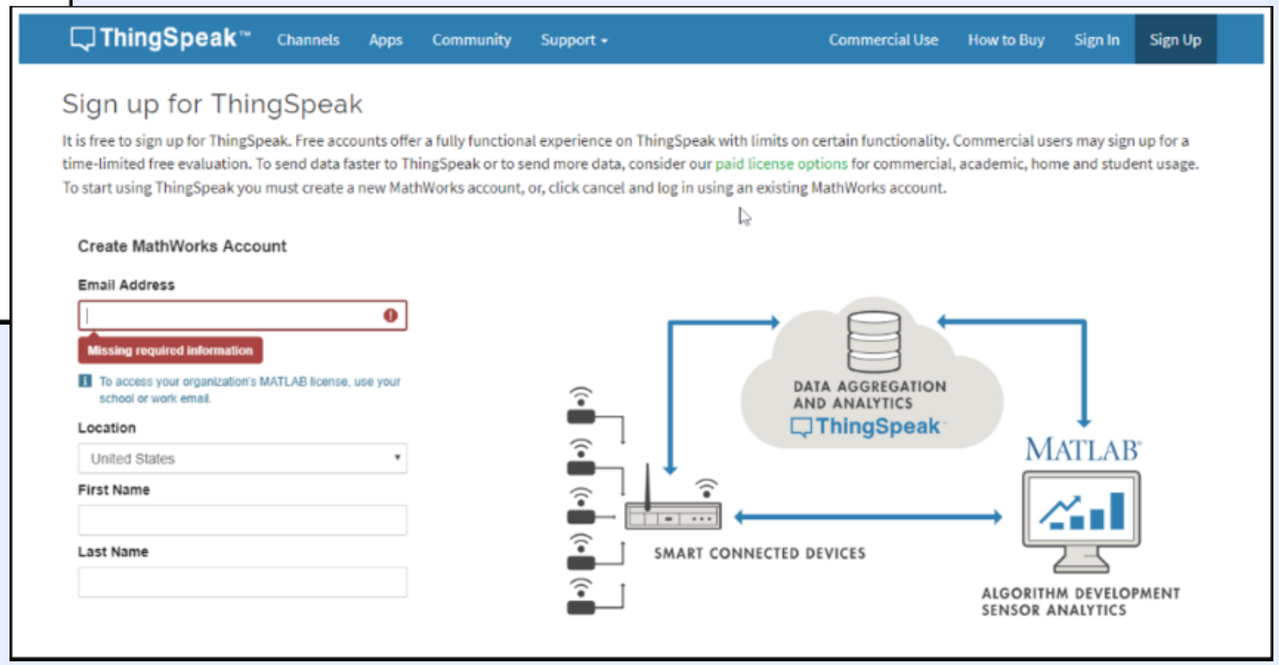
ThingSpeak Set Up (1)



Step 1: Sign up in https://thingspeak.com



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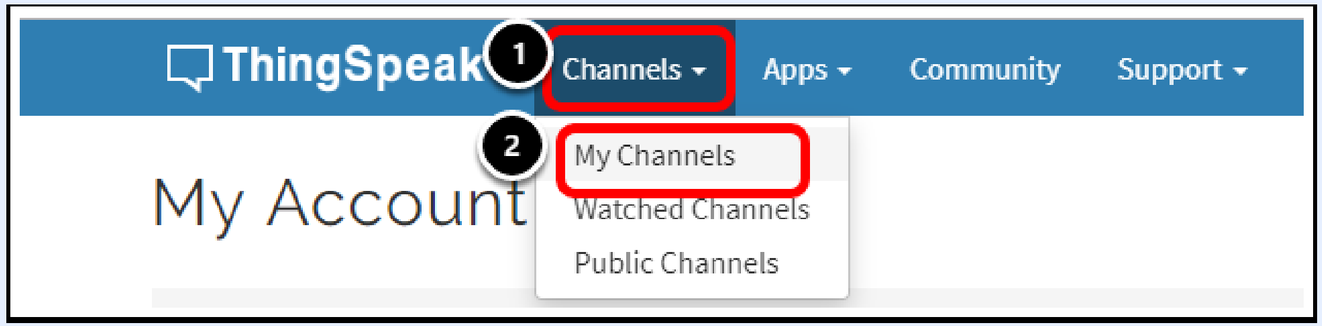
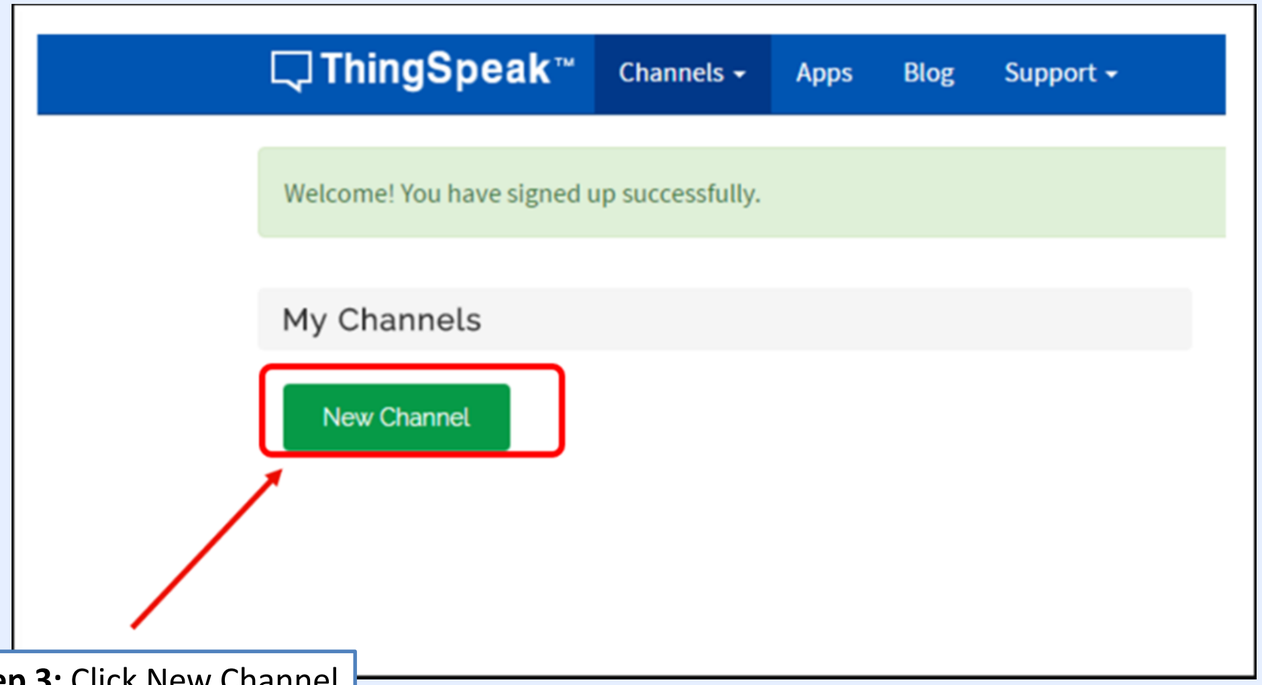
ThingSpeak Set Up (2)



Step 2: After login 'ThingSpeak', click Channels and choose 'My Channels'



Step 3: Click New Channel

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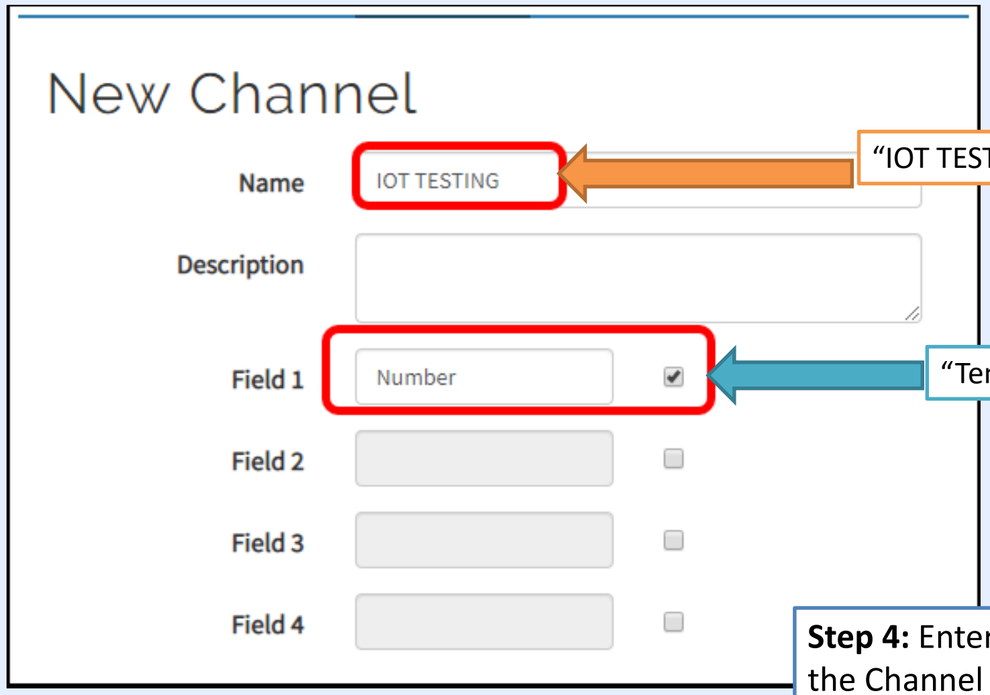
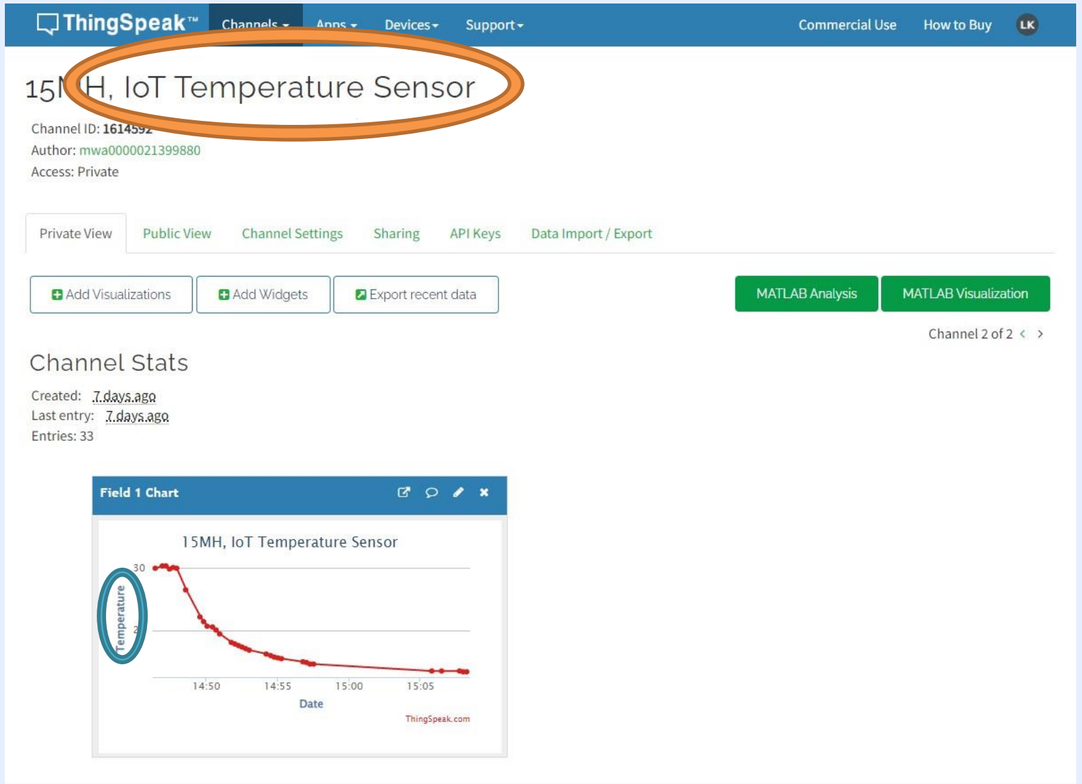
ThingSpeak Set Up (3)



"IOT TESTING" (for example)

"Temperature"

Step 4: Enter the name of the Channel and add a name in 'Field' to record the data.



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ThingSpeak Guideline (1)

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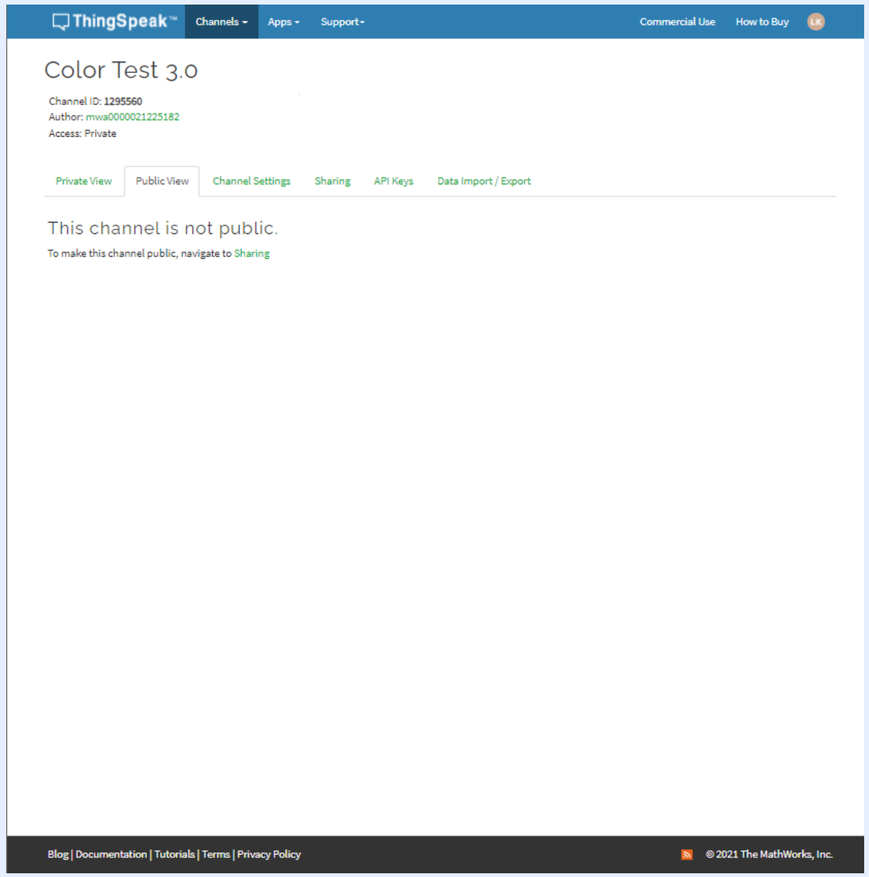
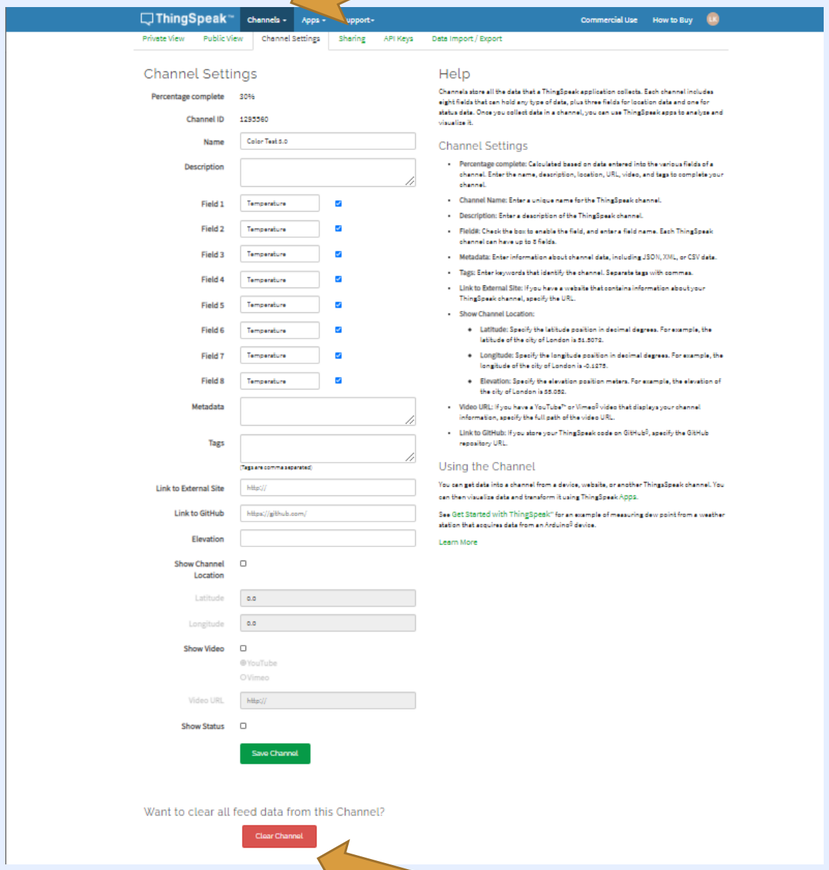
ThingSpeak Guideline (2)

1.Share



2. Edit(clear data)



Clear Channel

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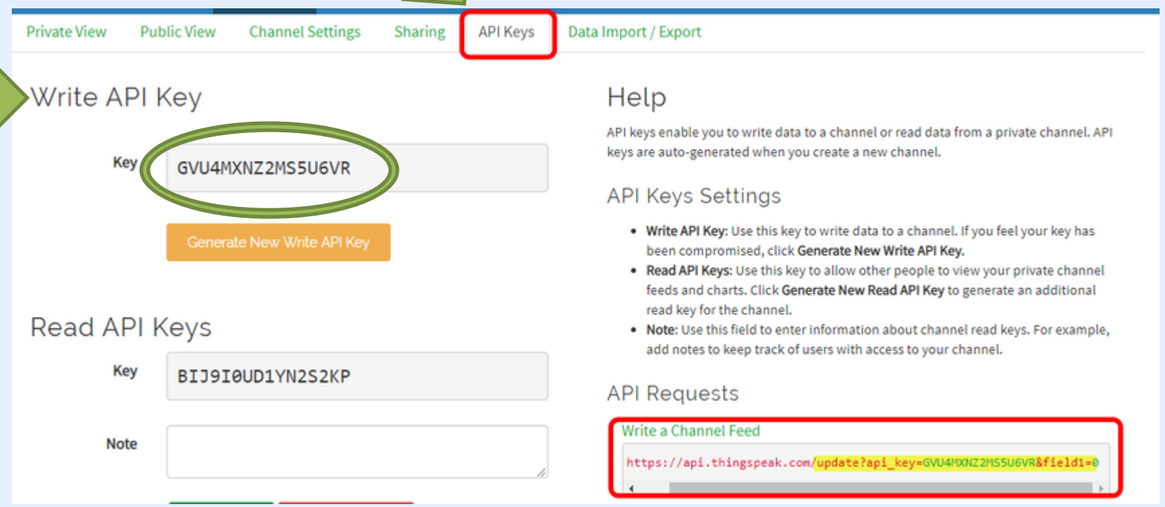
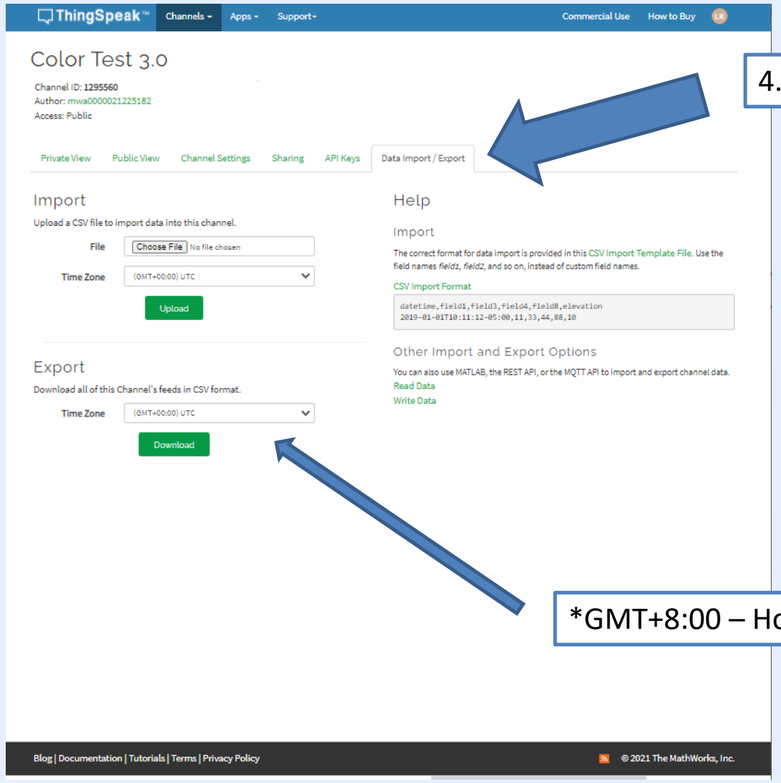
ThingSpeak Guideline (3)

3. API Key (Coding)



4. Download data(Excel)



*GMT+8:00 – Hong Kong

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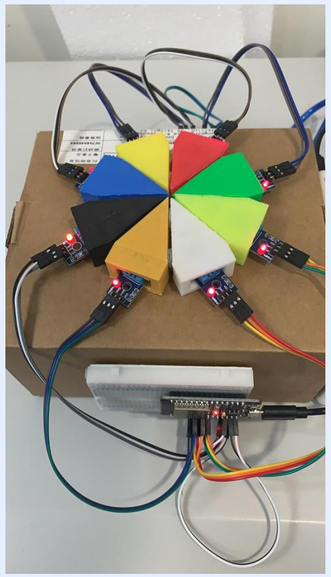
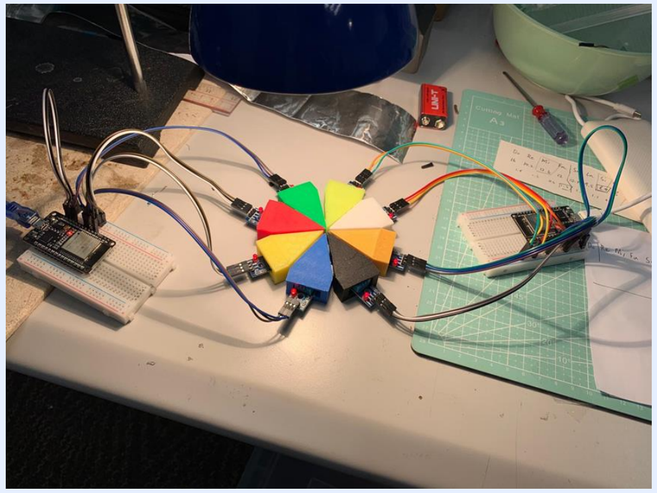
ThingSpeak & Excel Reference





Q30

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
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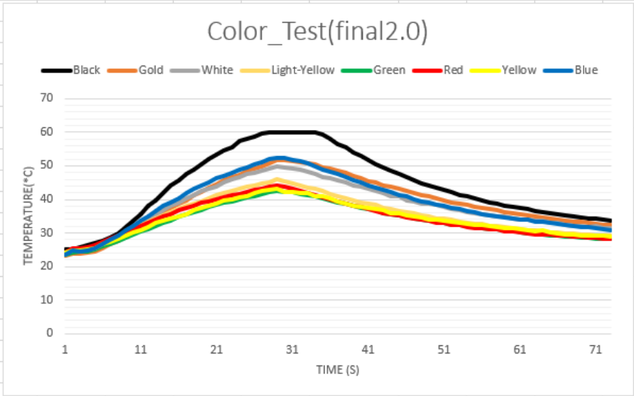
2	2021-02-0	1	25.1	23.3	23.8	23.7	23.4	24.3	24.1	23.7				
3	2021-02-0	2	25.2	23.9	24.9	25	24.3	25.6	24.9	24.7				
4	2021-02-0	3	25.8	24	25	25.3	24.5	25.6	24.9	24.6				
5	2021-02-0	4	26.5	24.2	25.1	25.2	24.6	25.7	25	24.8				
6	2021-02-0	5	27.1	24.5	25.5	25.6	25.2	26.4	25.5	25.6				
7	2021-02-0	6	27.7	25.6	26.6	26.8	26	27.3	26.6	26.8				
8	2021-02-0	7	28.6	26.6	27.9	27.9	26.8	28.3	27.5	28.1				
9	2021-02-0	8	29.9	27.7	29.1	29	27.7	29.2	28.4	29.2				
10	2021-02-0	9	31.8	29	30	30	28.5	30.1	29.3	30.7				
11	2021-02-0	10	33.7	30.3	31.7	31.1	29.5	31.2	30.1	32.2				
12	2021-02-0	11	35.7	31.5	33	32.3	30.4	32.1	30.9	33.6				
13	2021-02-0	12	38	33.1	34.1	33.4	31.2	33.1	31.9	34.9				
14	2021-02-0	13	39.8	34.6	35.4	34.4	32.2	34	33	36.5				
15	2021-02-0	14	41.9	35.9	36.9	35.2	33	34.8	33.6	38				
16	2021-02-0	15	44	37.4	38	36.3	33.8	35.7	34.4	39.2				
17	2021-02-0	16	45.6	38.7	39	37.1	34.8	36.7	35.1	40.4				
18	2021-02-0	17	47.5	39.8	40.2	38.1	35.5	37.5	35.7	41.9				
19	2021-02-0	18	48.8	41.3	41.3	38.8	36.2	38.1	37	43.1				
20	2021-02-0	19	50.6	42.3	42.4	39.5	37	38.9	37.5	44				
21	2021-02-0	20	52	43.4	43.3	40.2	37.7	39.4	38.2	45.2				
22	2021-02-0	21	53.4	44.3	43.9	41.2	38.3	40	38.8	46.2				
23	2021-02-0	22	54.6	45.6	45.1	41.8	38.9	40.5	39.8	47				
24	2021-02-0	23	55.6	46.5	46	42.4	39.4	41.2	40.1	47.8				
25	2021-02-0	24	57.4	47.4	46.7	43.1	40.1	41.7	40.5	48.8				
26	2021-02-0	25	58	48.4	47.5	43.7	40.6	42.3	41	49.4				
27	2021-02-0	26	58.8	49.3	48	44.1	41.1	42.7	41.9	50.3				
28	2021-02-0	27	59.6	49.9	48.7	44.6	41.5	43.3	42.4	51.1				
29	2021-02-0	28	60	50.9	49.3	45.1	42.1	43.9	42.8	52				
30	2021-02-0	29	60	51.6	49.7	45.9	42.5	44.1	43.3	52.2				
31	2021-02-0	30	60	51.6	49.6	45.3	42.2	43.7	42.3	52.2				
32	2021-02-0	31	60	51.5	49.1	44.8	42.1	43.1	42.3	51.7				
33	2021-02-0	32	60	51.2	48.8	44	41.7	42.4	42	51.5				
34	2021-02-0	33	60	50.8	48.2	43.6	41.3	42	41.8	50.7				
35	2021-02-0	34	60	50.6	47.6	43.1	41	41.2	40.9	49.8				
36	2021-02-0	35	59.2	49.6	46.7	42.4	40.4	40.6	40.8	49				
37	2021-02-0	36	58.1	49.3	46.3	41.7	39.6	40	40.2	48.3				



3.33333E+81

Excel (REFERENCE)

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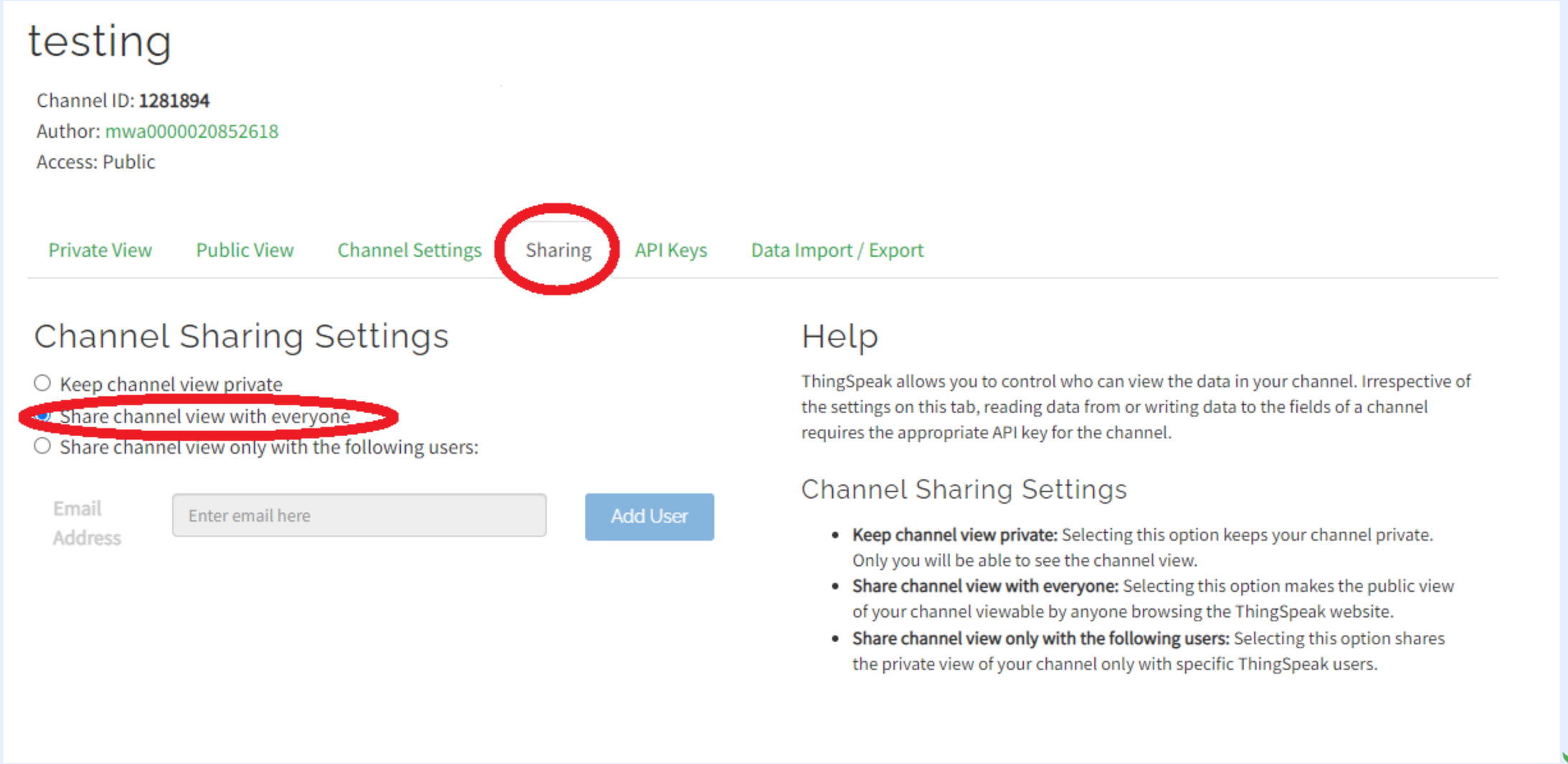
ThingSpeak Public View Sharing



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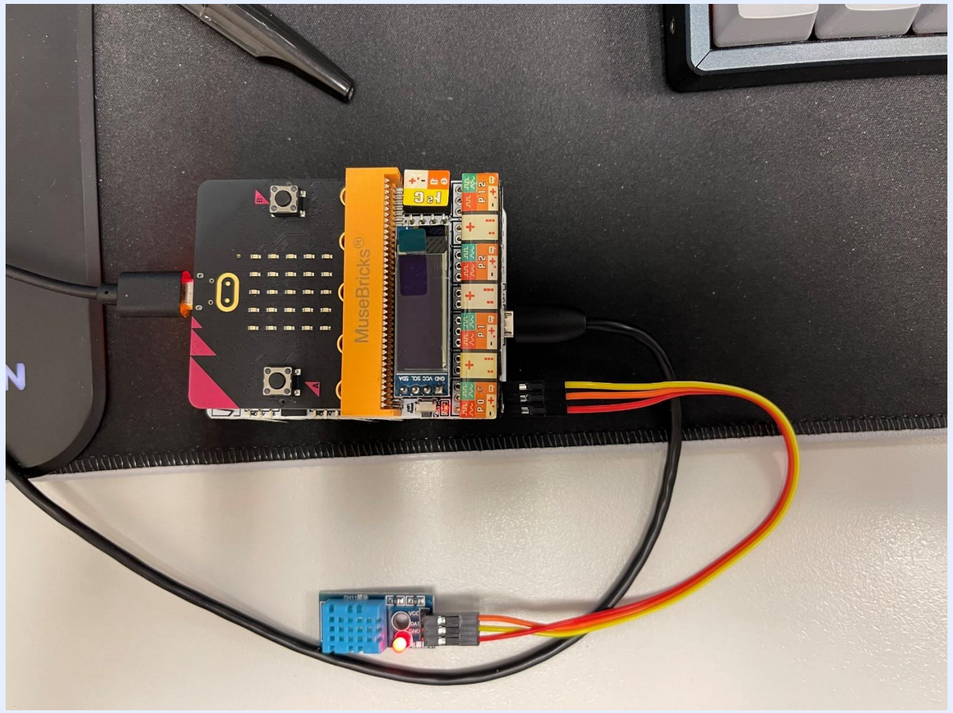
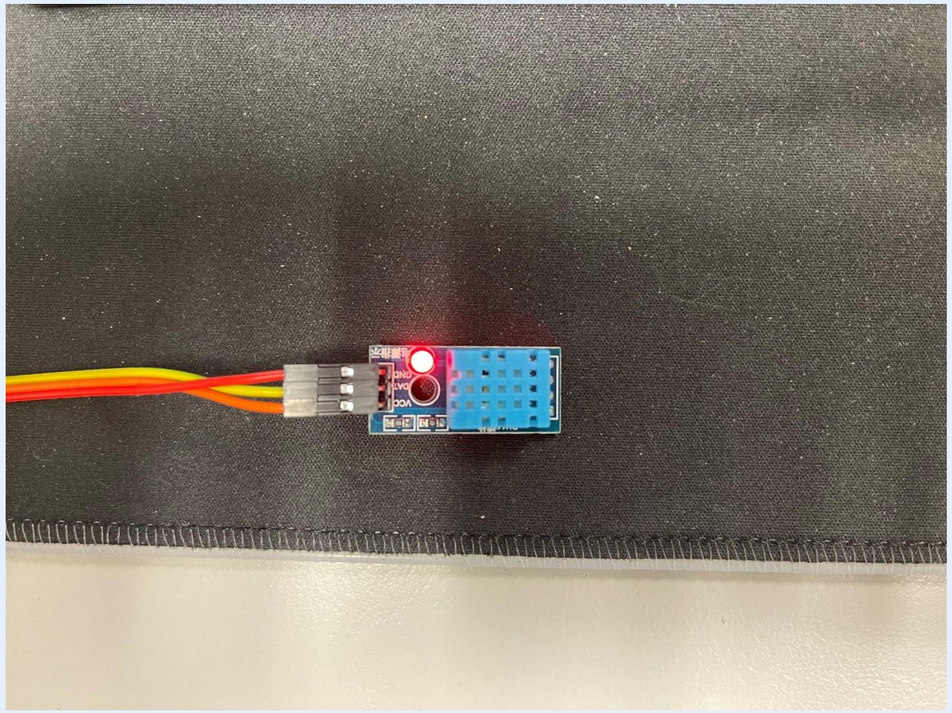
MuseLab



IoT Temperature Monitoring System



DHT11 humidity/temperature sensors

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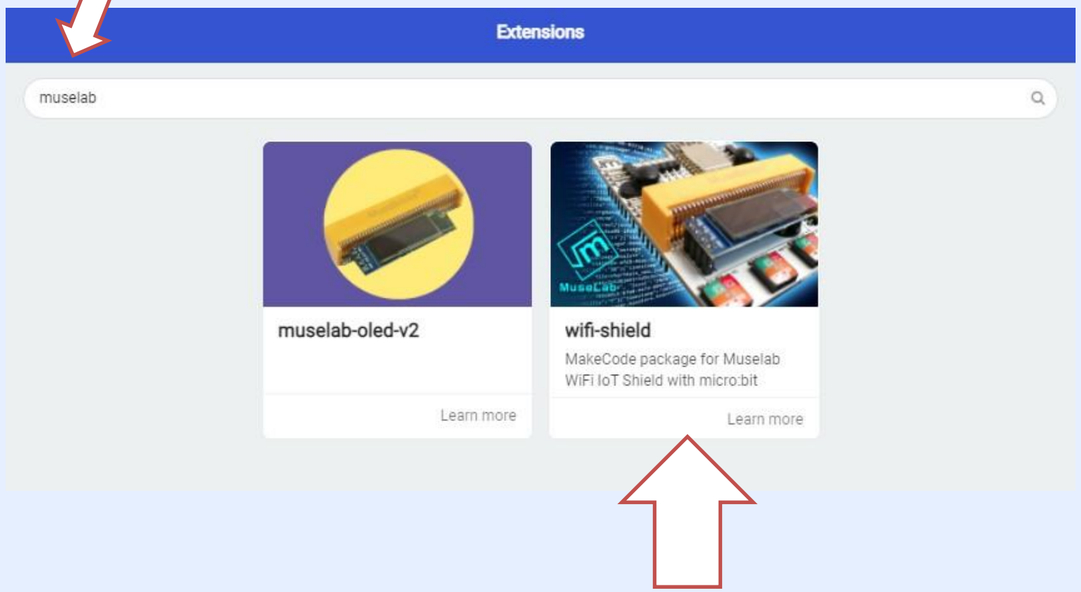
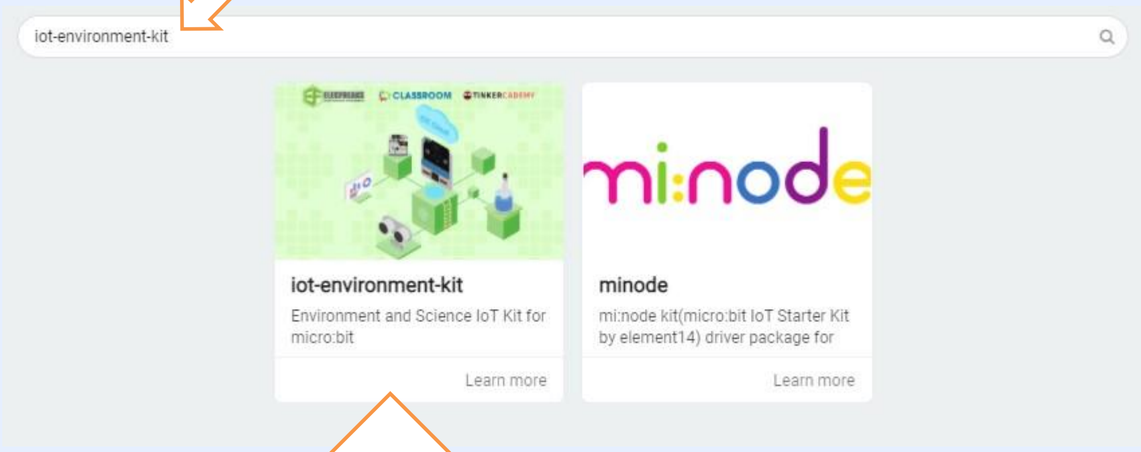
MakeCode extensions

MuseLab



Iot-environment-kit



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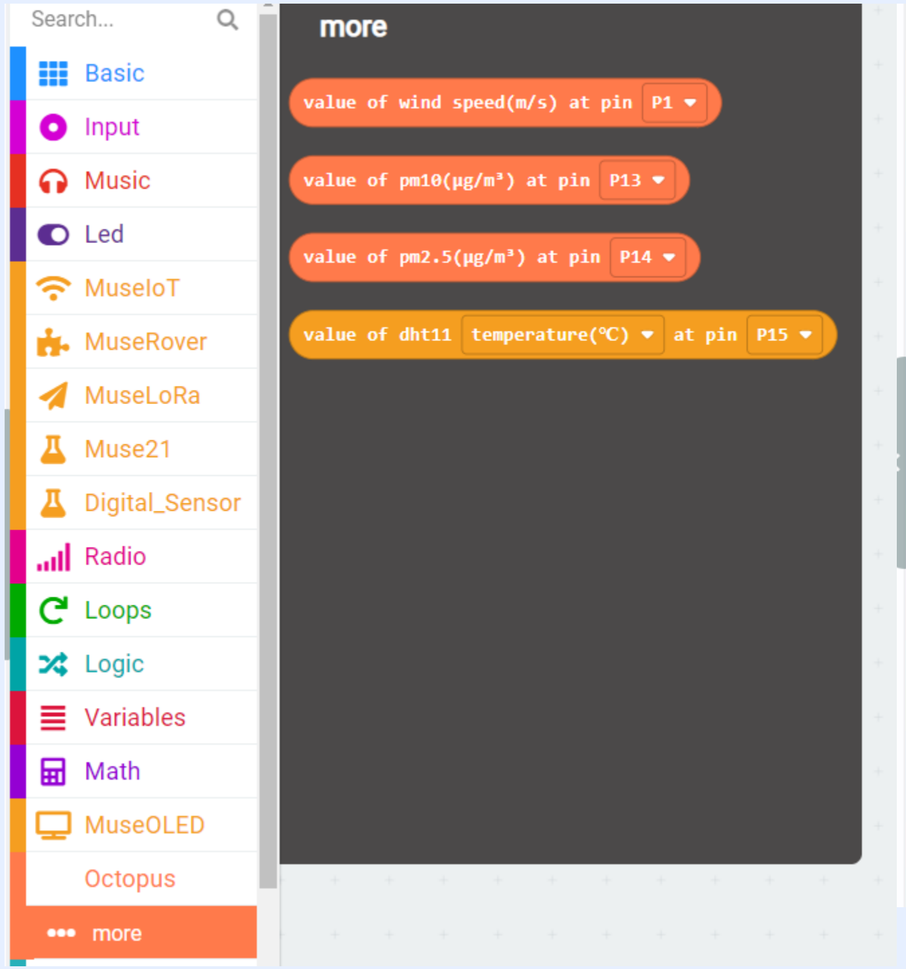
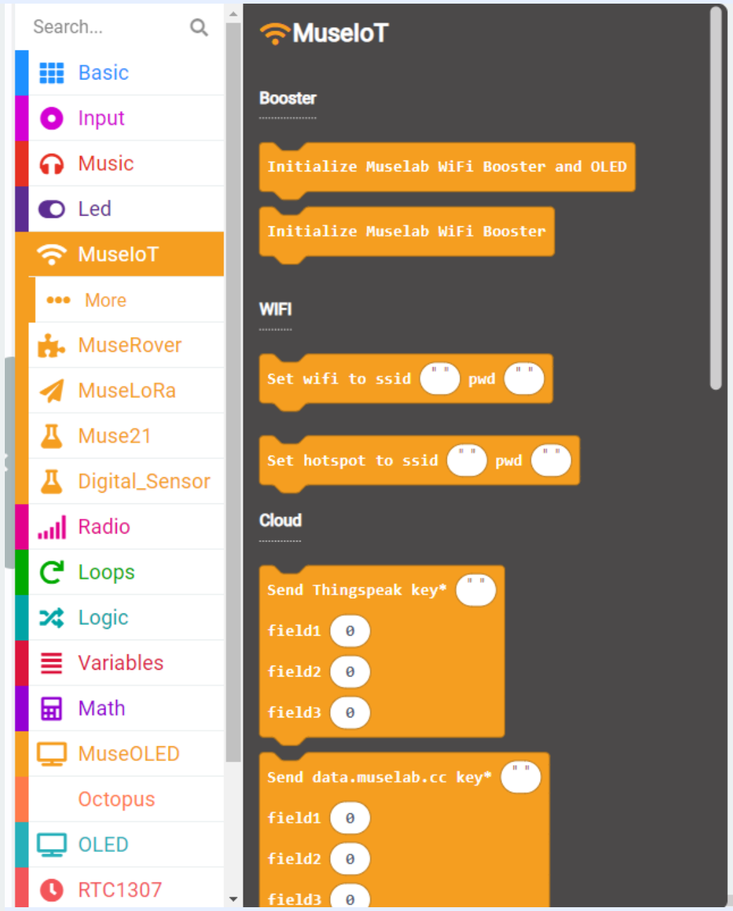
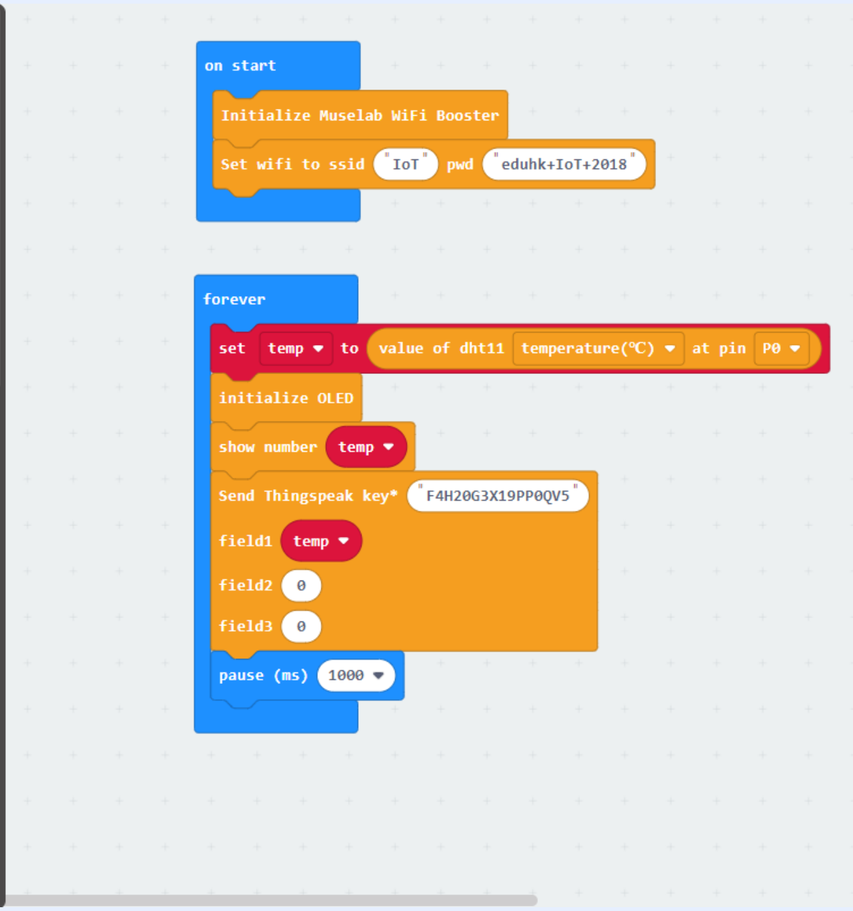
Makecode Coding







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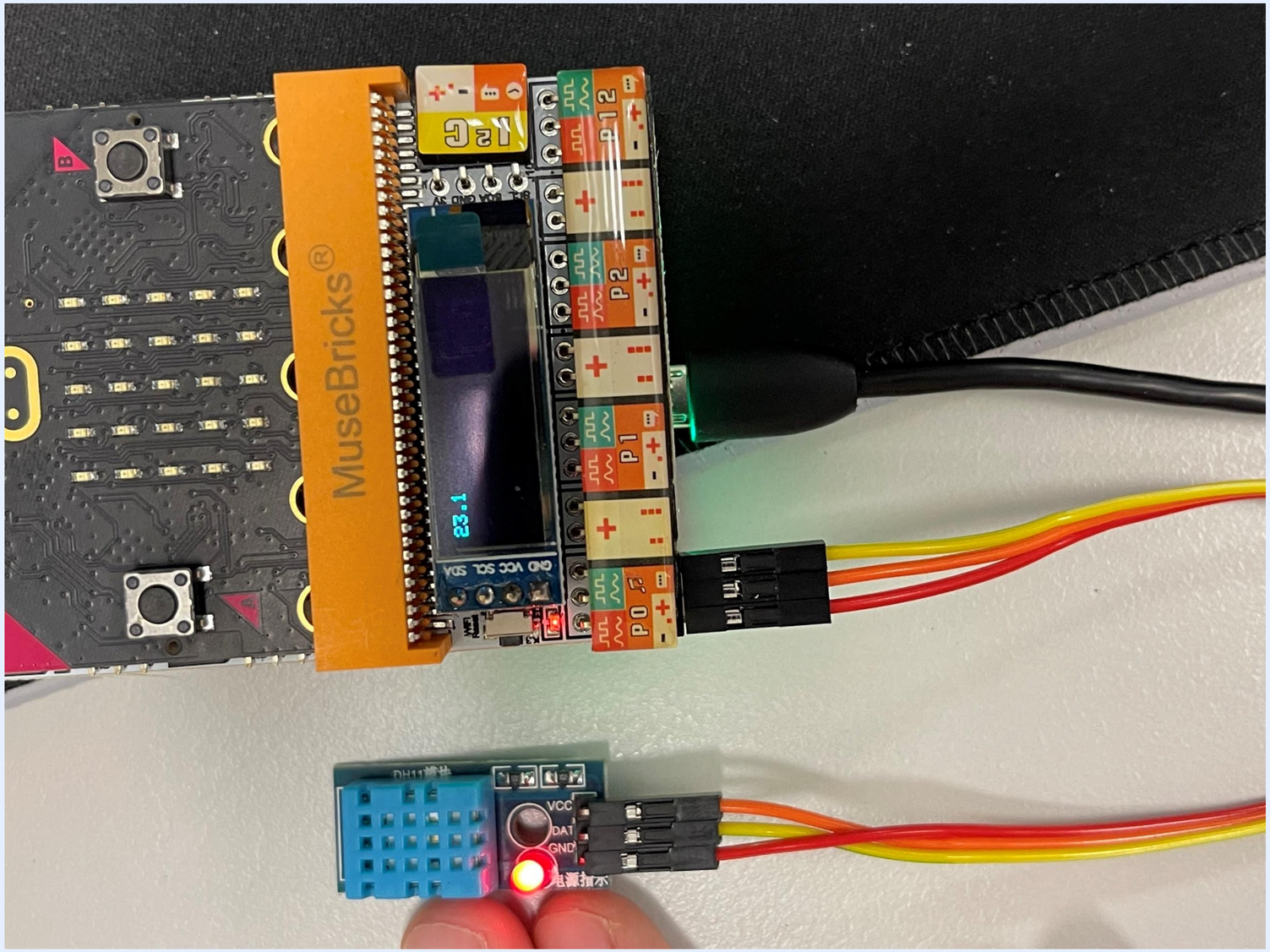
Circuit



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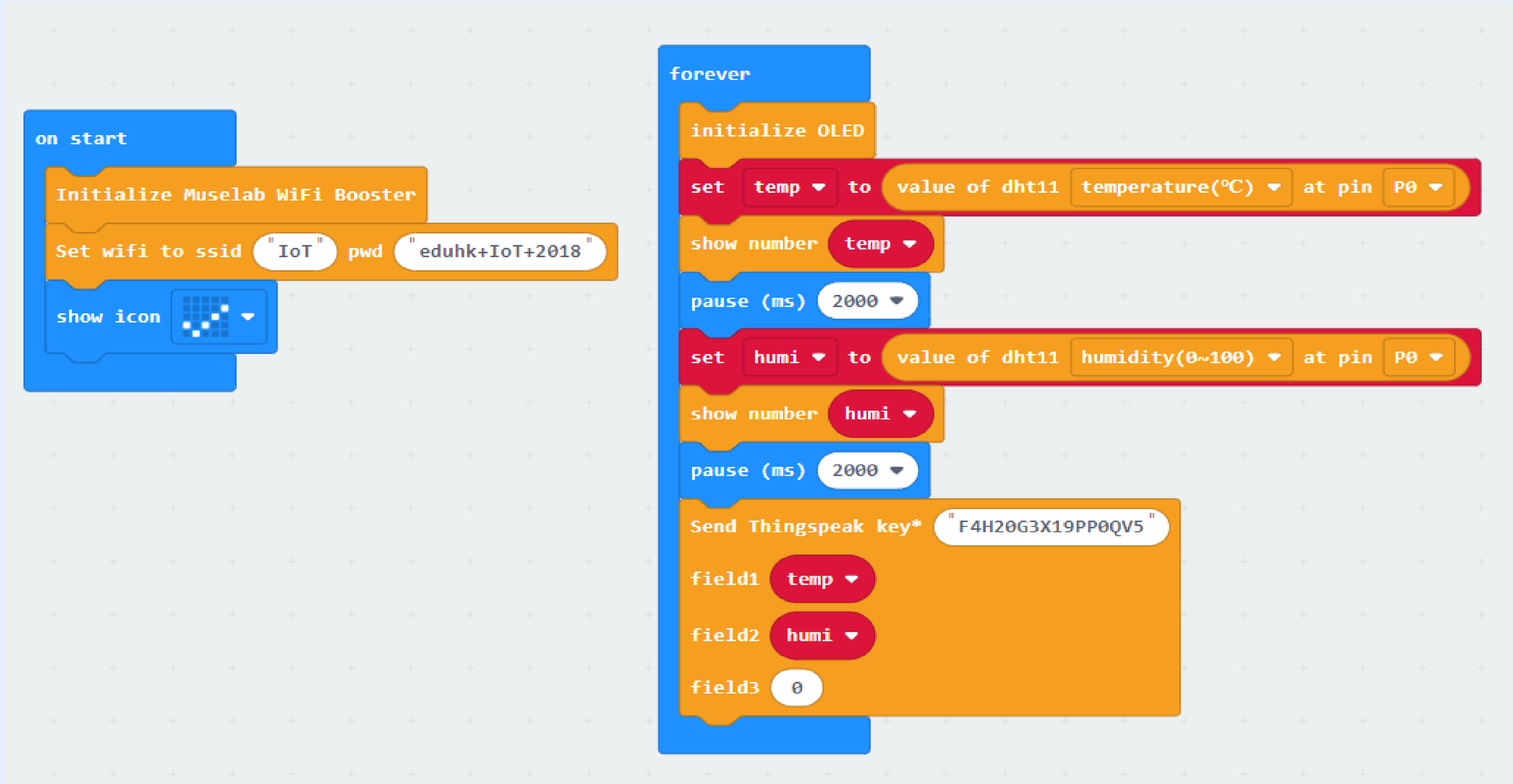
Circuit 2



https://makecode.microbit.org/_1owL0fdM5W8i

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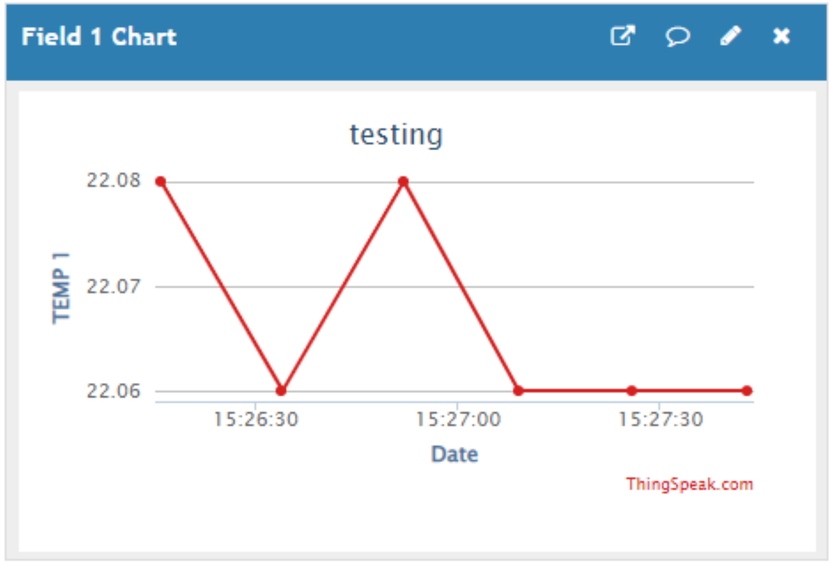
ThingSpeak

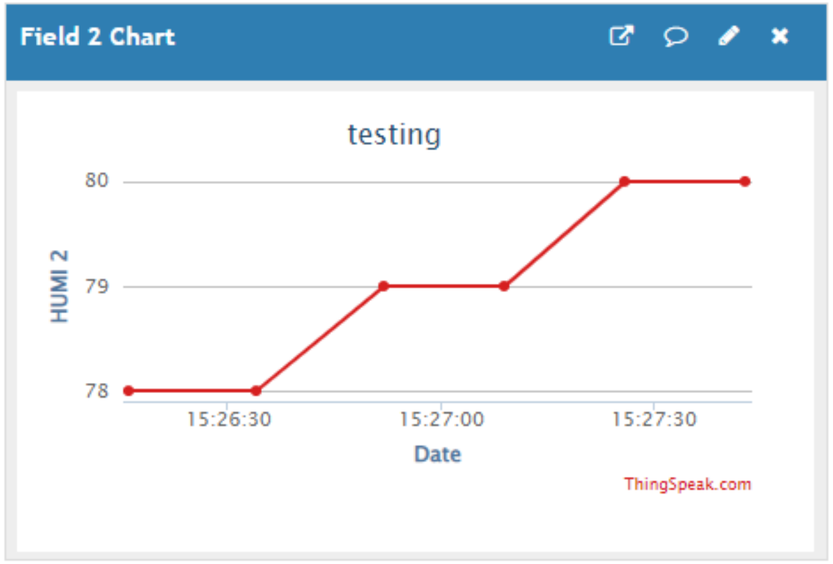
Private View | Public View | Channel Settings | Sharing | API Keys | Data Import / Export

Add Visualizations | Add Widgets | Export recent data | MATLAB Analysis | MATLAB Visualization

Channel Stats

Created: about a year ago
Last entry: less than a minute ago
Entries: 6





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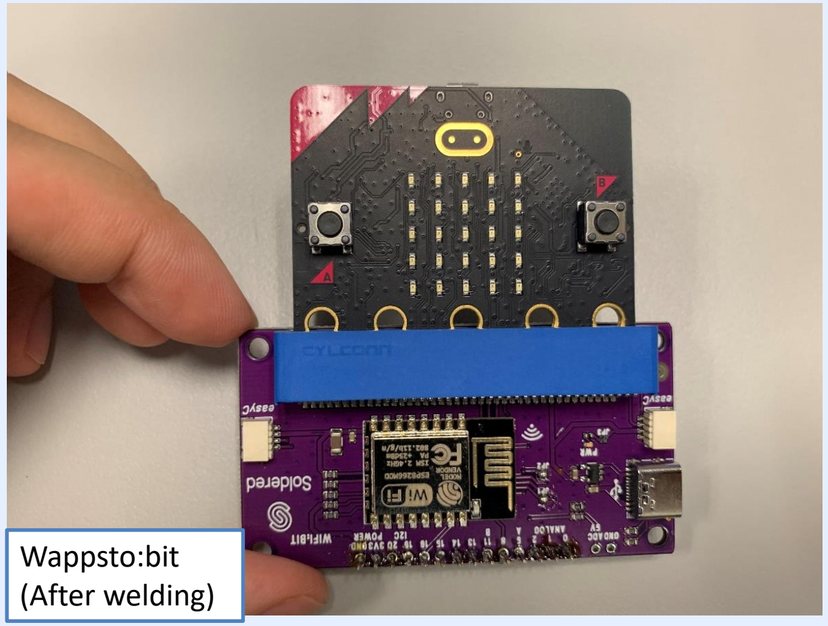
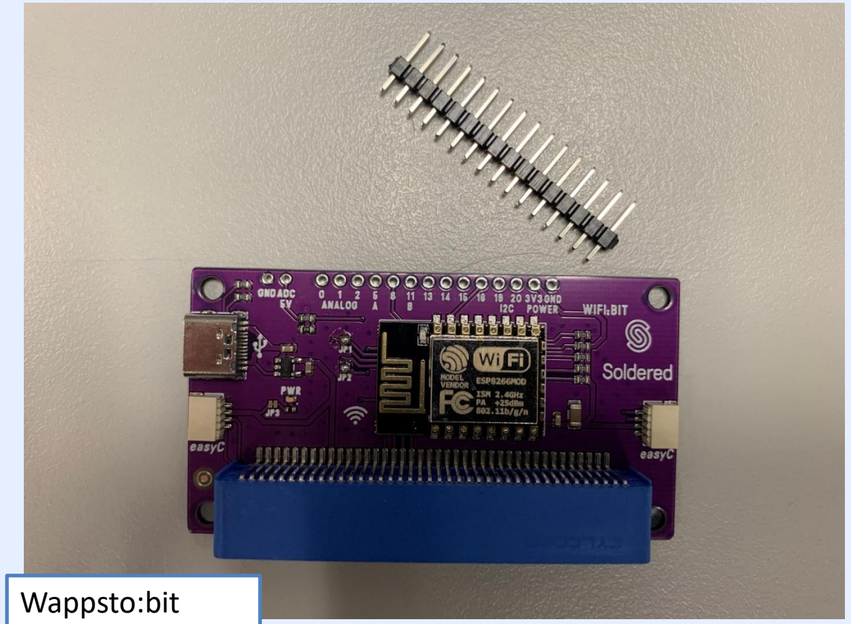
Wifi:bit



Wappsto:bit
(After welding)



Wappsto:bit
(Before welding)

ESP-8266

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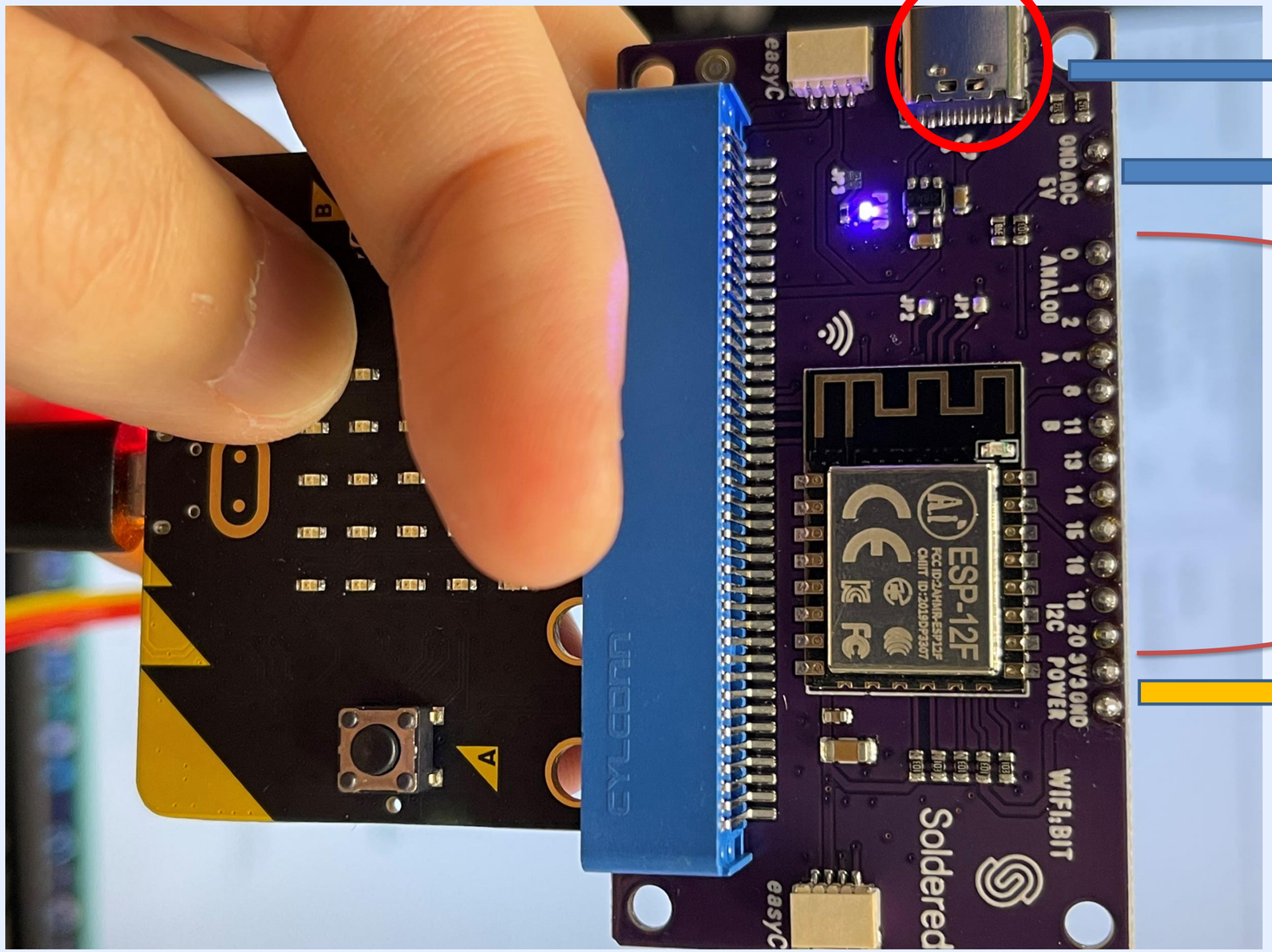
Wifi:bit



Power supply for Wifi:bit (Usb-type c)

5V power supply and GND

Data Pin

3.3V power supply and GND

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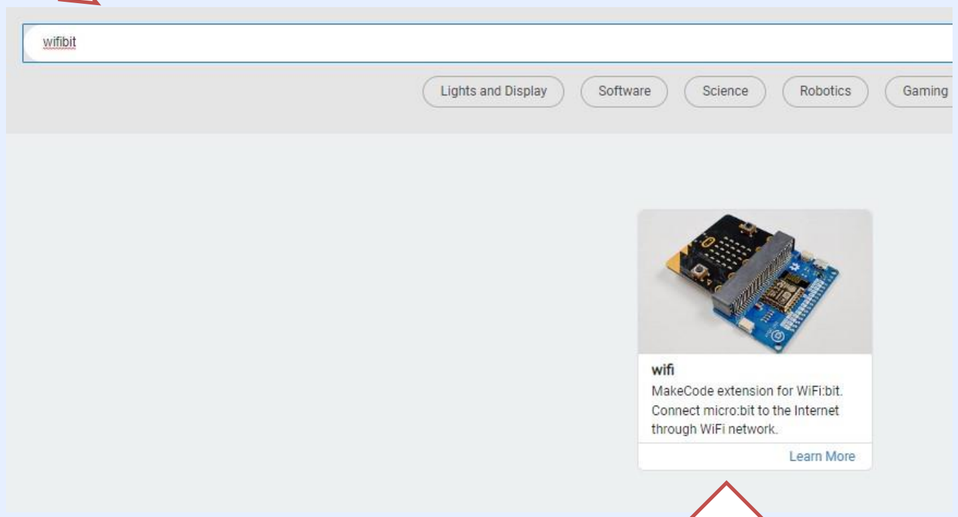
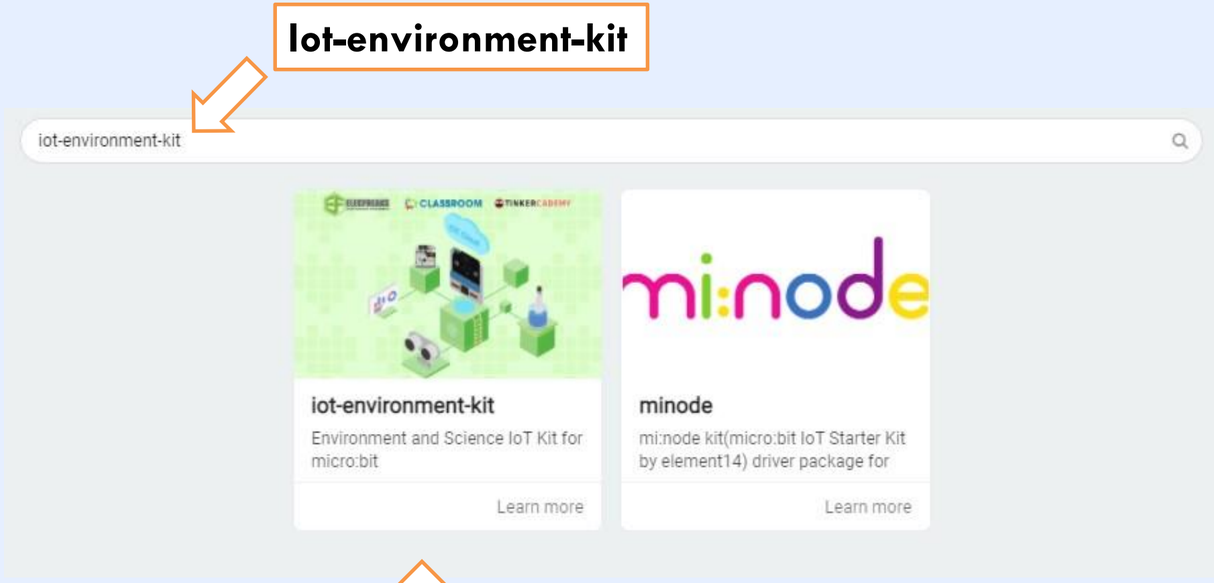
MakeCode extensions

Wifibit



Iot-environment-kit



Or you may use the sample code: https://makecode.microbit.org/_afK4hM8FUKfK

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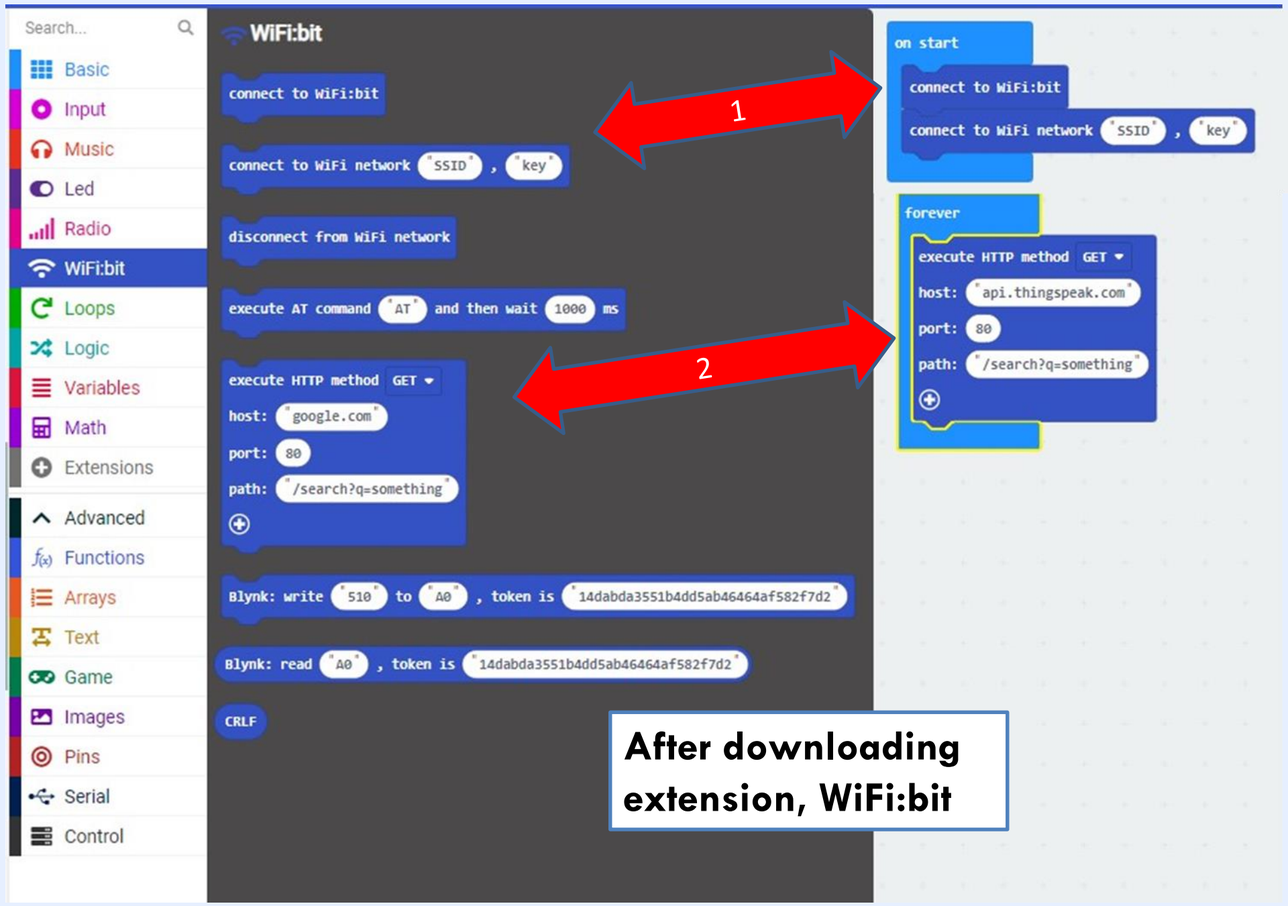
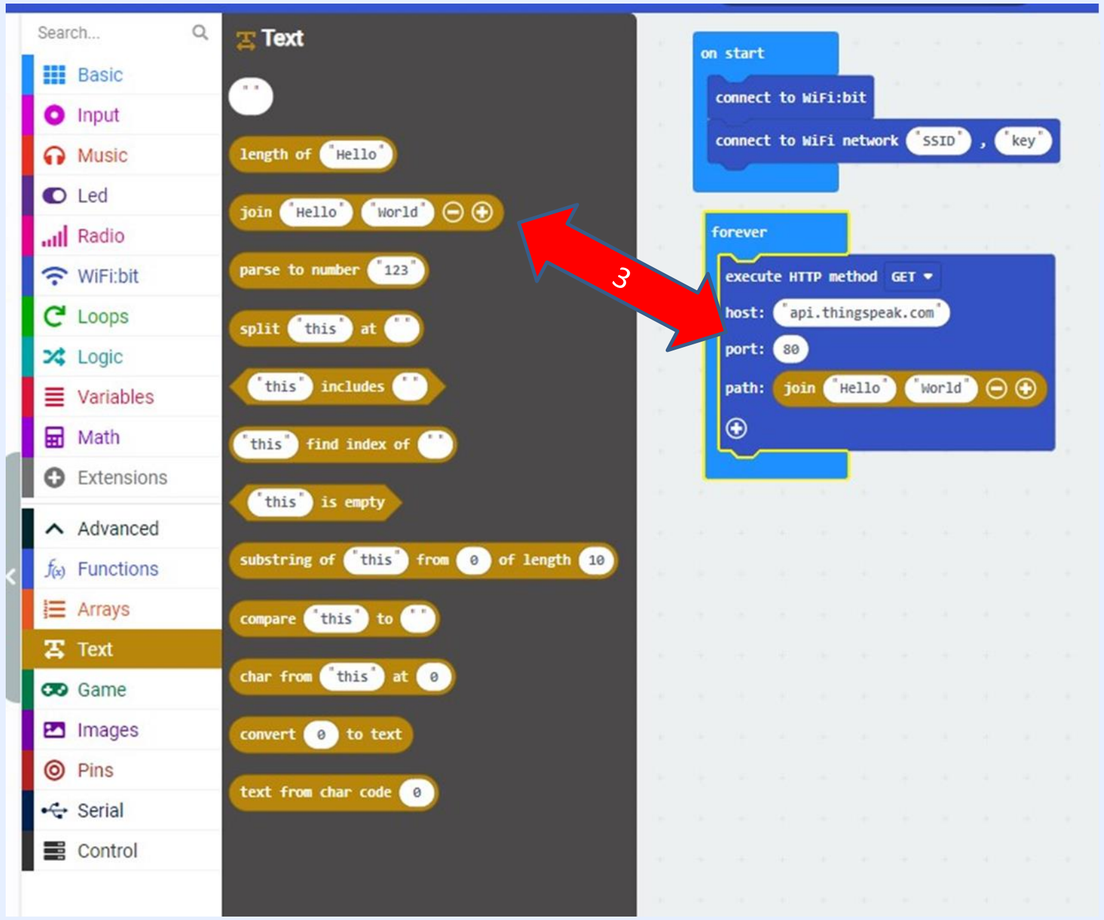
Coding (1)



After downloading extension, WiFi:bit



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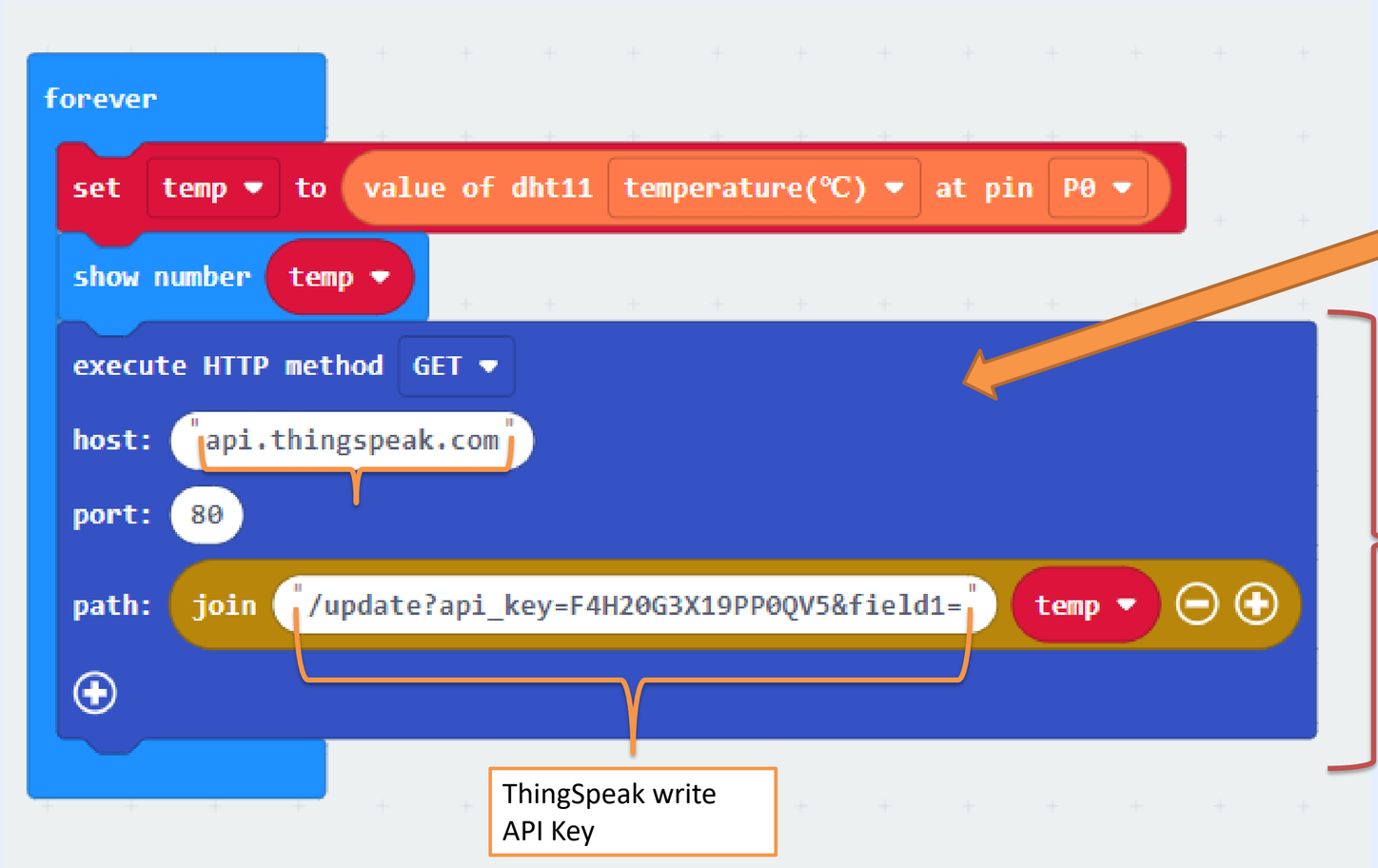
Coding (2)



Important*

API Requests

Write a Channel Feed

https://api.thingspeak.com/update?api_key=NBUA2KF3LO1BH9JP&field1=0

「api.thingspeak.com」

「/update ..... field1=」

Upload Data to one field

https://makecode.microbit.org/_M2EMr6RrYPzP

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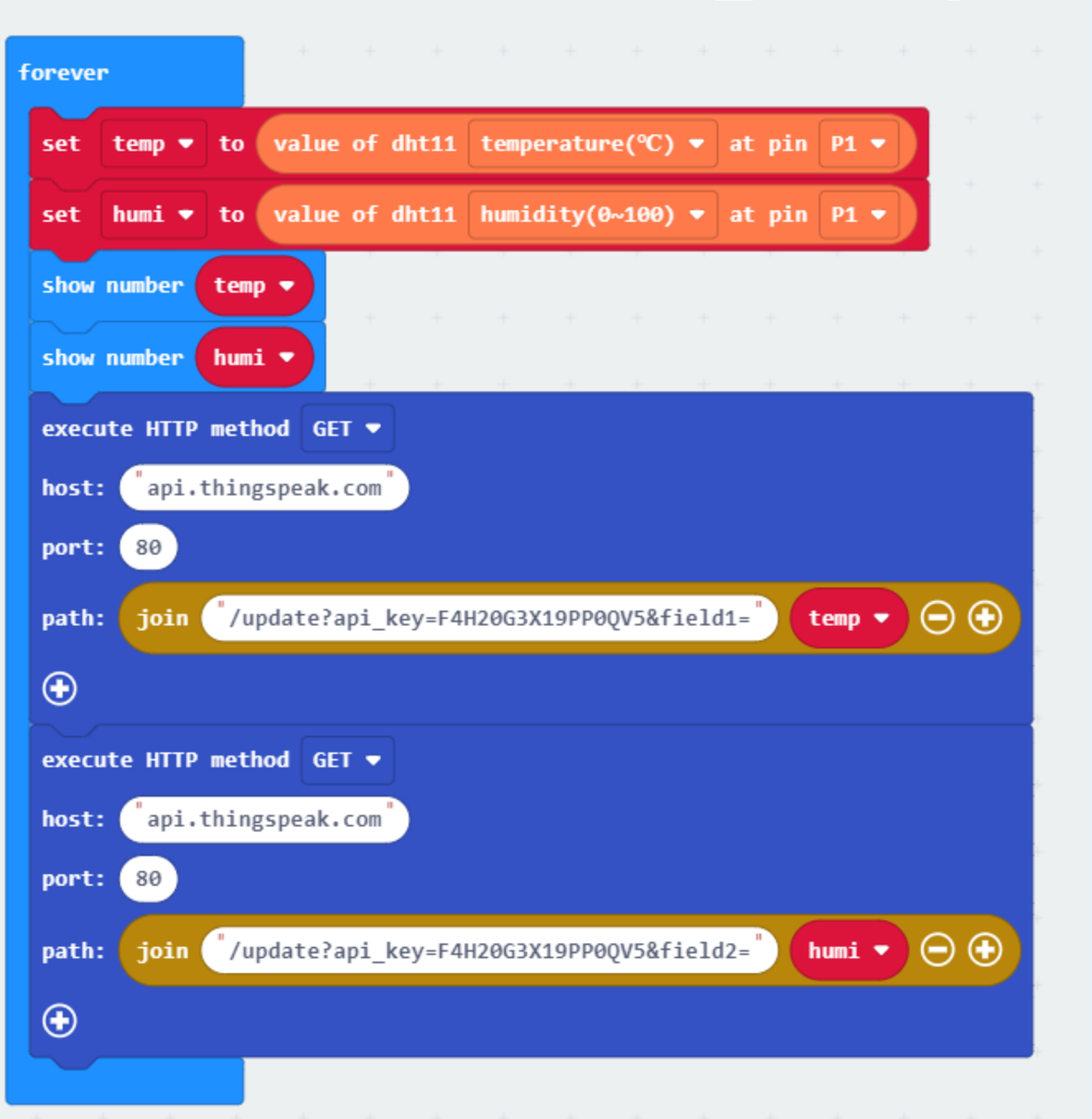
Coding (upload 2 fields)



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iot:bit

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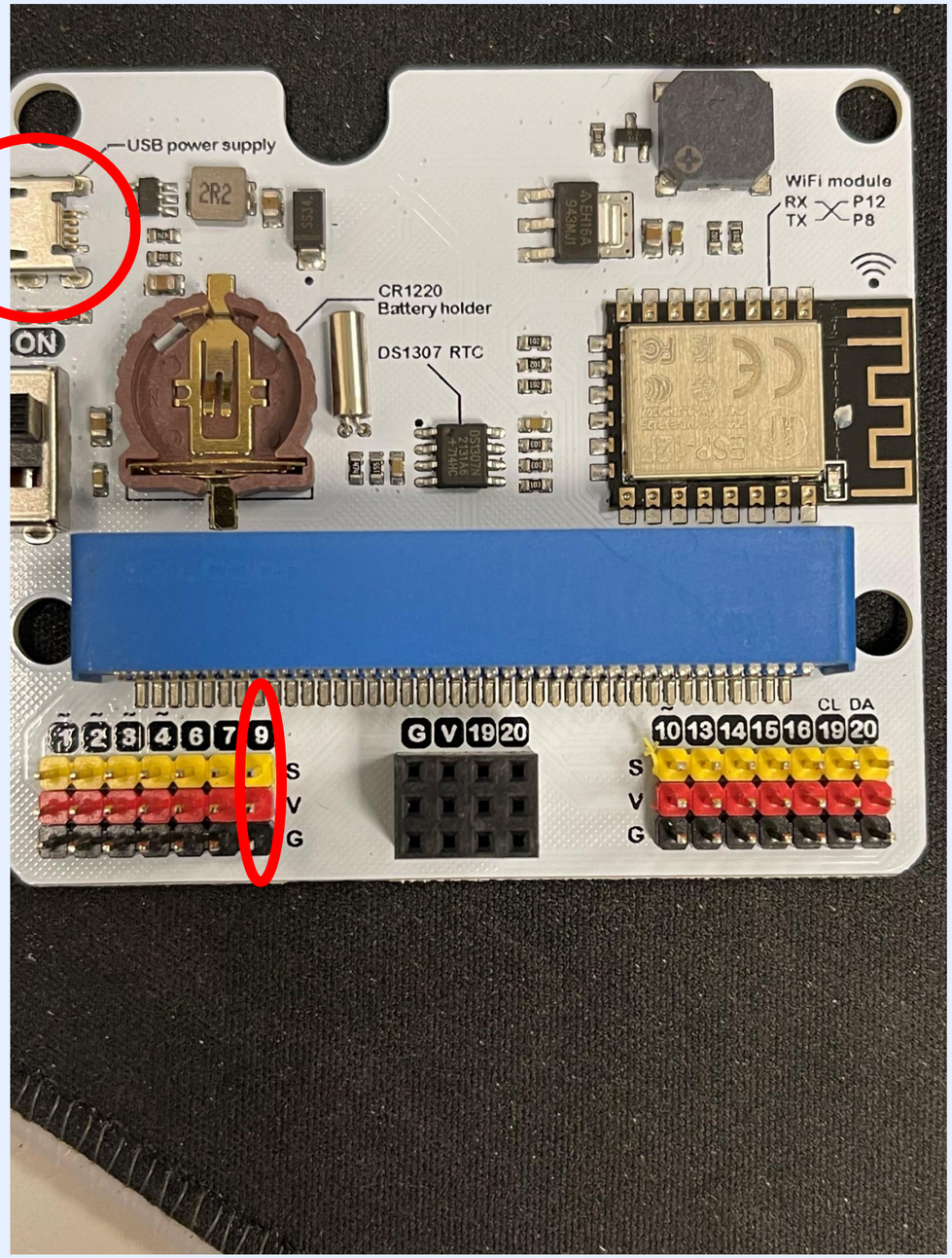
Power supply for iot:bit



S = Data pin
V = 3.3v power
G = GND

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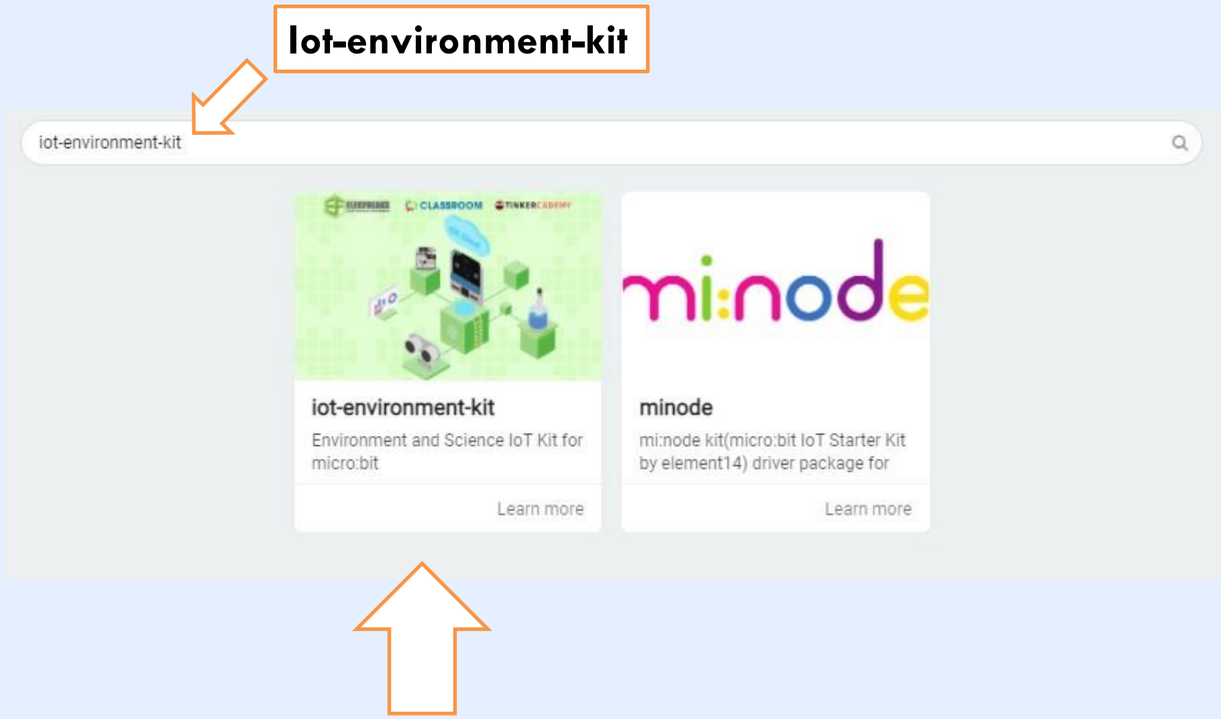
MakeCode extensions



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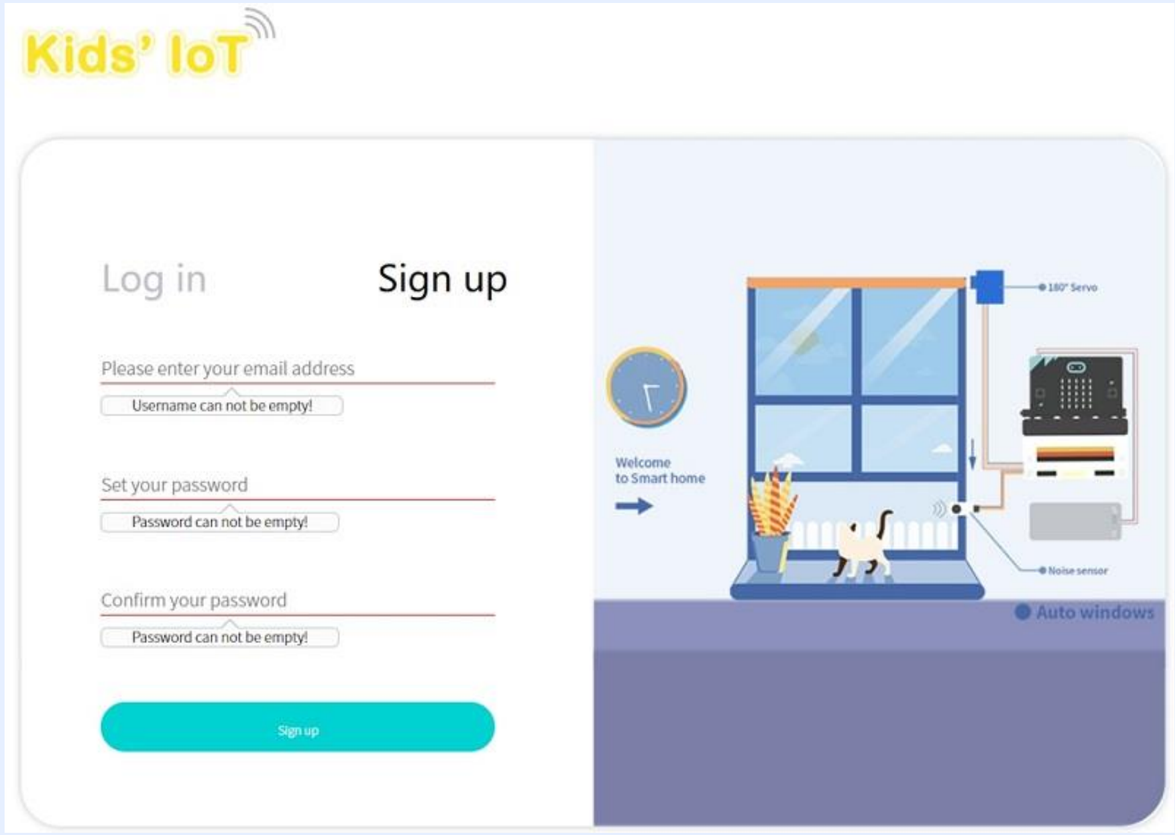
Coding 1 (KidsIoT)

- KidsIoT is a platform for IoT(Internet of Things) produced by Elecfreaks with only three minutues to get connected, it can achieve a remote control to the micro:bit.

- Step 1: Go to https://www.kidsiot.cn/
- Step 2: Sign Up



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- Step 3: Login
- Step 4: Click “log in” to enter the device manage interface, the “User Name” on the top left corner is your email address, the unique “User Token (User ID)” on the top right corner is the only identification code for this platform which is corresponding to your account.

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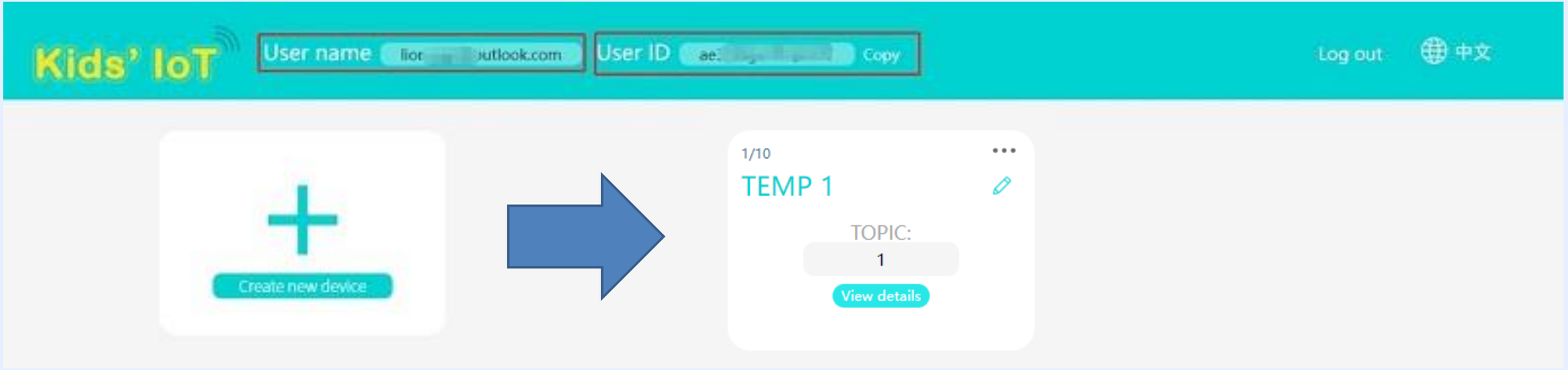
- Step 5: Create new device, “Topic” is the only identification code (the only device in the account), and you can revise the device name (only 10 devices can be created). Click “View Details” to see the data table and figure.



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Kids' IoT User name User ID 6YqrAhurNXIN Copy Log out 中文

Return to device list

Equipment_2

Last 10 Last 100 Export Data

No.	Time	Data
1	2019-11-02 16:13:58	29
2	2019-11-02 16:13:53	25
3	2019-11-02 16:13:48	42
4	2019-11-02 16:13:43	46
5	2019-11-02 16:13:38	48
6	2019-11-02 16:13:33	50
7	2019-11-02 16:13:28	47
8	2019-11-02 16:13:21	47
9	2019-11-02 16:13:16	15
10	2019-11-02 16:13:11	30

Remote Control

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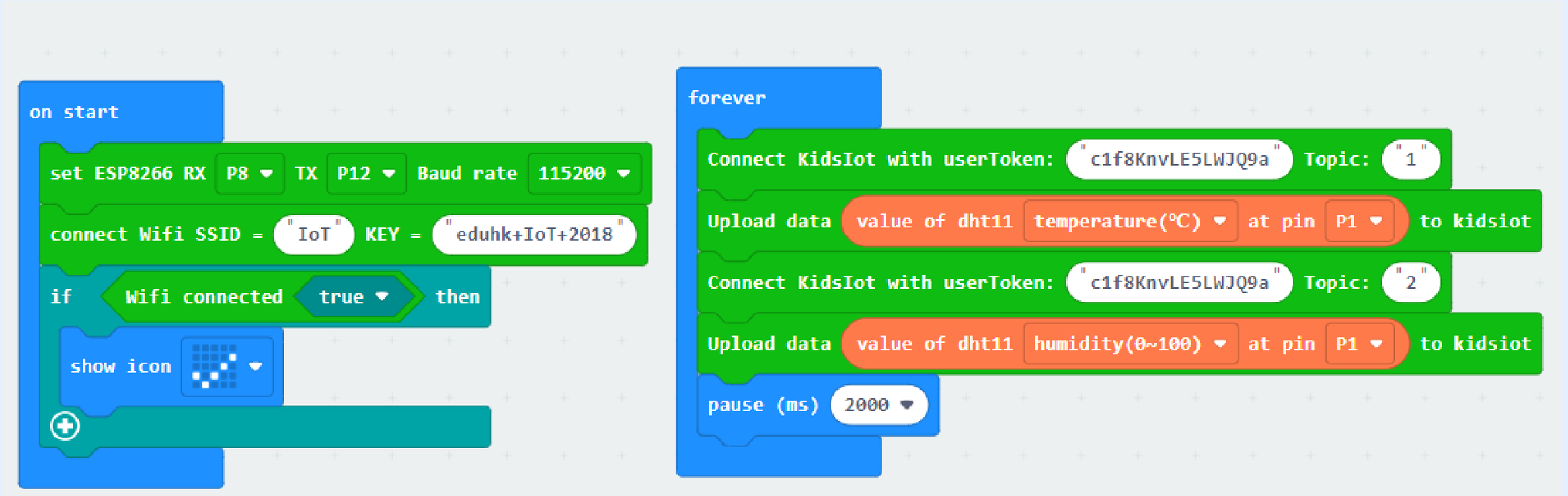
Write Code



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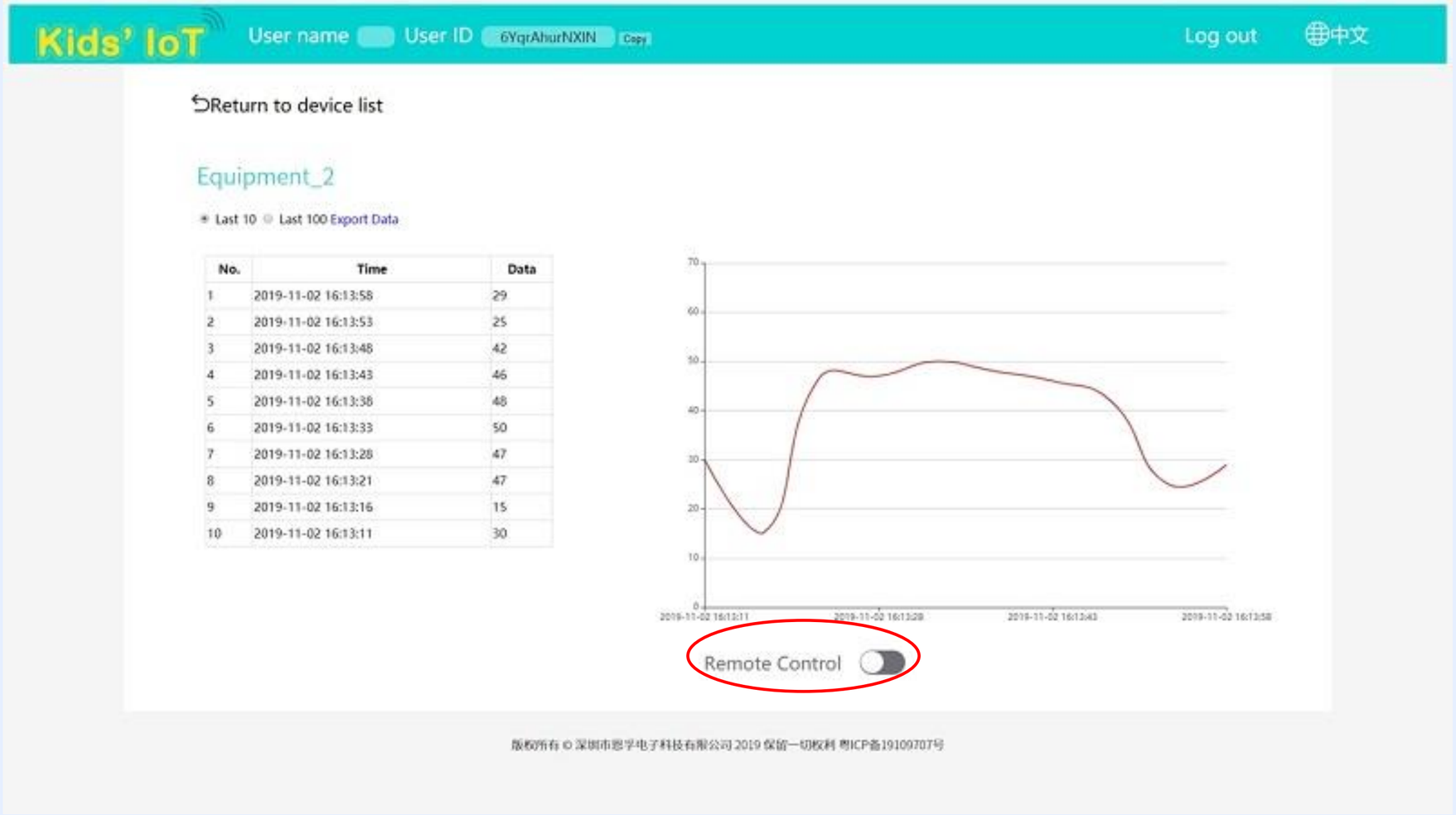
Special Function (Remote Control)



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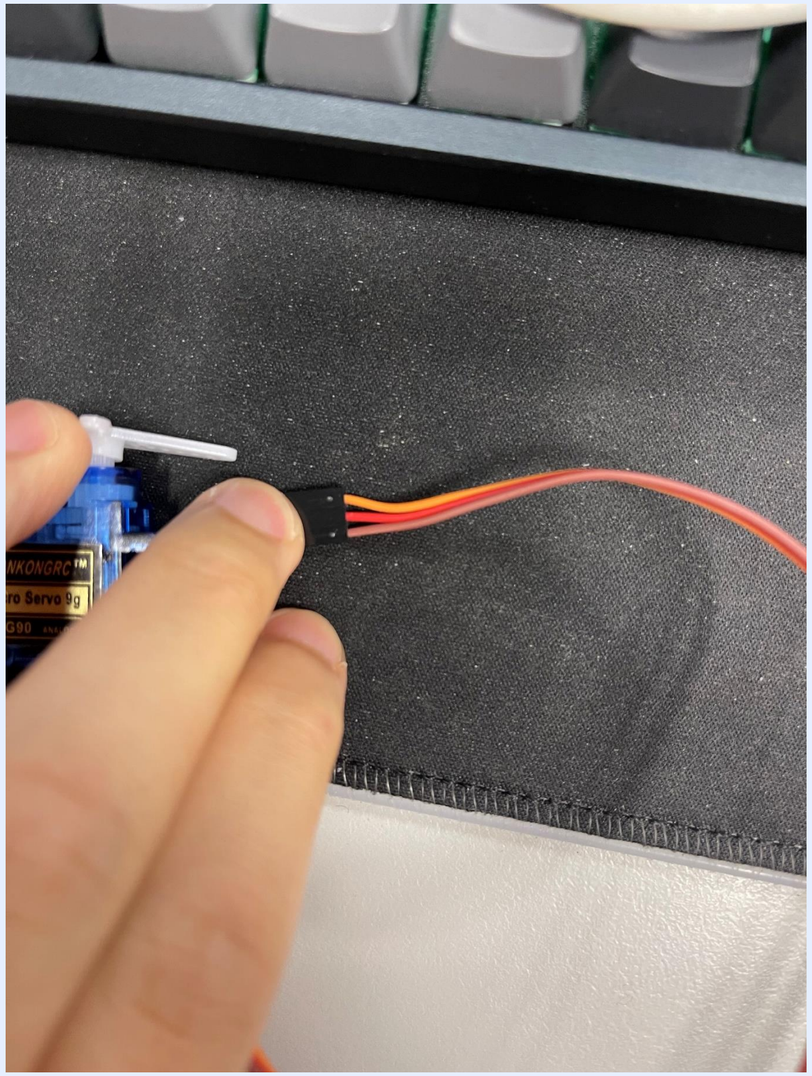
Special Function (Remote Control)



Micro Servo SG90 Analog

Orange -> Data
Red -> 3.3v
Brown -> GND

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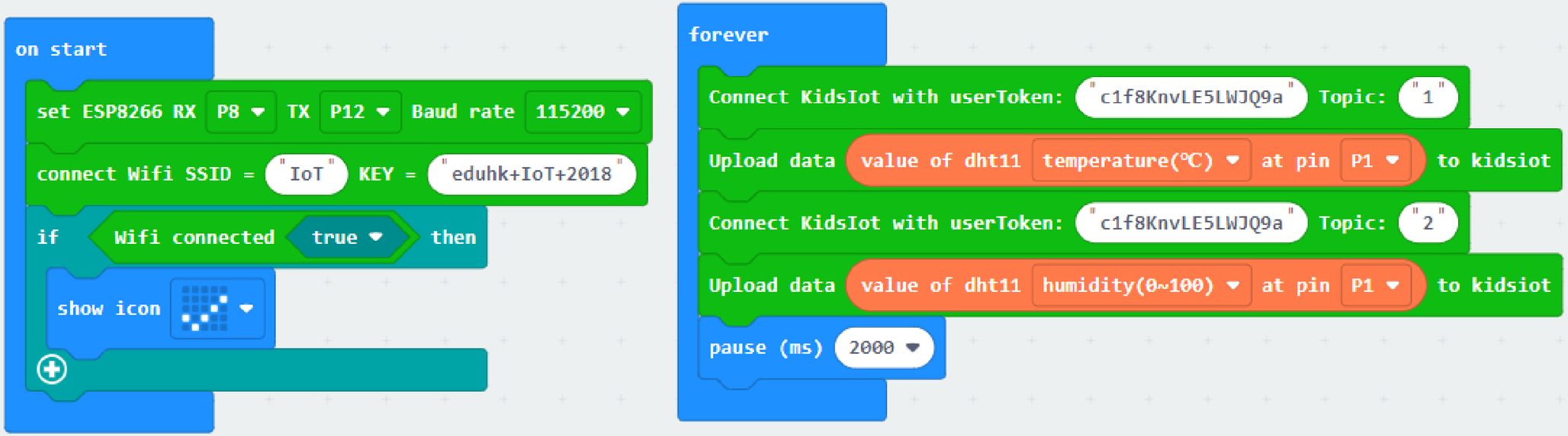
Write Code (Remote Control)



https://makecode.microbit.org/_XvCUup55w0J6

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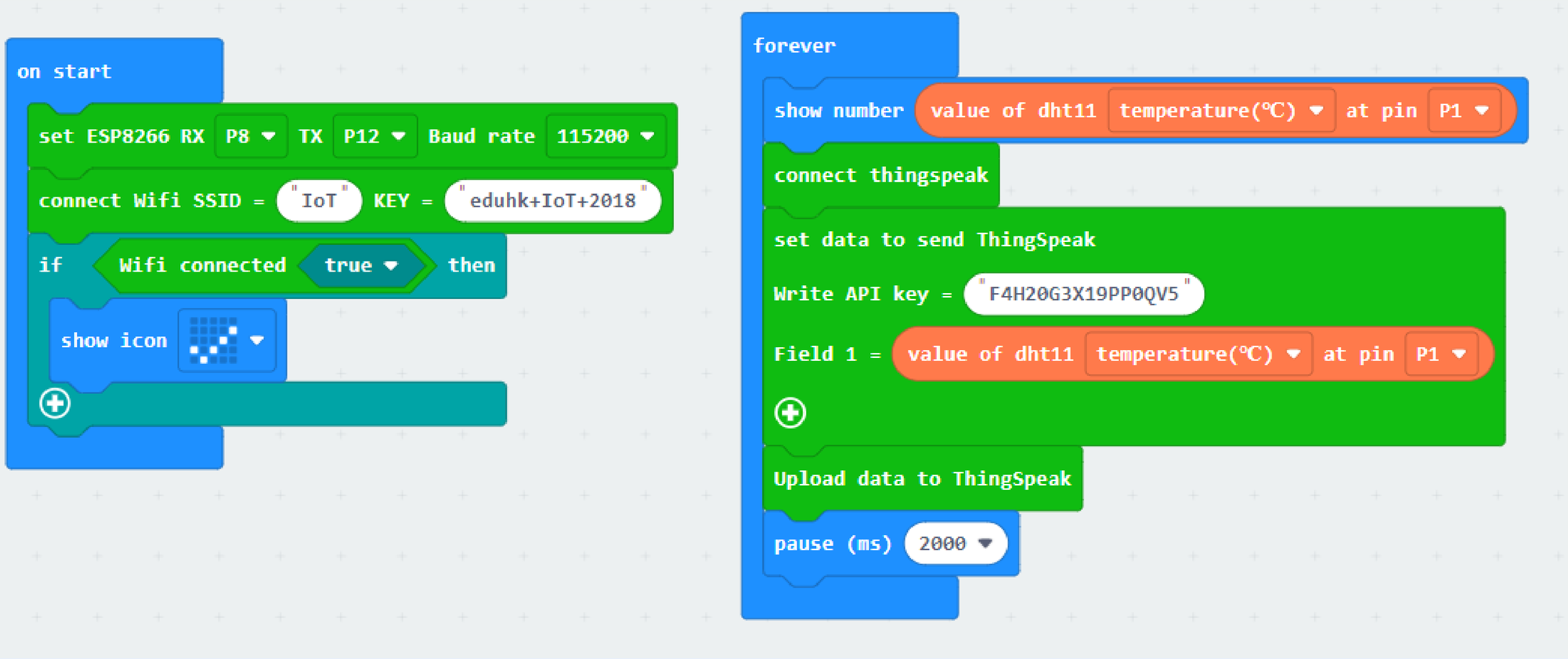
Coding 2 (ThingSpeak)



https://makecode.microbit.org/_J2qChEMhY6Fp

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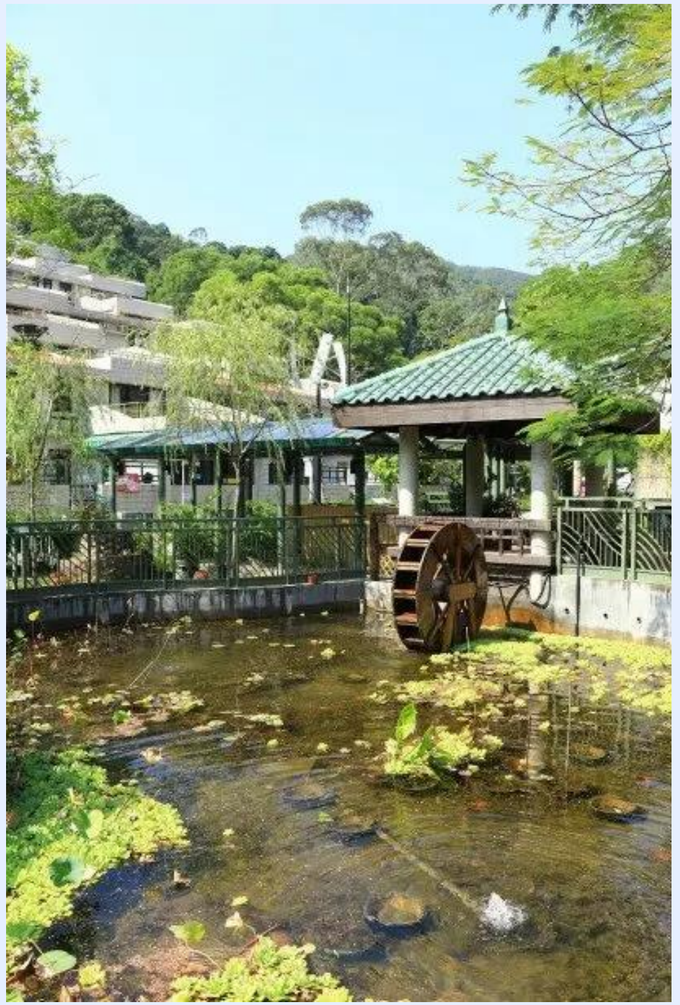
Activity

- Copy your Public view link
- Paste your public view link into below Google document: https://docs.google.com/document/d/1Qok_1ETjaNvYPk8cFFf7tDqQhfXdMzcemEoiqfzmWoU/edit?usp=sharing
- Data Collection (DHT11 humidity/temperature) in the EdUHK Campus (15 mins)

  You may go to the Eco-garden, fish pond outside Bio lab and roof top in block E, etc.
- Come back and share your result



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Connect Wifi without extension board

Esp-01/s

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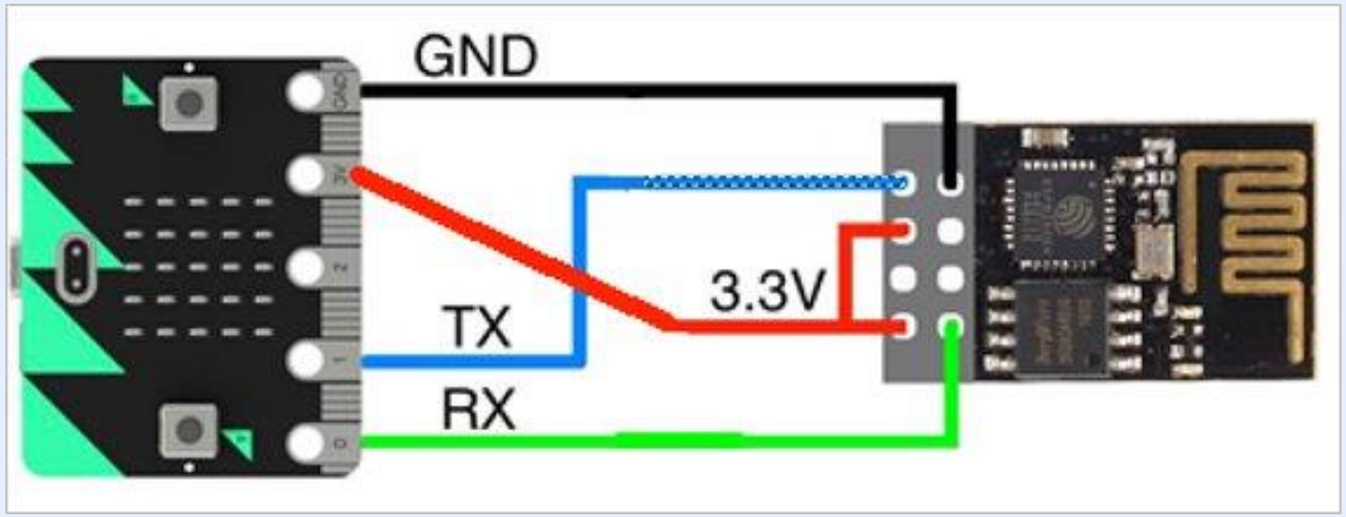
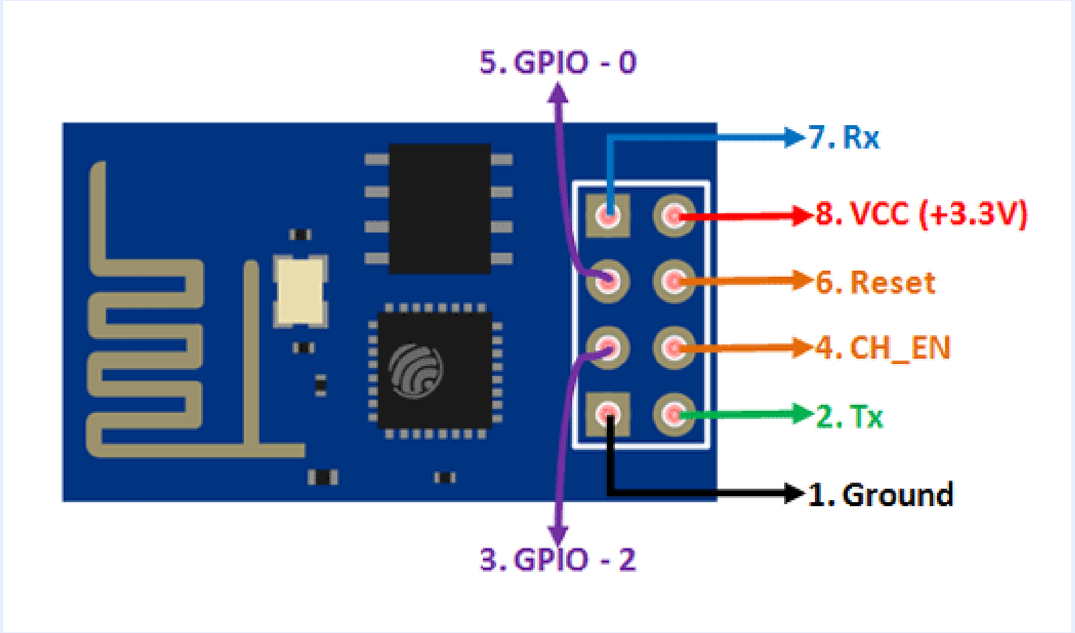
Connect Wifi without extension board





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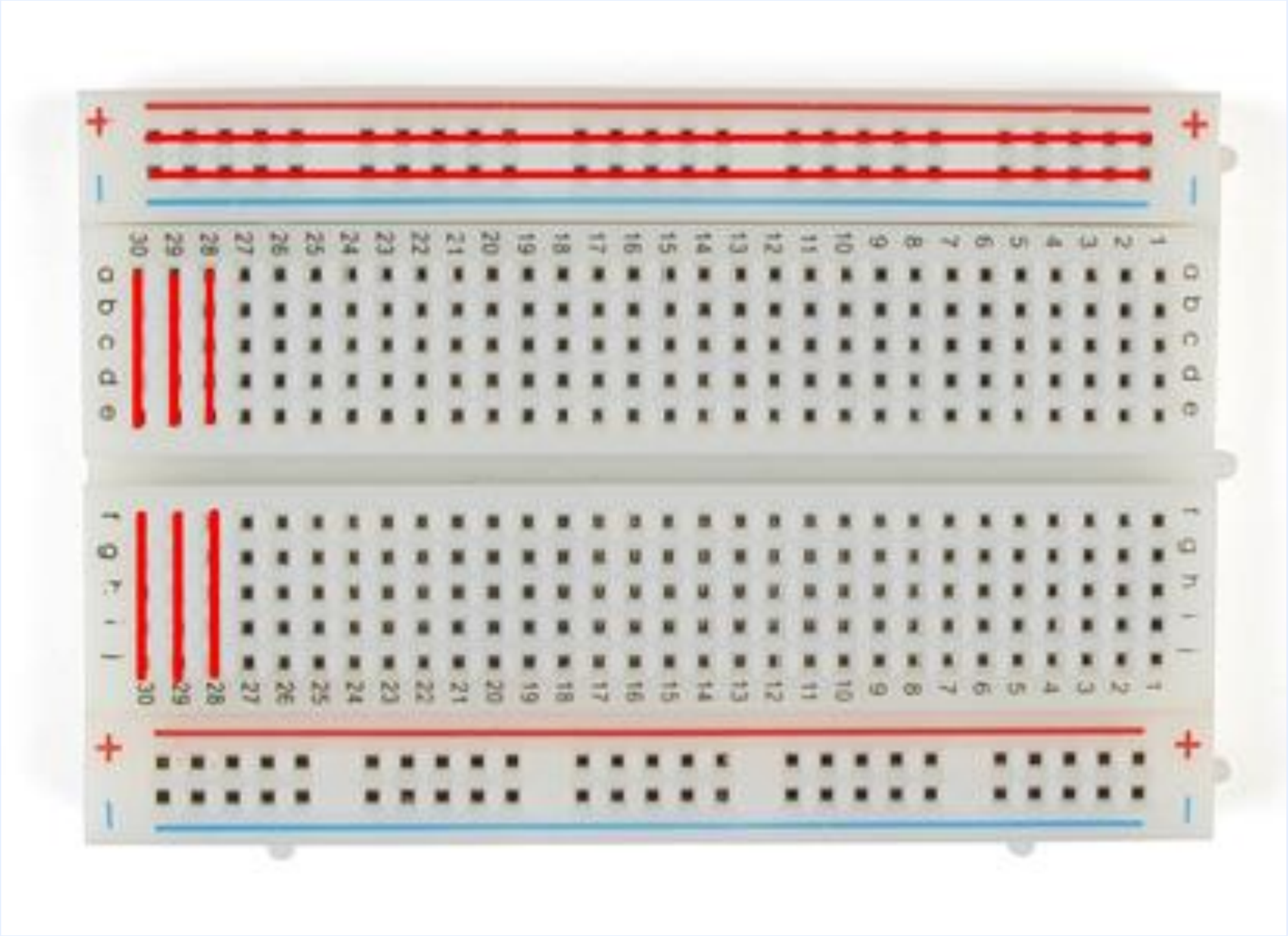

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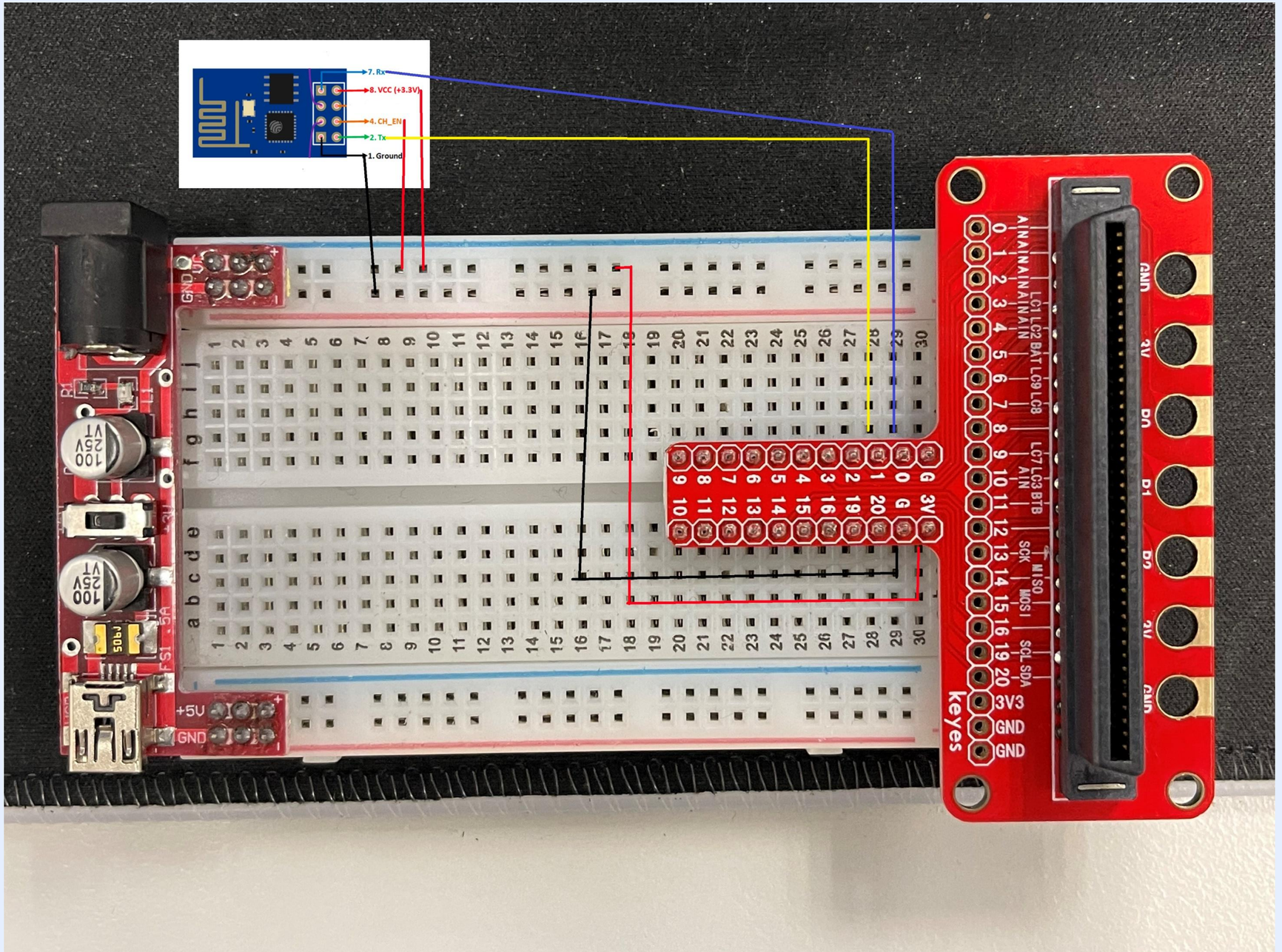

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Make code

esp8266

Lights and Display | Software | Science | Robotics | Gaming | Networking | Individual sensors

ESP8266_ThingSpeak
MakeCode extension for ESP8266 and ThingSpeak

Learn More

esp8266
Extension for ESP8266 WiFi Module AT Mode - by Cytron Technologies

Learn More

iot-environment-kit
Environment and Science IoT Kit for micro:bit

Learn More

PTKidsBIT-IoT
Makecode extensions for PTKidsBIT: IoT

Learn More

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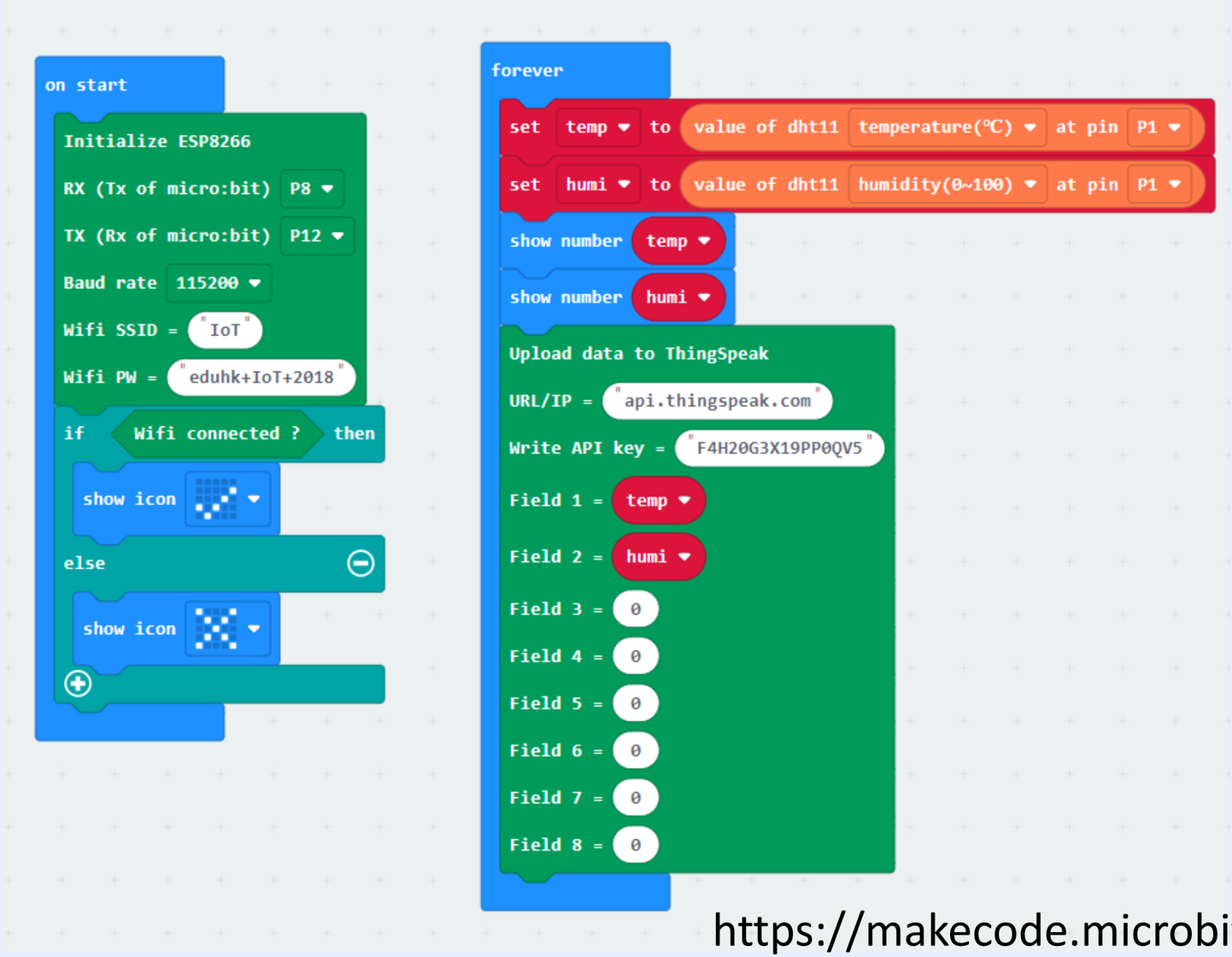
Make code



https://makecode.microbit.org/_UsqVoU3f74zE

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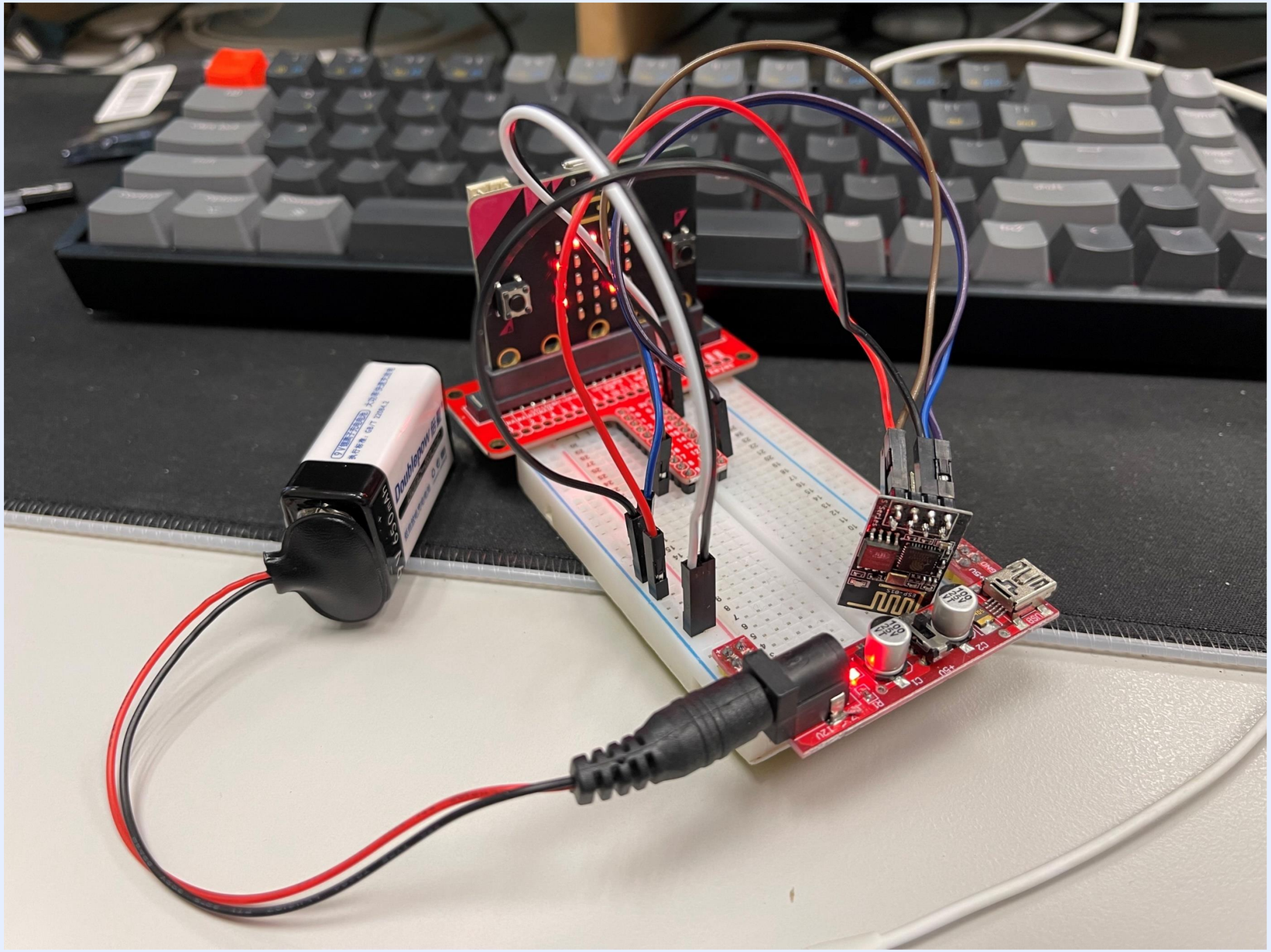

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One more thing ...

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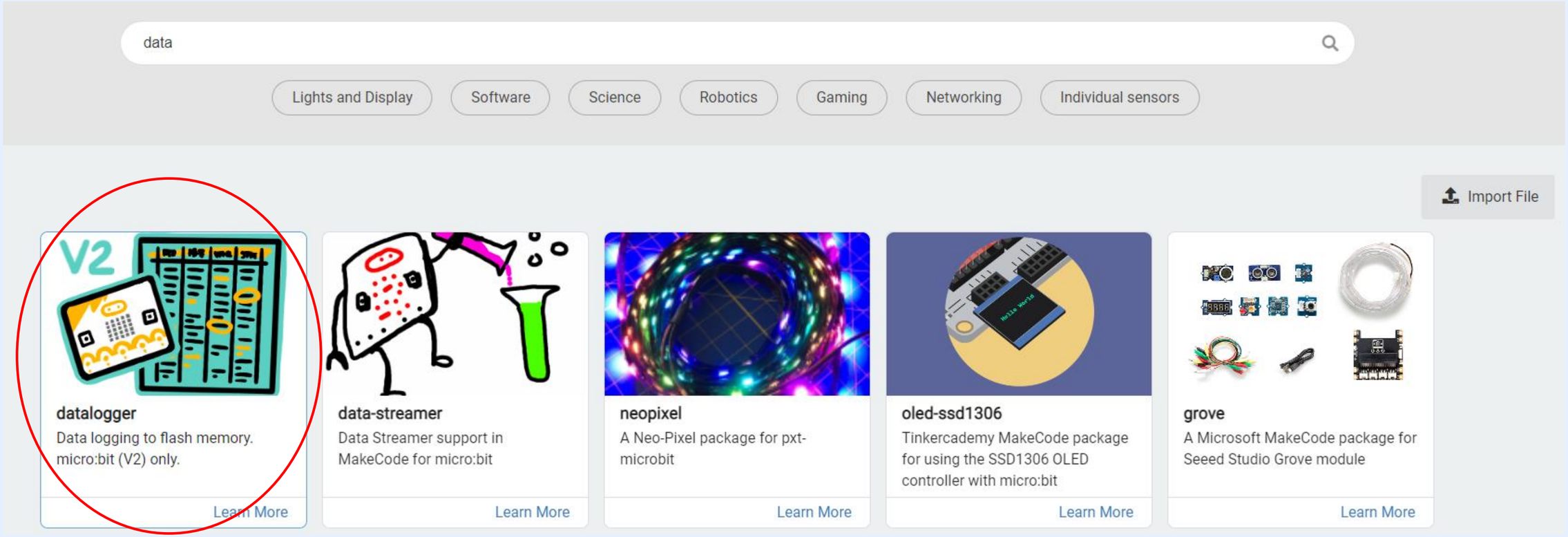
Micro:bit v2 Data logging (non-IoT)



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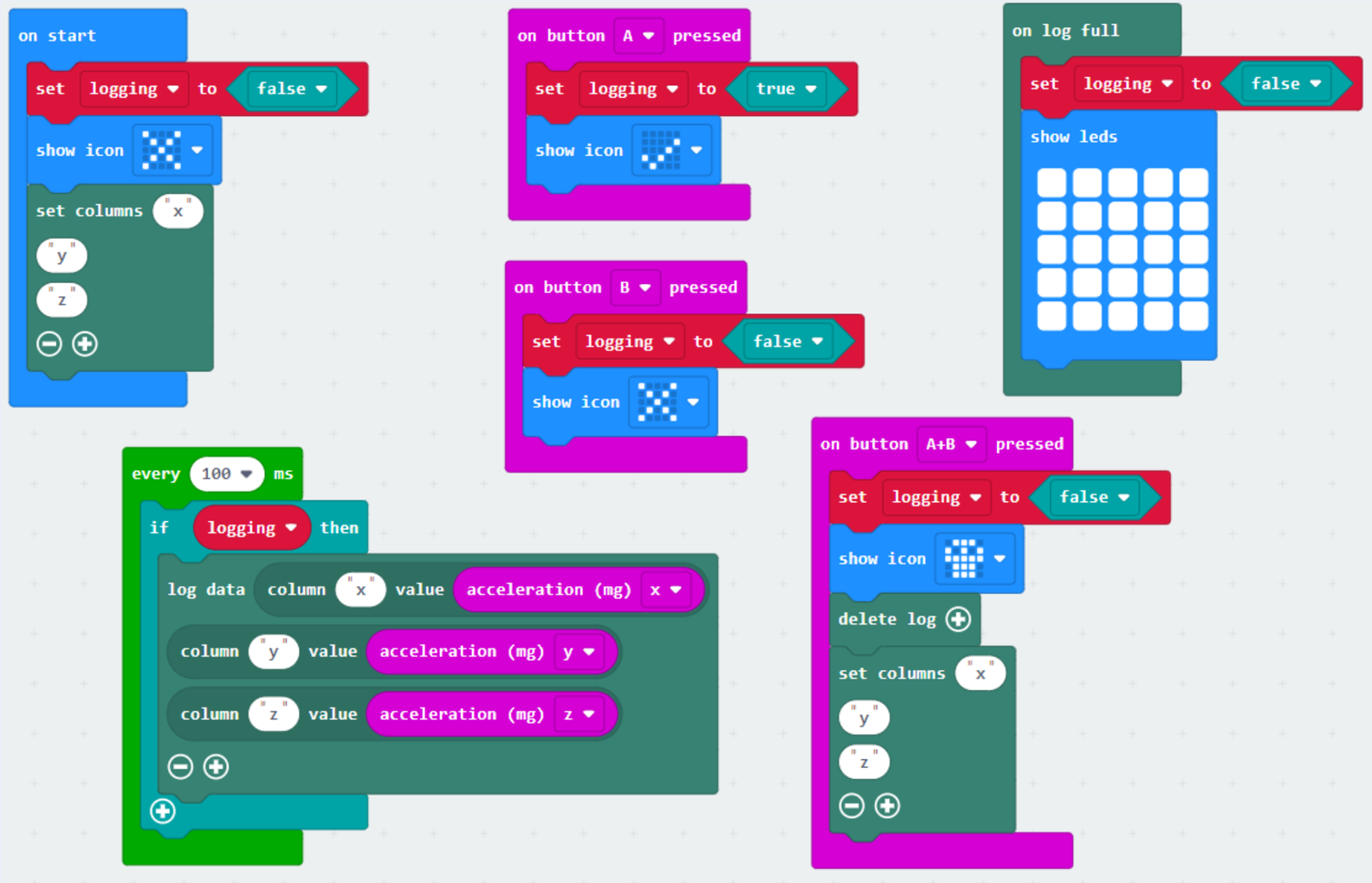
Code Sample: Movement data logger



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