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The Education University of Hong Kong
2022-2023 Quality Education Fund Thematic Network - Tertiary Institutes
STEM Project Team

SCHOOL:東華三院鄺錫坤伉儷中學TWGHs Mr & Mrs Kwong Sik Kwan College

TOPIC: School-based Workshop

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Overview of the workshop

1. **Introduction to IoT (Mr Rex Chim)**
    - What is IoT and practices in STEM Education
    - Different types of micro:bit IoT board
    - Different IoT platforms

2. **Hands-on practices (Ms Ana Lam)**
    - Monitoring temperature using temperature sensor (DS18b20) and *ThingSpeak*
    - Monitoring temperature at *KidsIoT* and remote control the servo motor

3. **Assessment in STEM Education (Dr Bill Yeung)**

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1. Introduction about IoT and practices in STEM Education

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What is IoT

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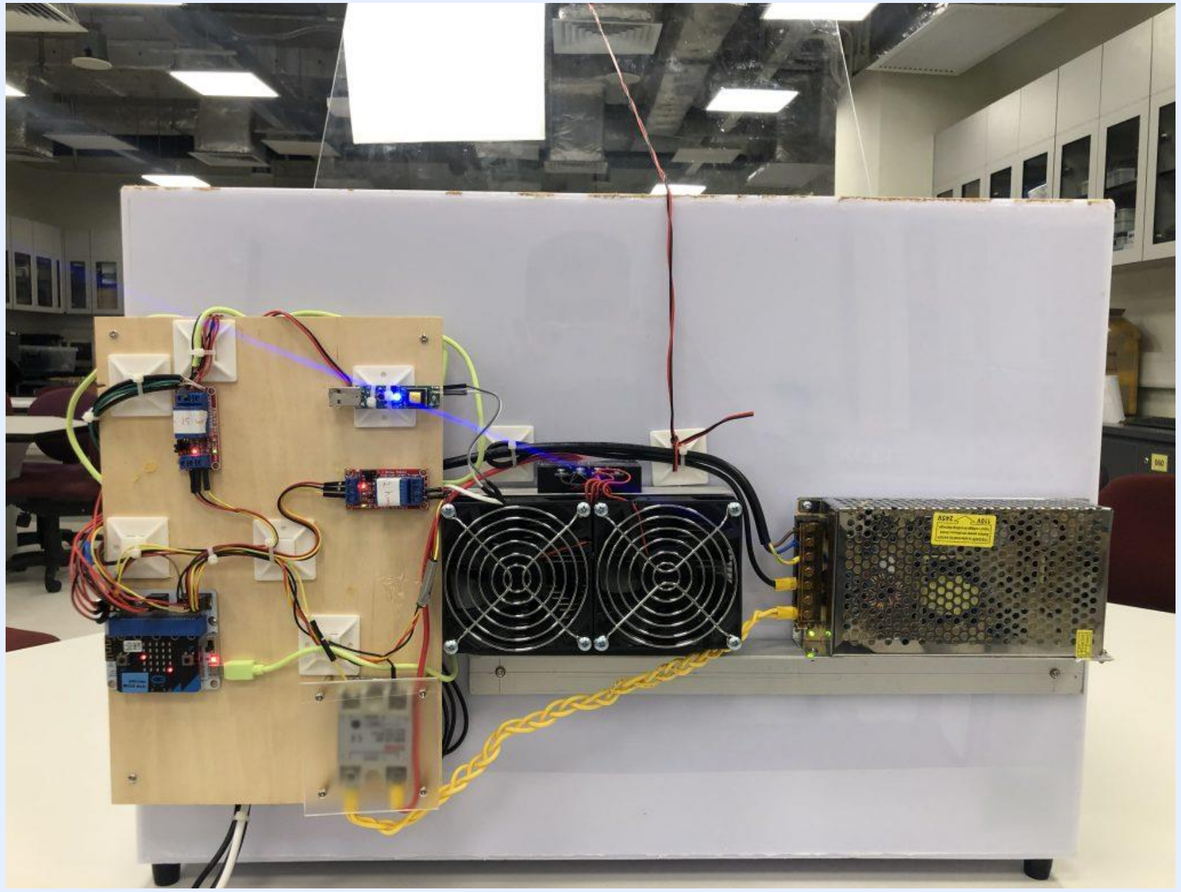
Uses of IoT in STEM Education



Micro:bit-driven Greenhouse Hydroponic Device with IoT

https://stemsdl21.eduhk.hk/index.php/resources/project-works/iot/iotgreenhouse/

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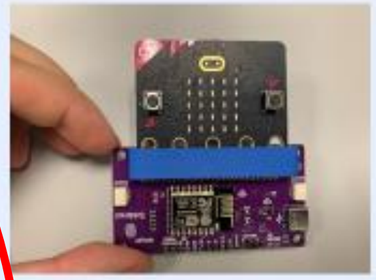
Micro:bit IoT Board Comparison



	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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Different IoT platforms

ThingSpeak

Google Assistant

IBM Watson

CISCO

IFTTT

ORACLE

Microsoft Azure IoT Platform

Kids' IoT

amazon alexa

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2. Hands-on Practices

2.1. Monitoring temperature using temperature sensor (DS18b20) and ThingSpeak

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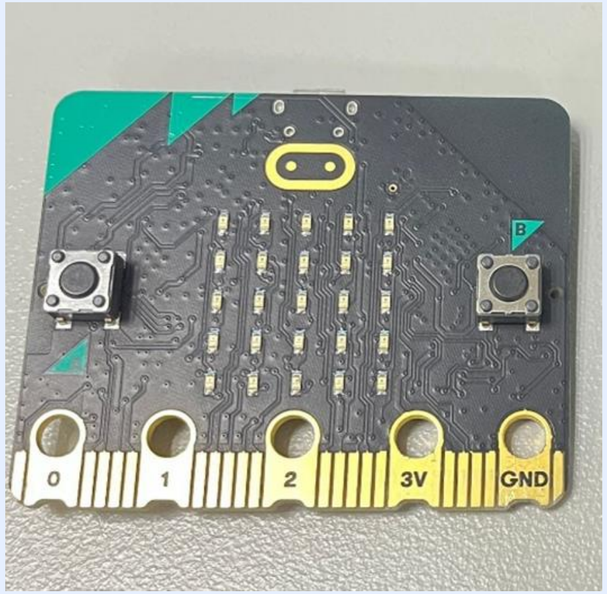
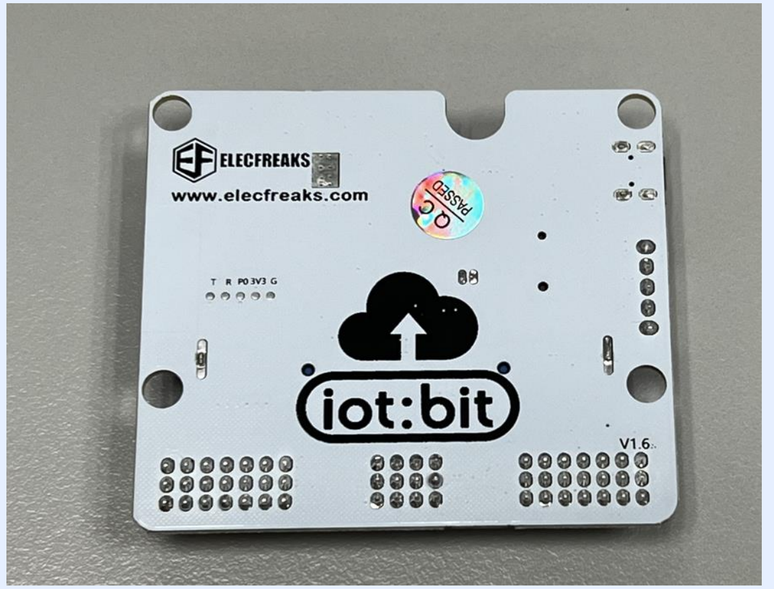
Materials

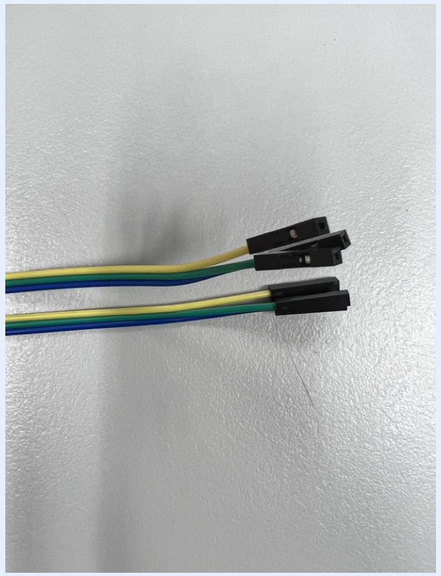
Water-proof Temperature Sensor (DS18b20)



Micro:bit



IoT Board



Dupont Jumper Cables

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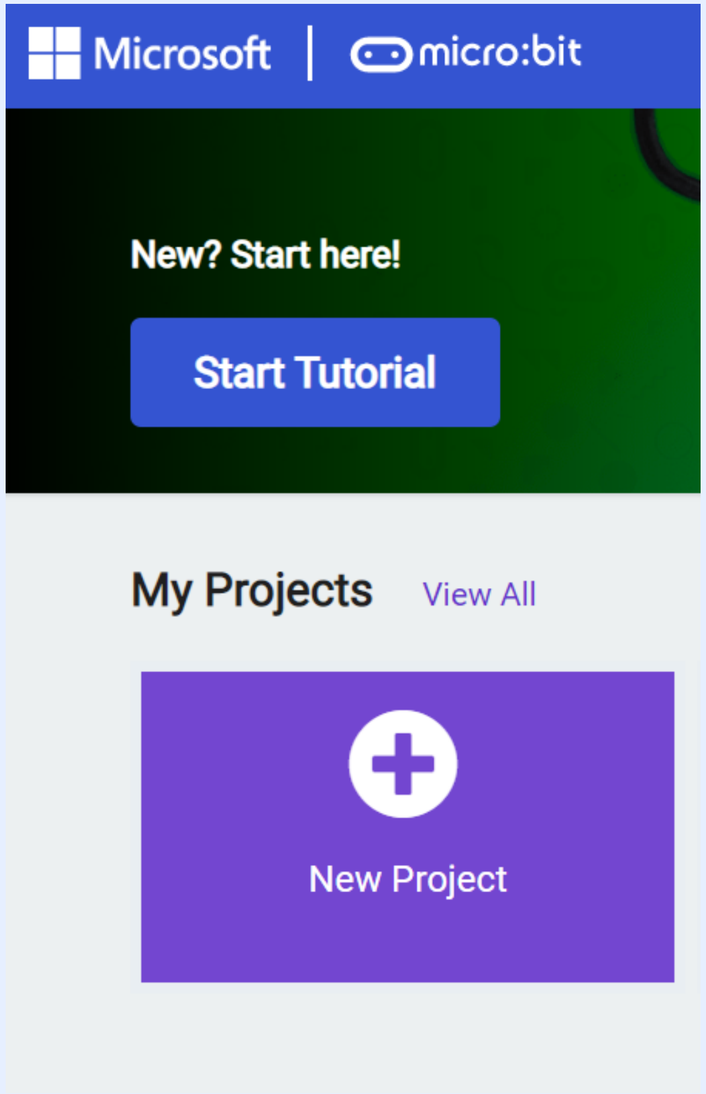
Makecode

https://makecode.microbit.org/



- New Project and name the project

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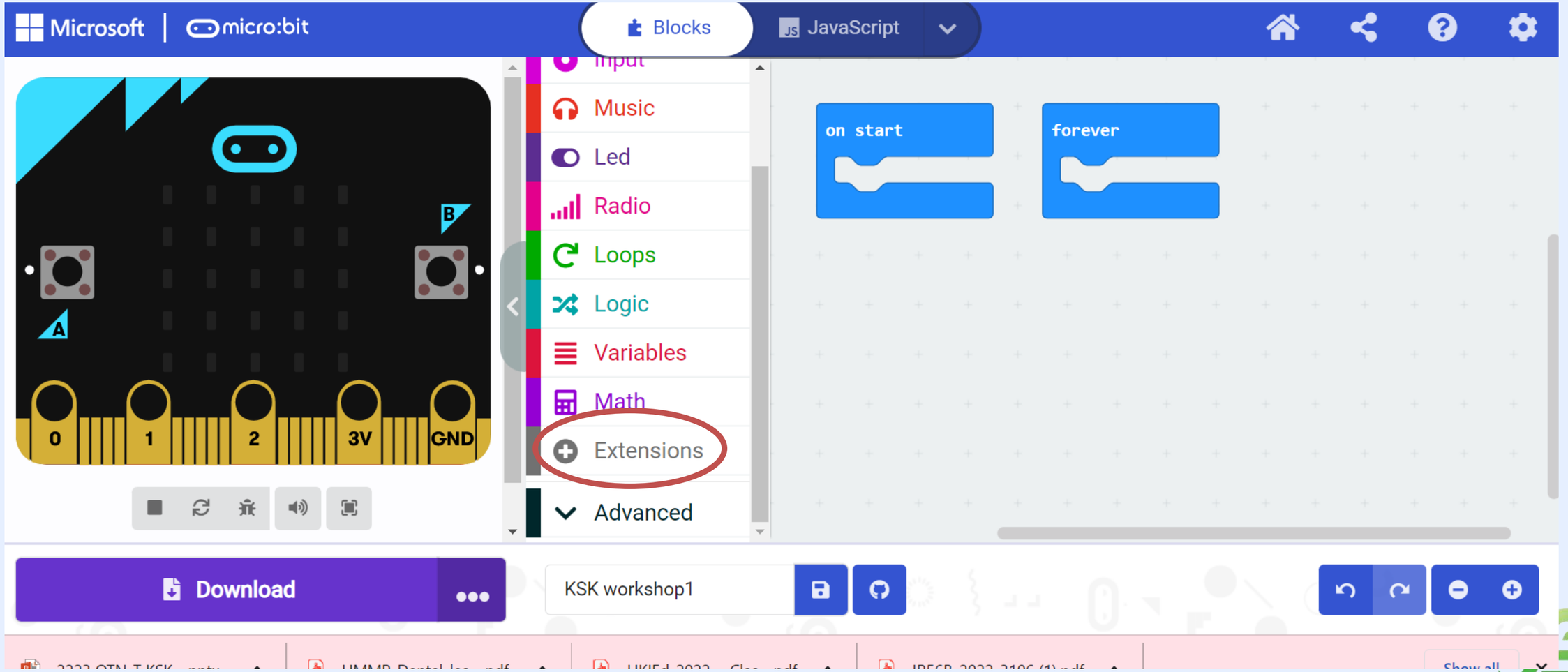
Add Extensions



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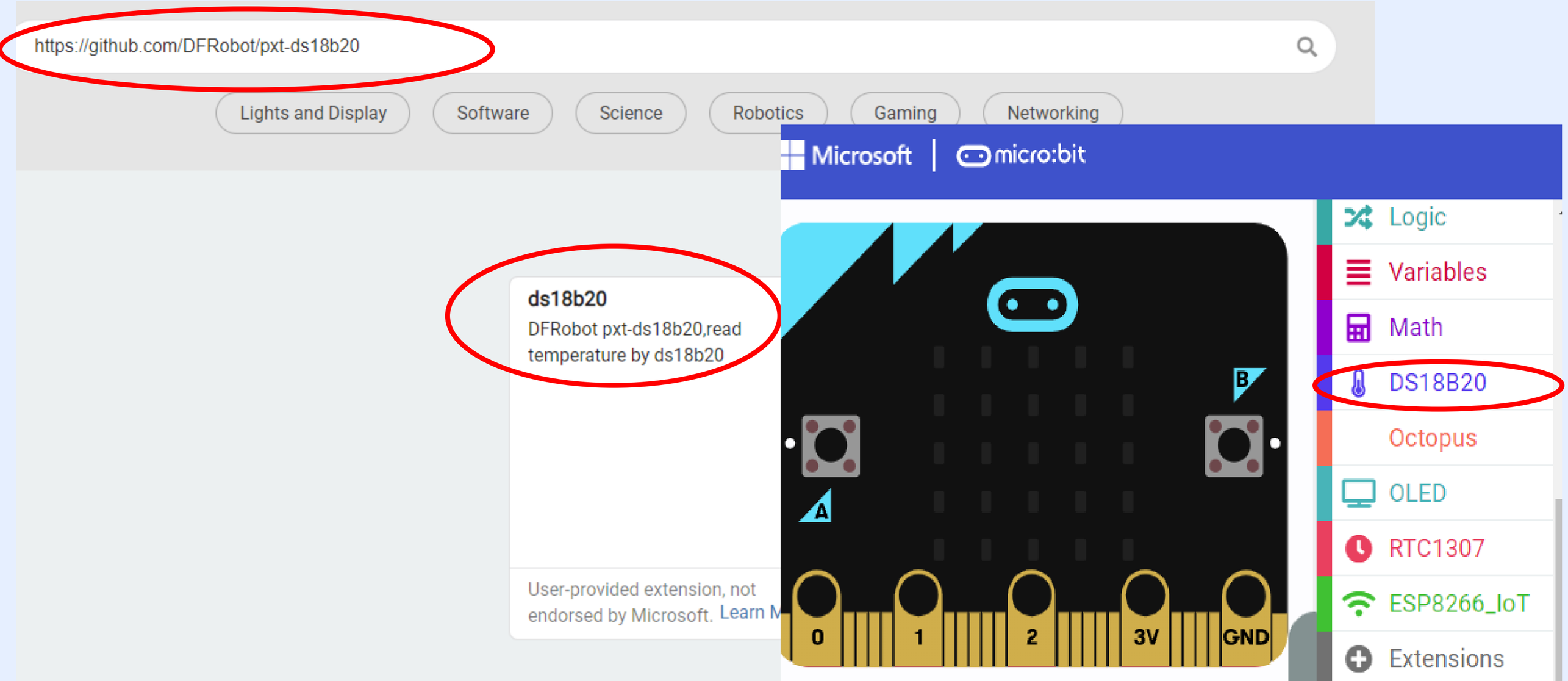
1. Add DS18B20 to Makecode

Add extension: https://github.com/DFRobot/pxt-ds18b20



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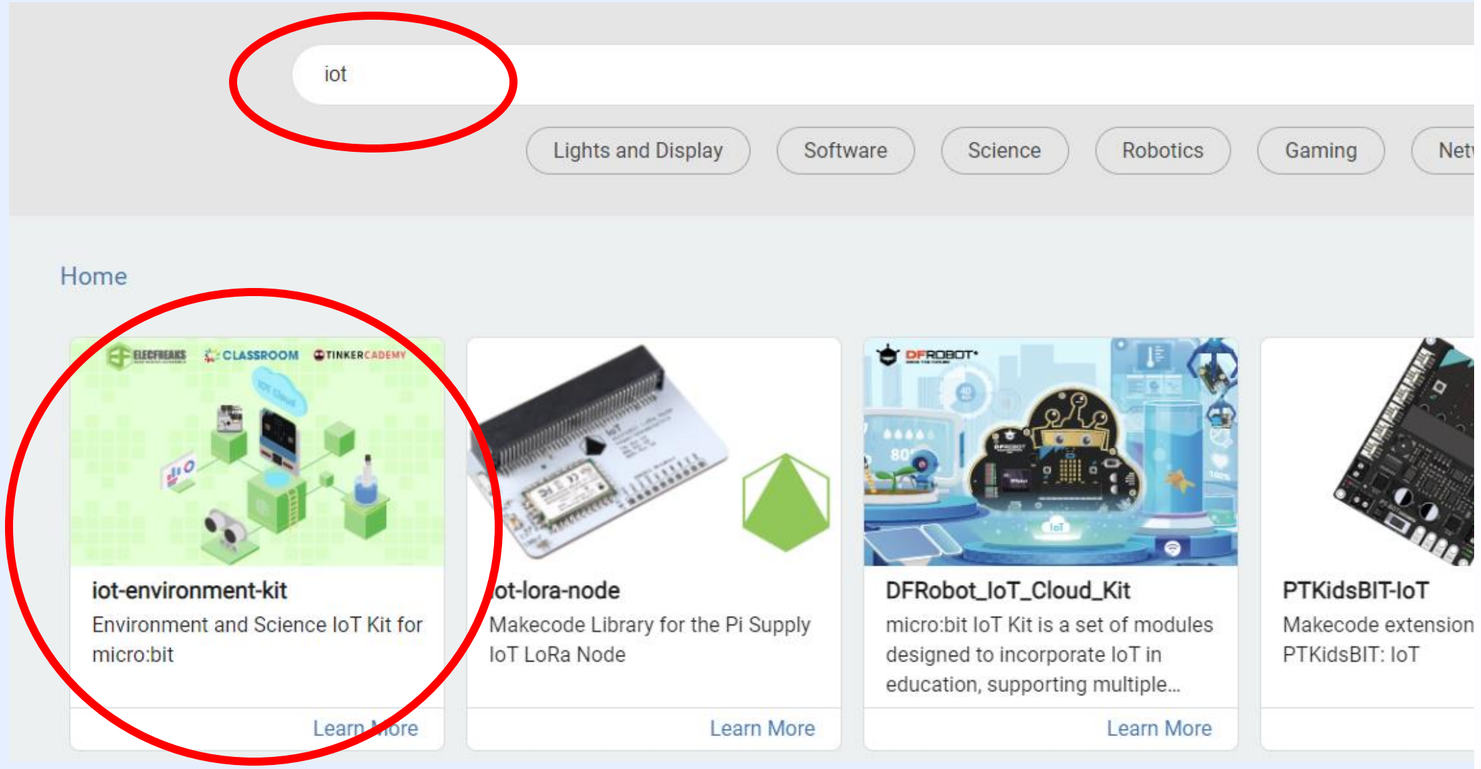
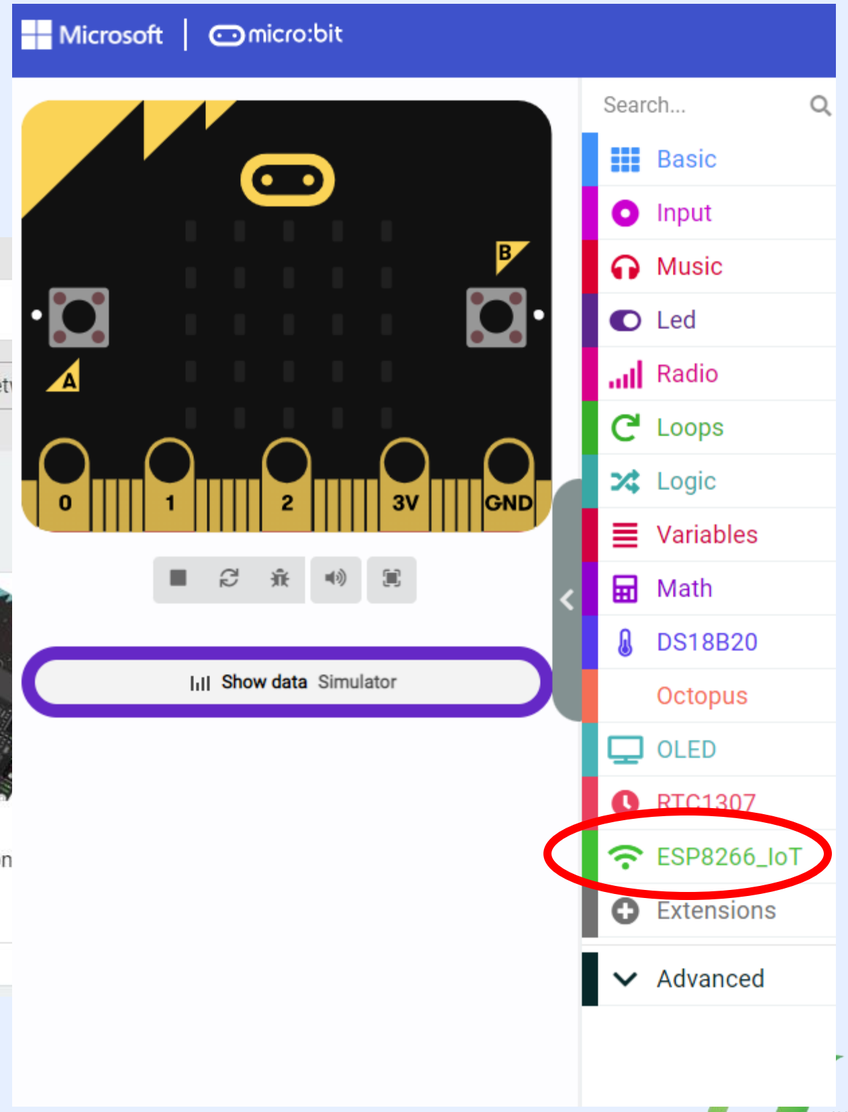
2. Add IoT-environment-kit to Makecode

Add extension: IoT-environment-kit





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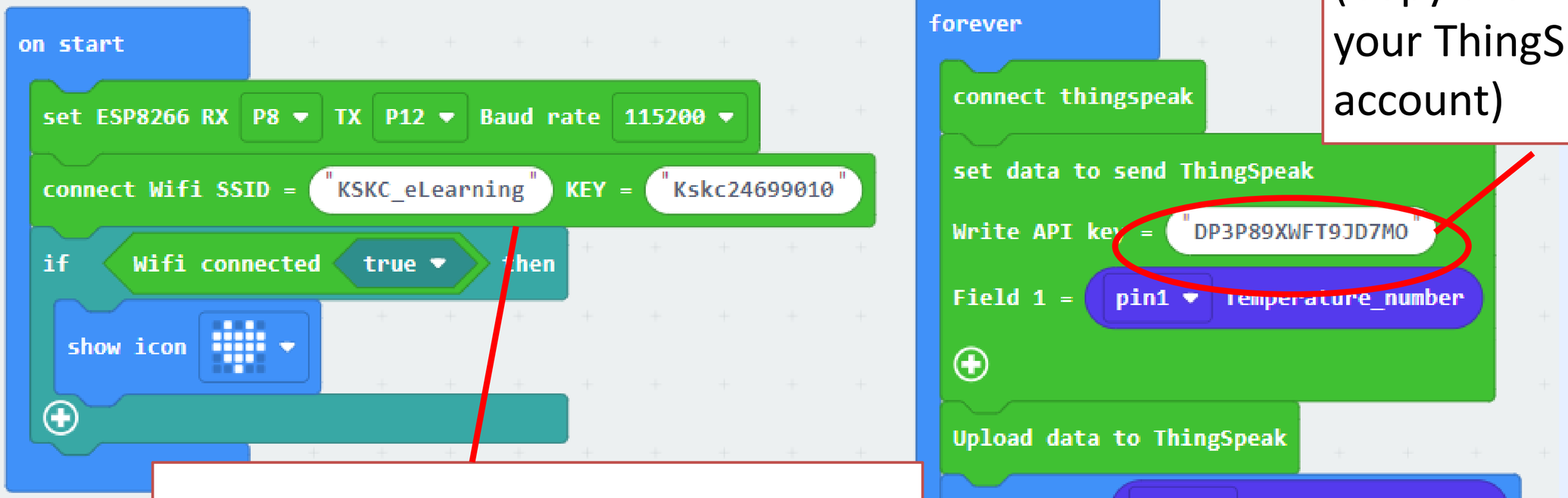
Coding

Link:https://makecode.microbit.org/_Y2g2v4XAq4rq



Change the API key (Copy the API key from your ThingSpeak account)

Drag in these blocks.
Then enter the Wi-Fi name and the password.

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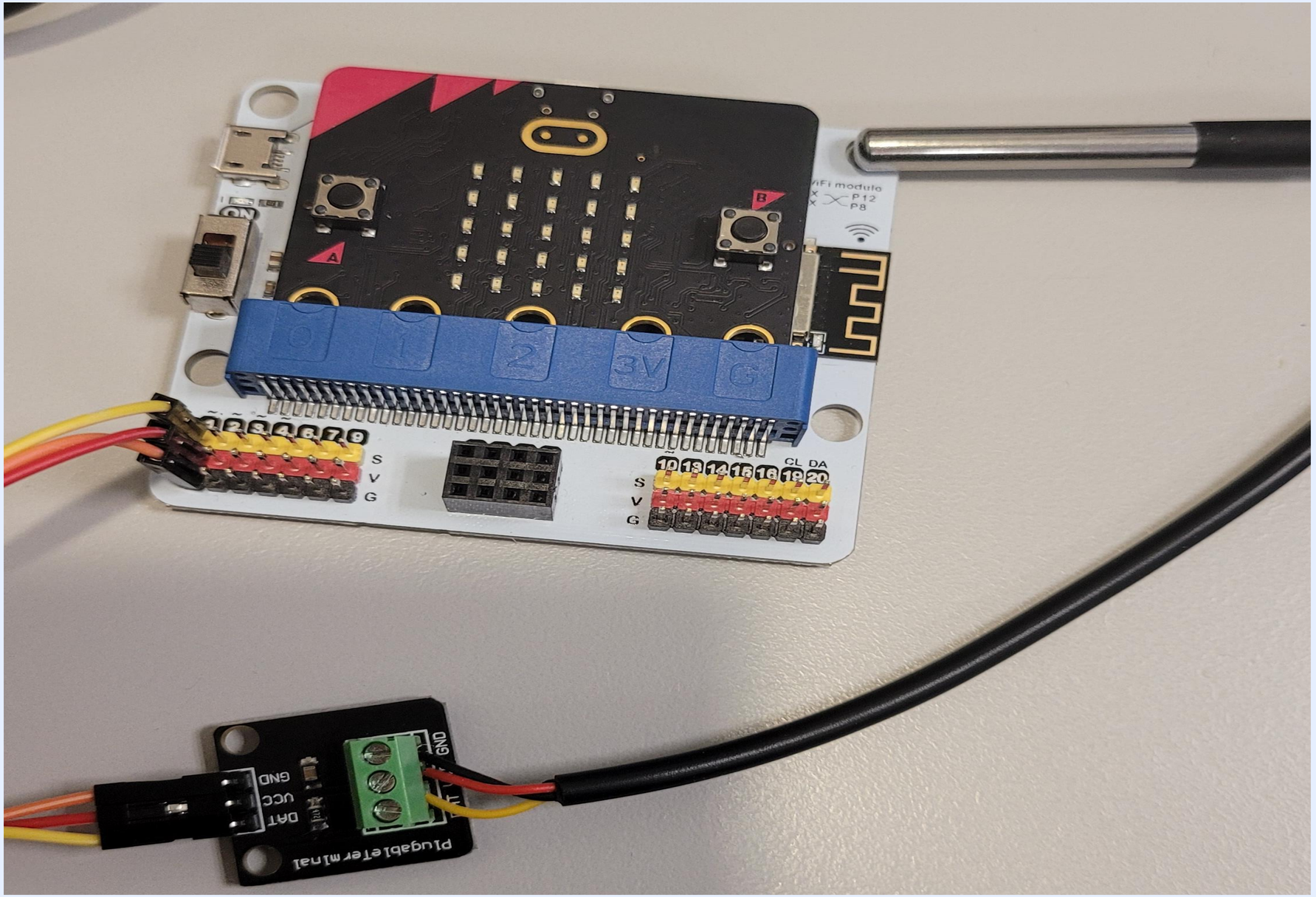
Temperature sensor setting



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IoT setting

Sign Up to https://thingspeak.com/login?skipSSOCheck=true

ThingSpeak™ Channels Apps Support Commercial Use How to Buy

To use ThingSpeak, you must sign in with your existing MathWorks account or create a new one.

Non-commercial users may use ThingSpeak for free. Free accounts offer limits on certain functionality. Commercial users are eligible for a time-limited free evaluation. To get full access to the MATLAB analysis features on ThingSpeak, log in to ThingSpeak using the email address associated with your university or organization.

To send data faster to ThingSpeak or to send more data from more devices, consider the paid license options for commercial, academic, home and student usage.

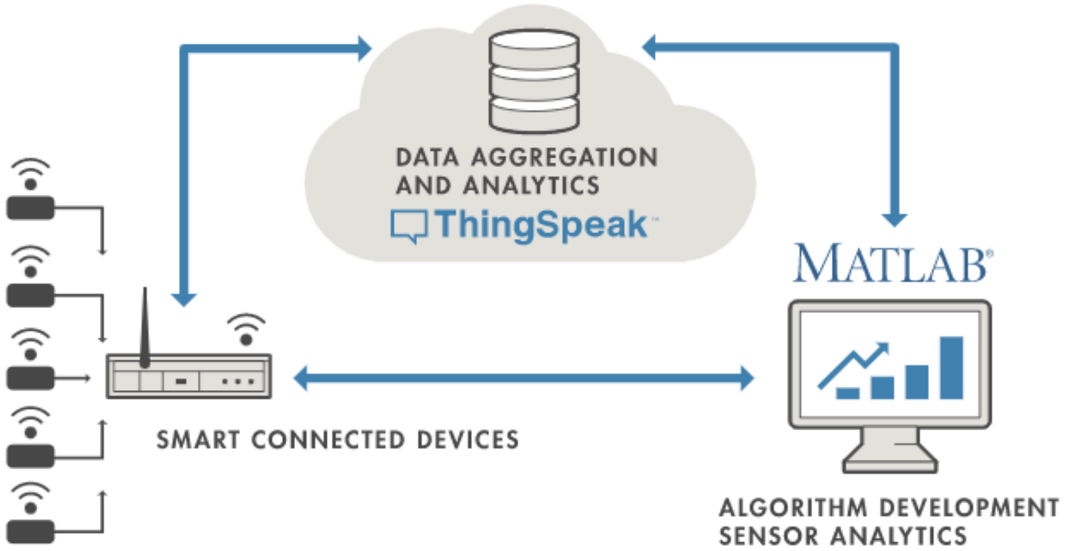
MathWorks

Email

No account? Create one!

By signing in, you agree to our privacy policy.

Next



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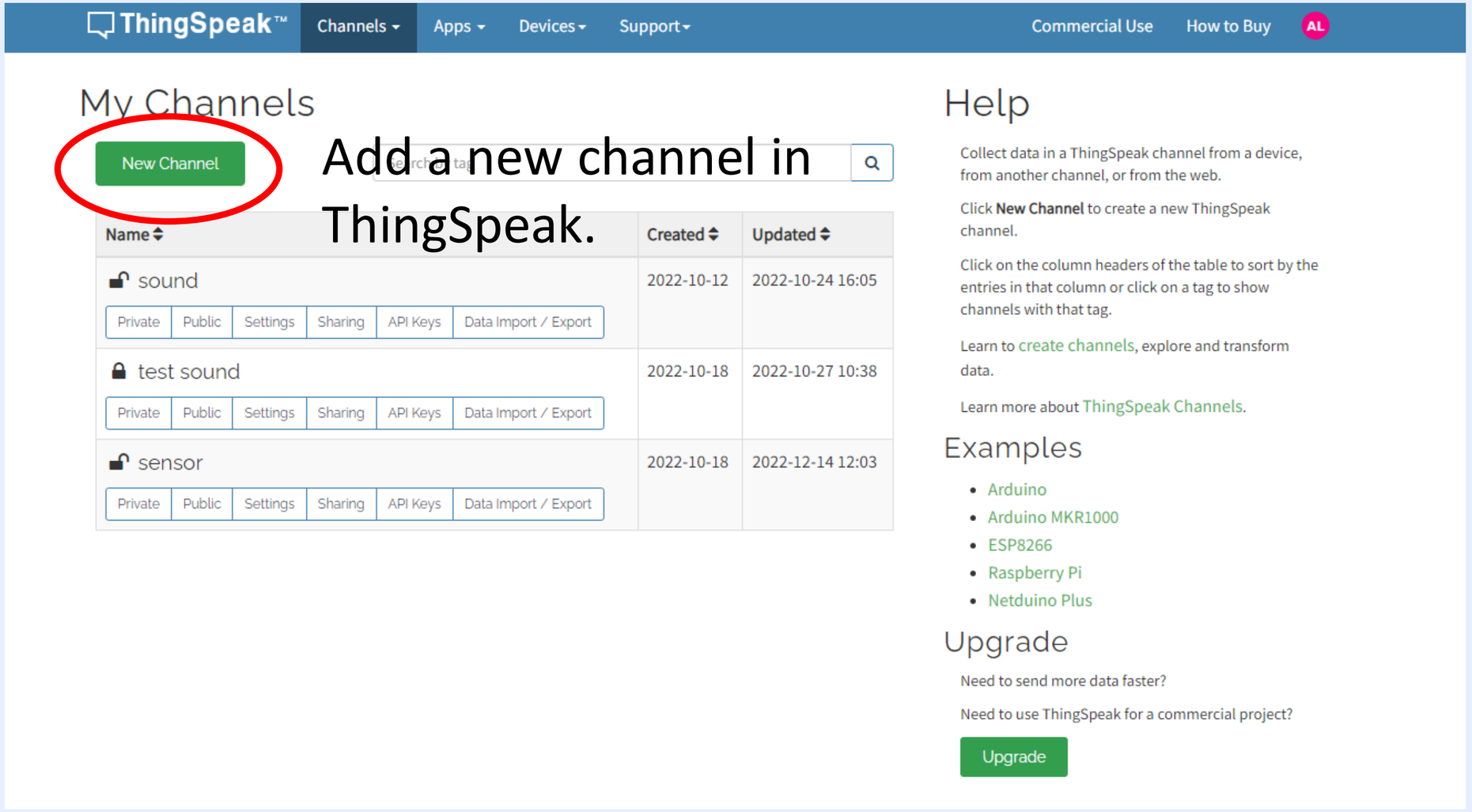
Create a New Channel



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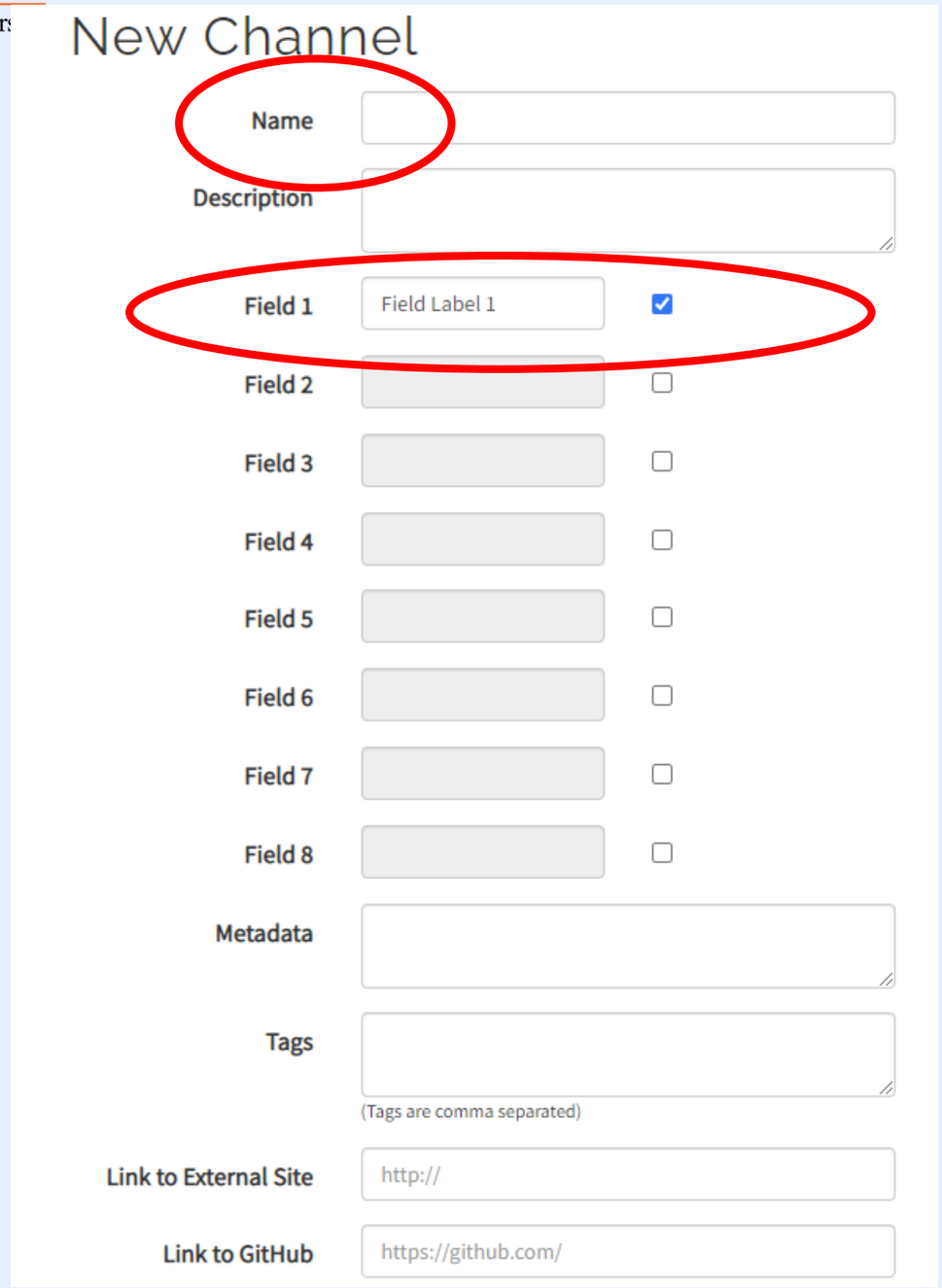
At New Channel:



Enter the Name and field name.

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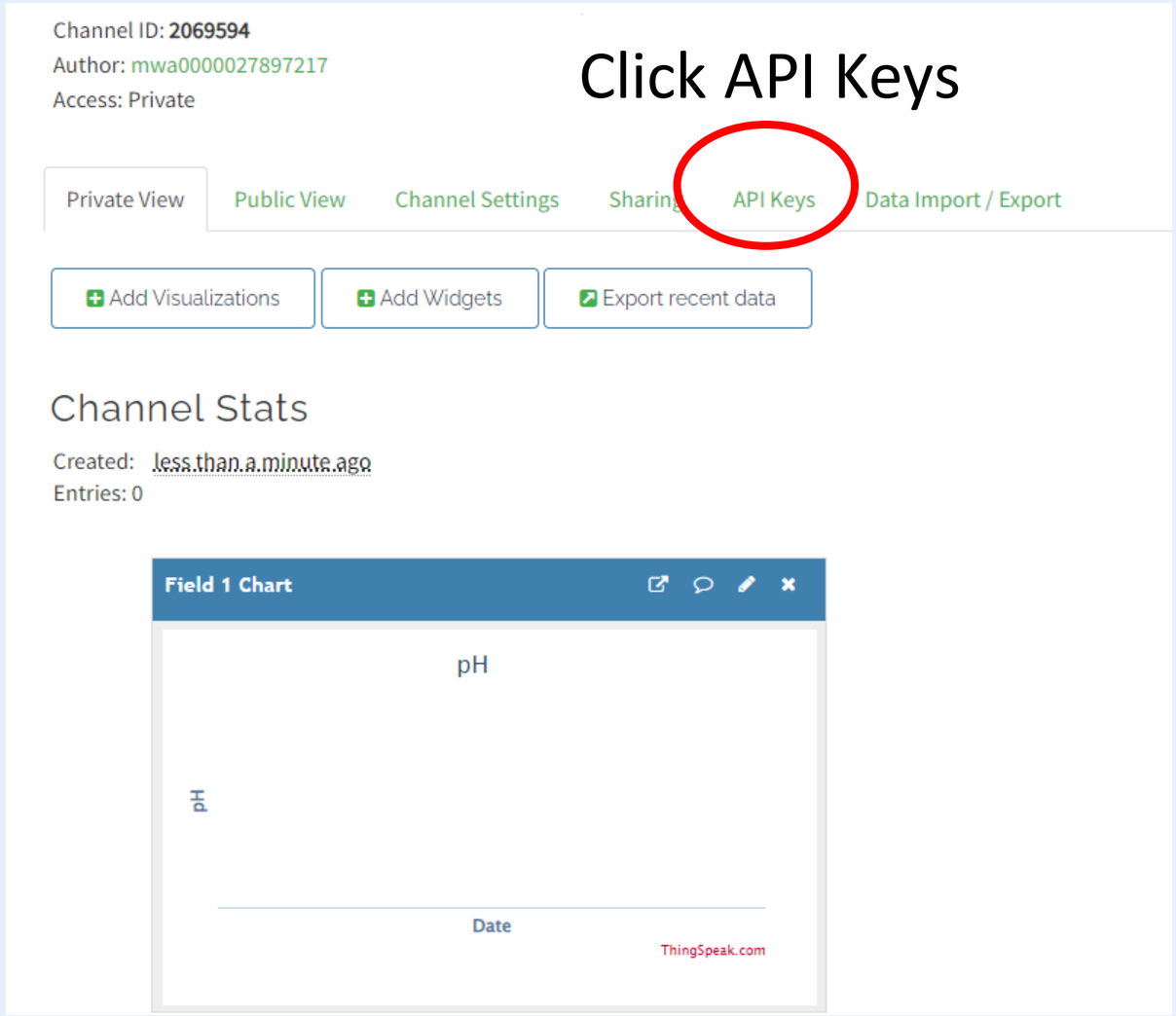
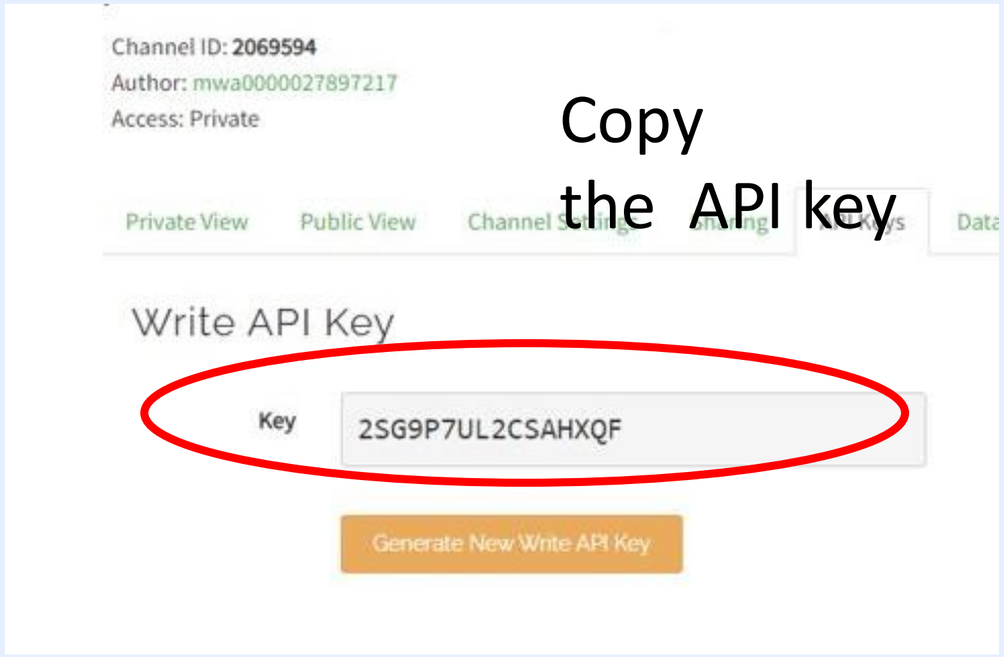
Copy the API Key at ThingSpeak





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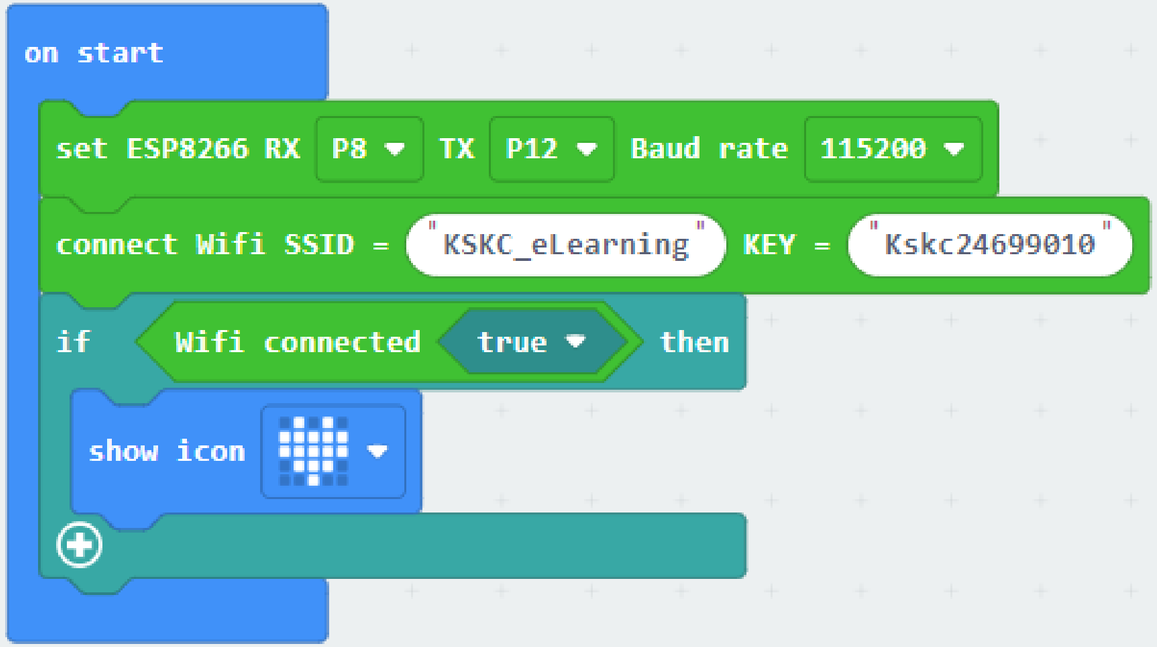
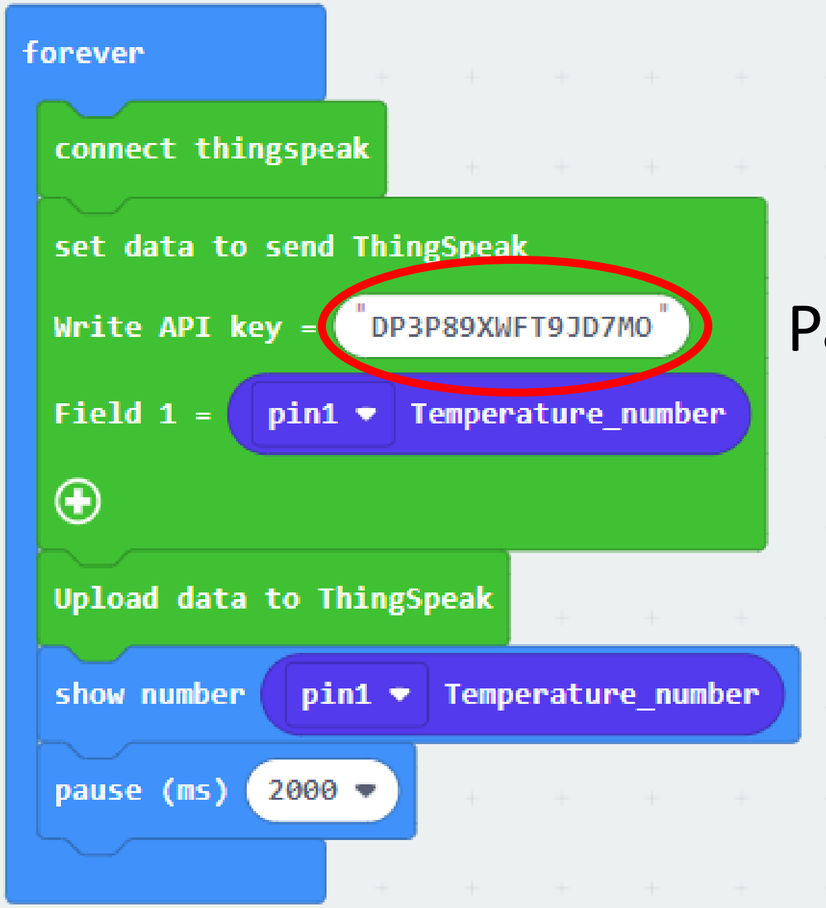
Paste the API Key (from ThingSpeak) to MakeCode

At MakeCode





Paste here.

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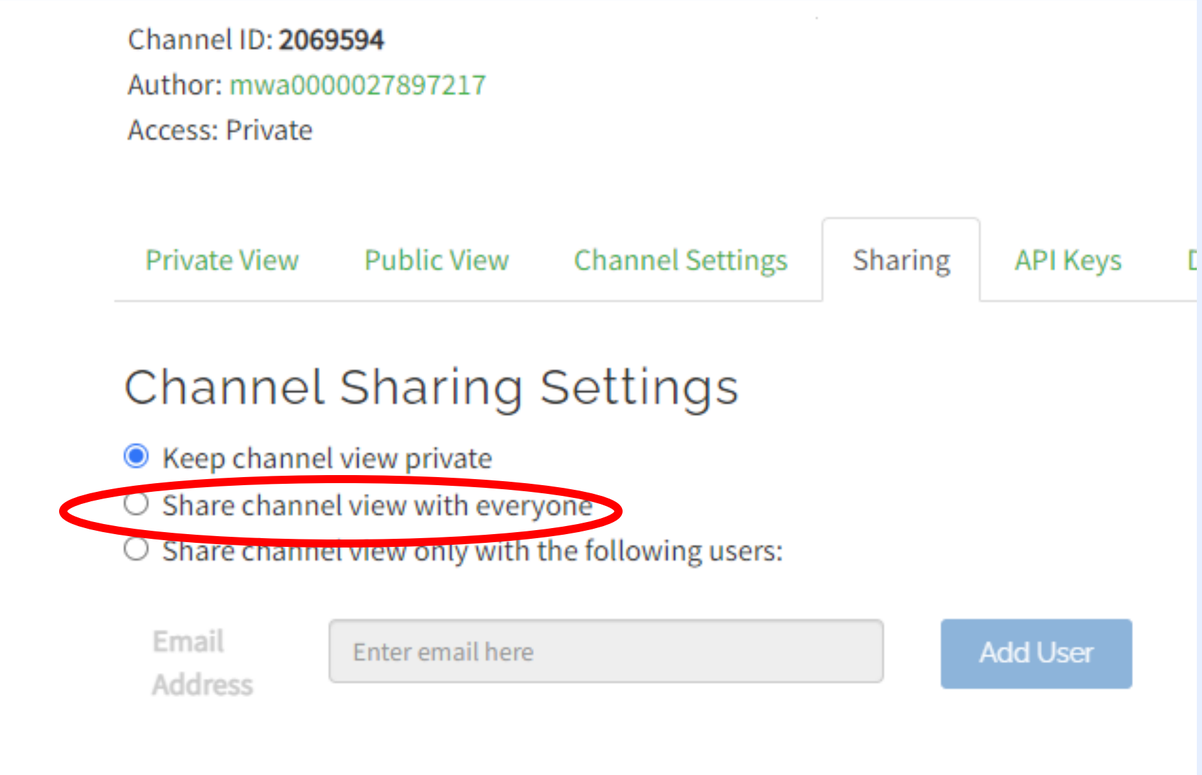
Sharing the link



If you want to share the data with everyone with the link, click here.

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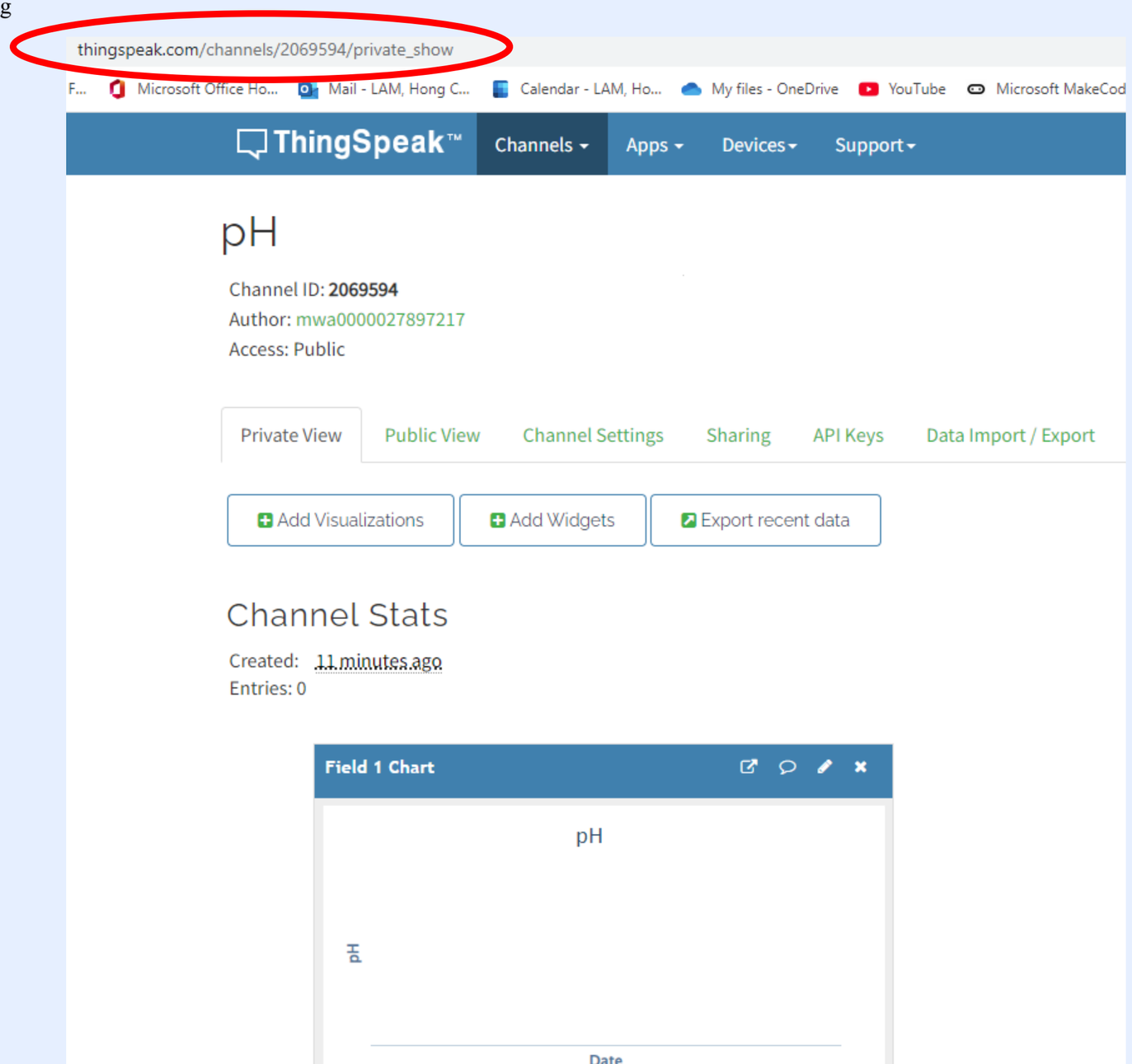
IoT setting



Share this link.

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2. Hands-on Practices

2.2. Monitoring temperature at KidsIoT and remote control the servo motor

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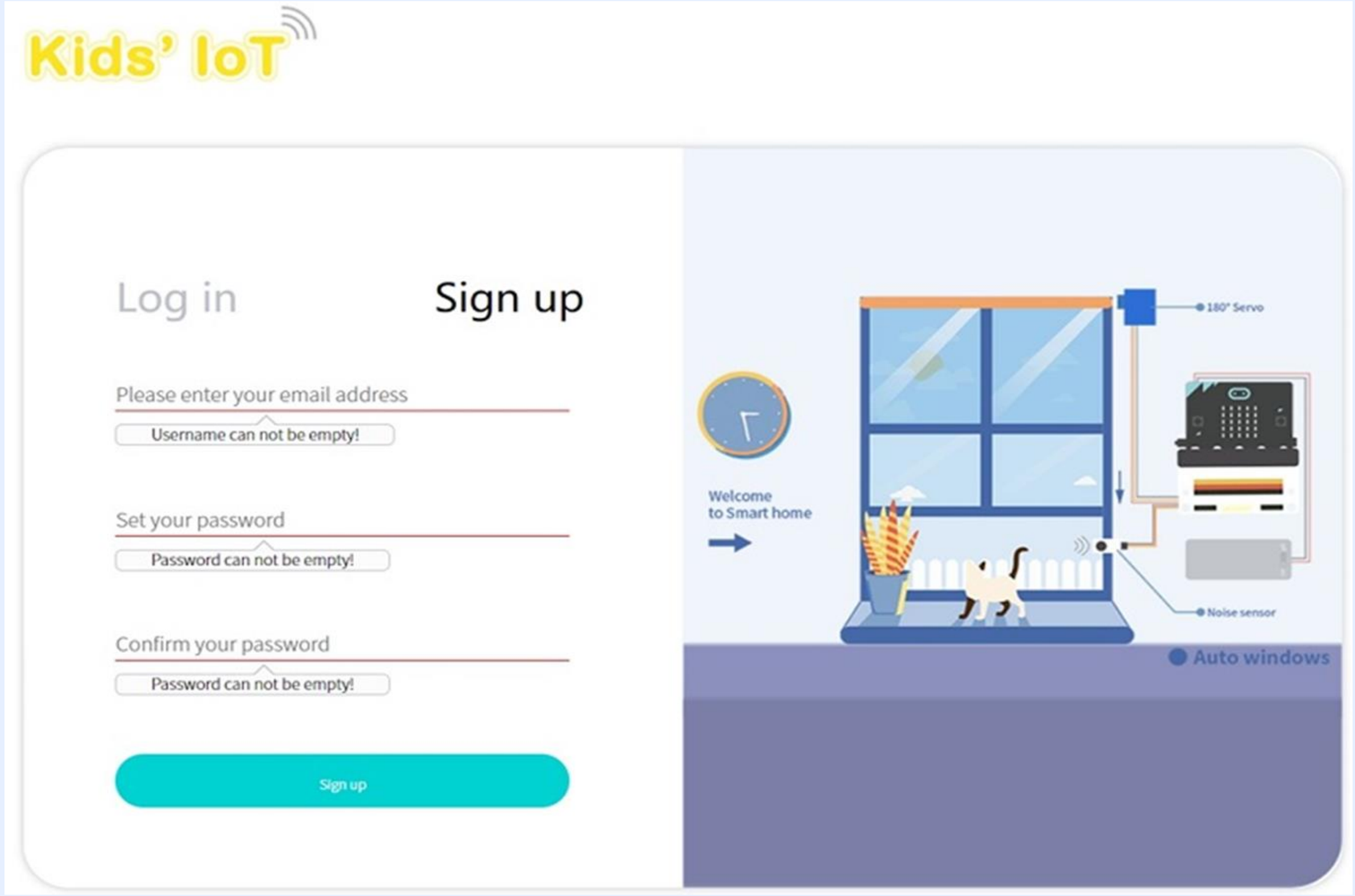
KidsIoT setting

Sign Up to https://www.kidsiot.cn/



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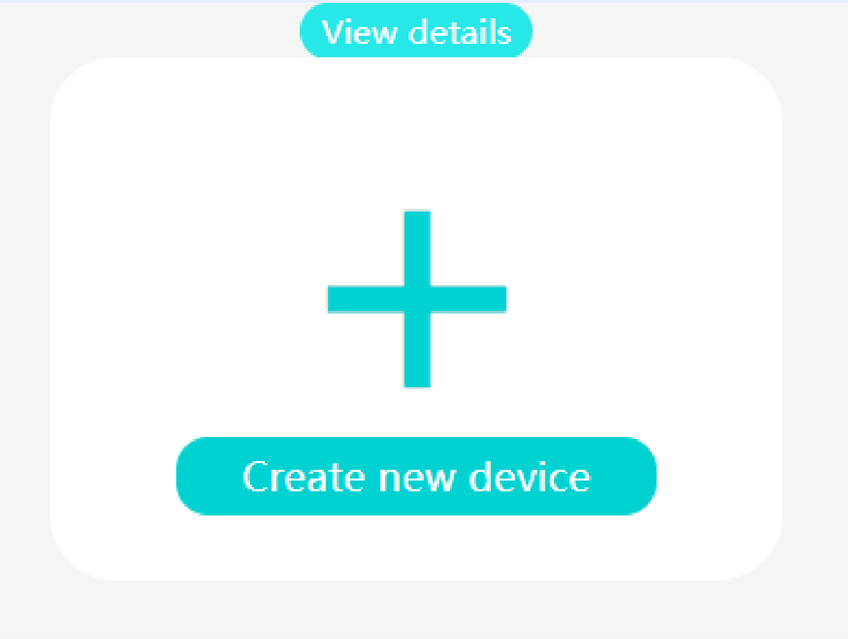
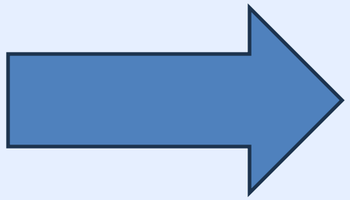
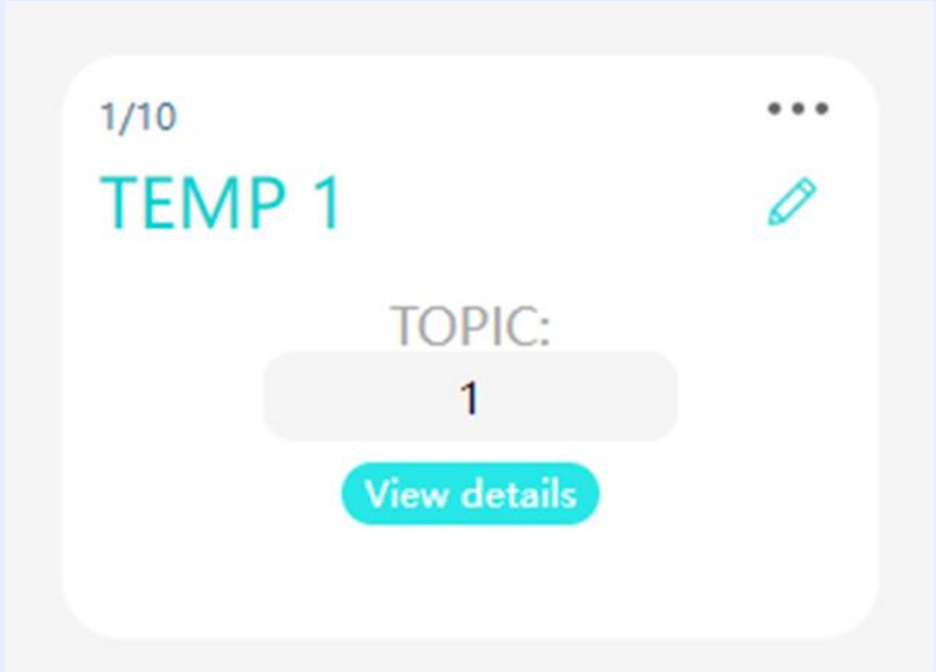
KidsIoT setting

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).







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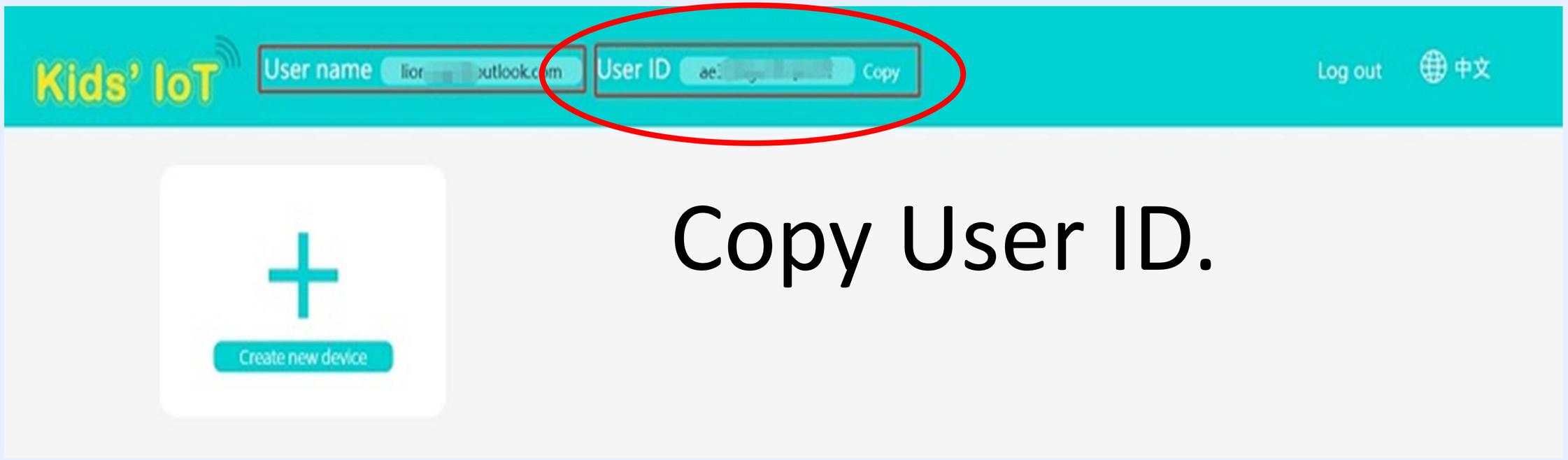
KidsIoT setting



Copy User ID.

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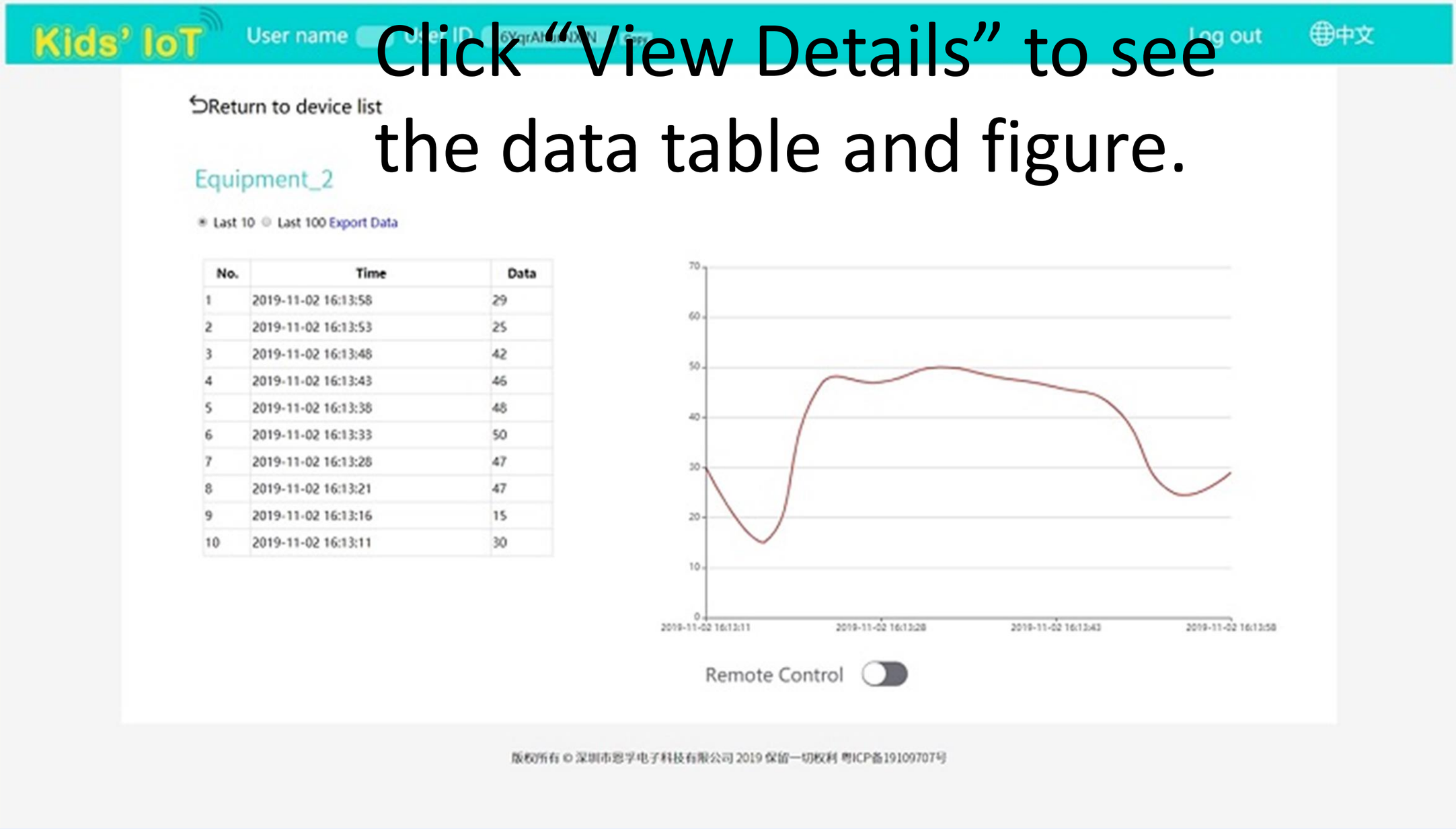
KidsIoT setting

Click “View Details” to see the data table and figure.



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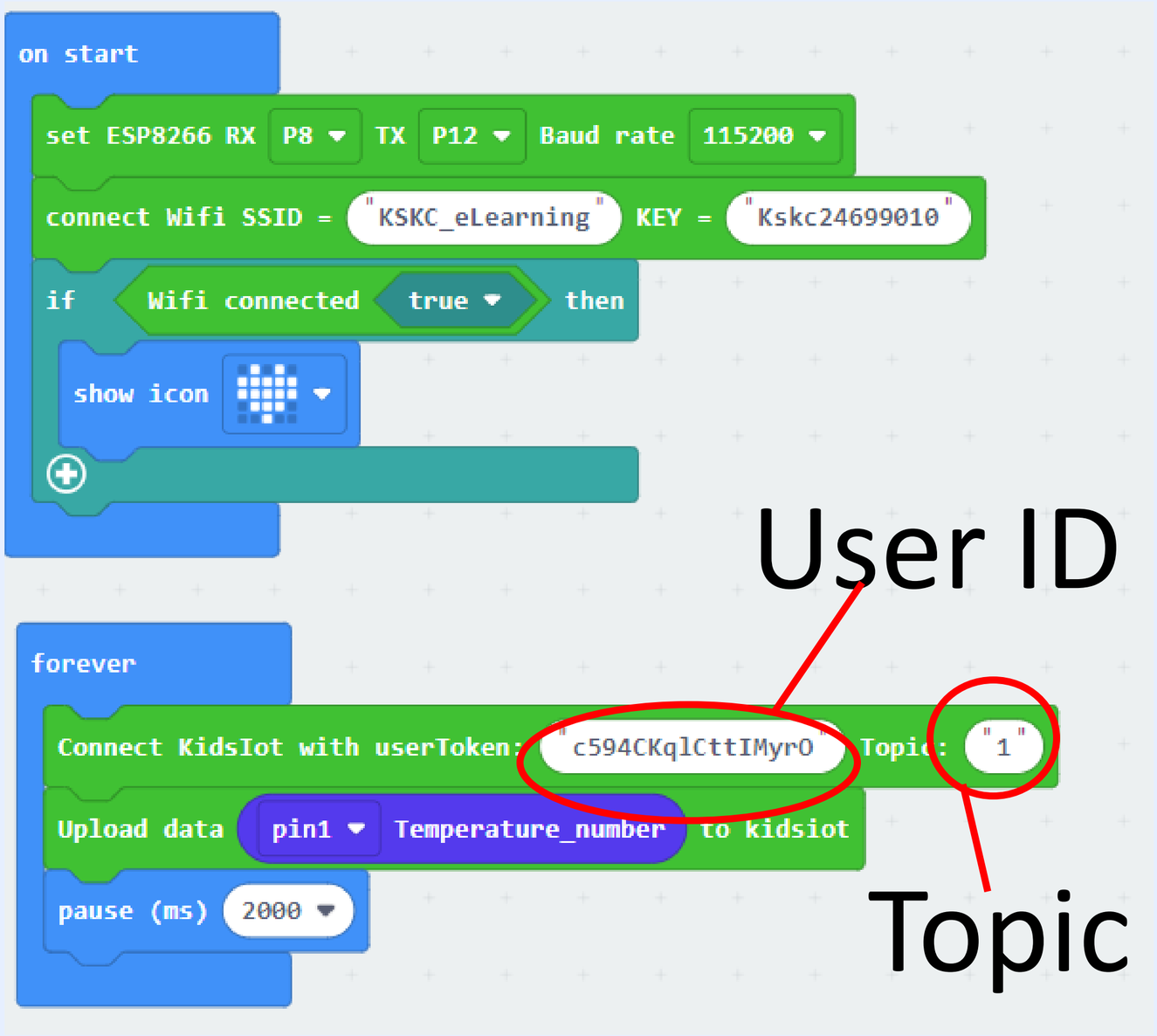
Coding - KidsIoT setting



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Different types of servo motor

Micro-servo motor (SG-90) (Analog Vs Digital)

High Torque Servo Motor Metal Gear
MG995 (Analog –180/360 Degree)

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Servo motor (Analog Vs Digital)

- Analog signal is a continuous signal --> use to give signal of angles
- Digital signals are time-separated signals --> e.g. 1 or 0

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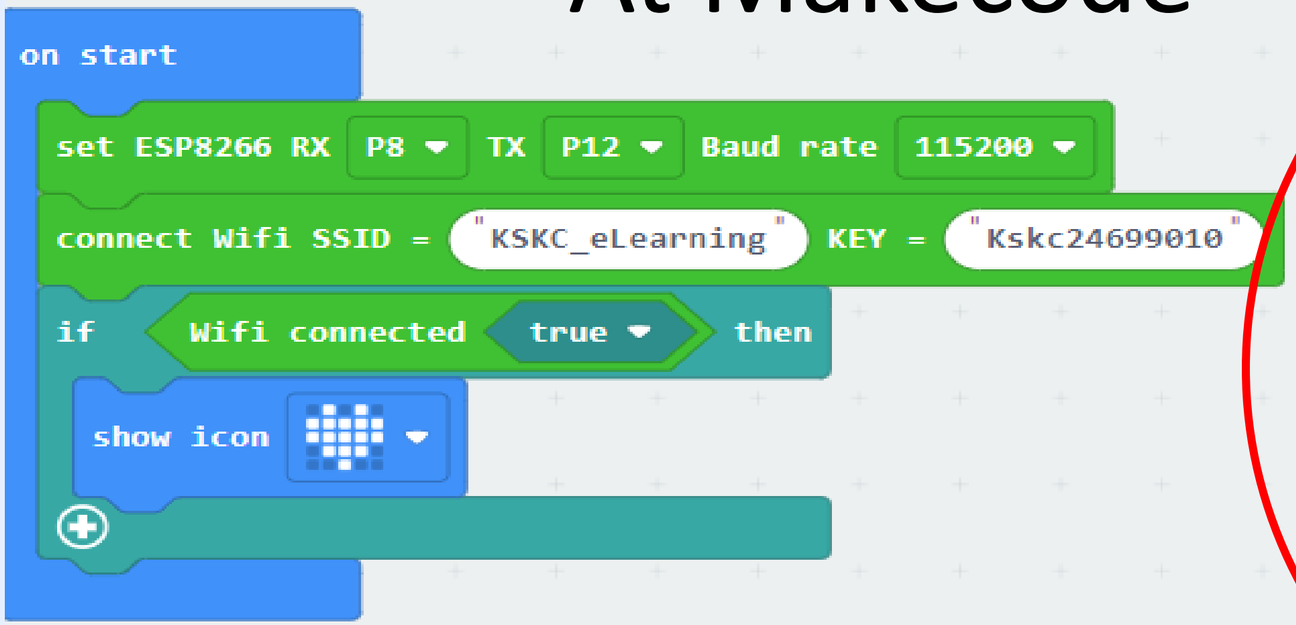
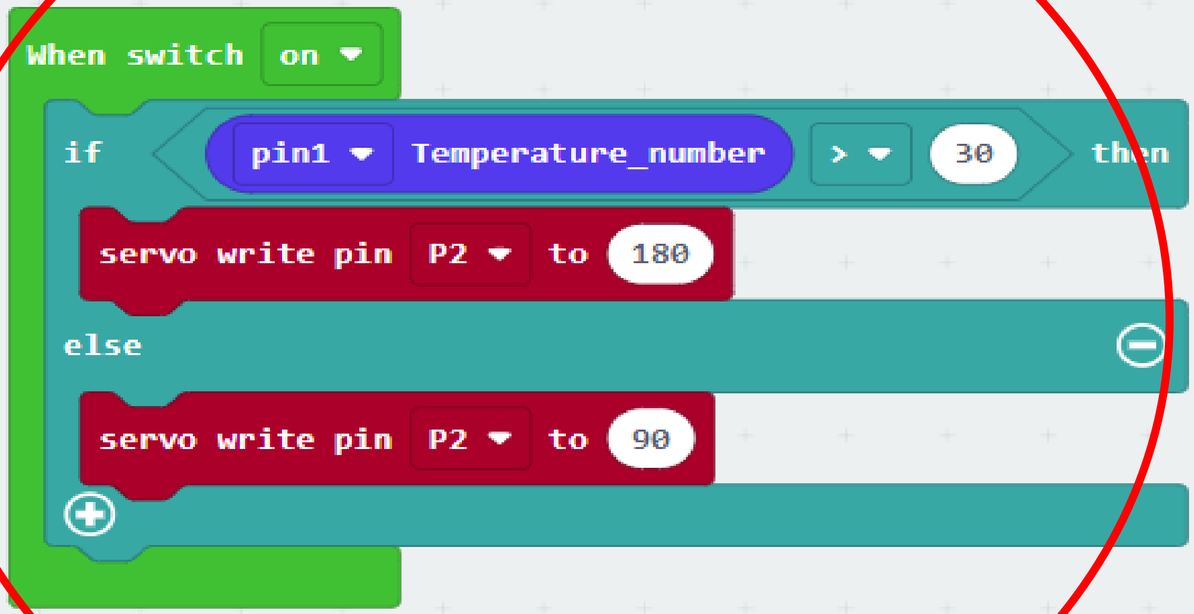
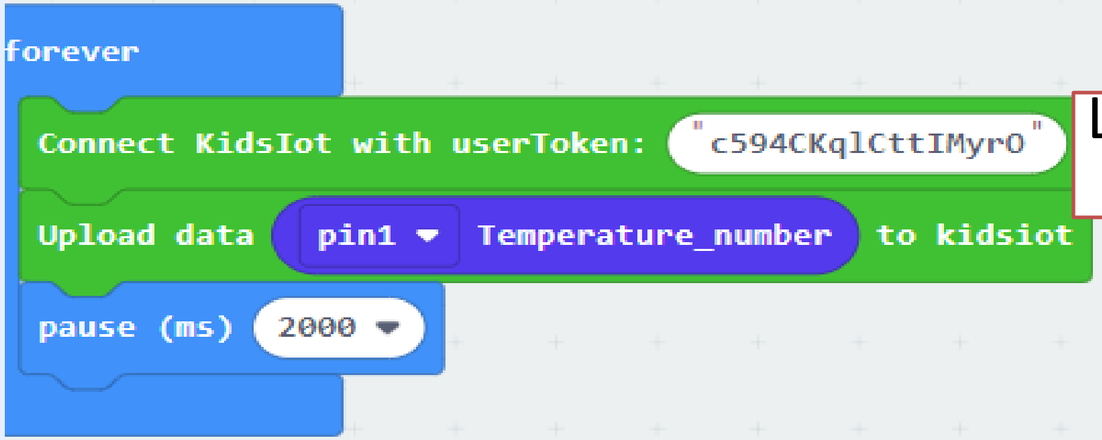
KidsIoT setting(Remote Control)
Digital servo

At Makecode







Link: https://makecode.microbit.org/_FtMJWL3XU7jq

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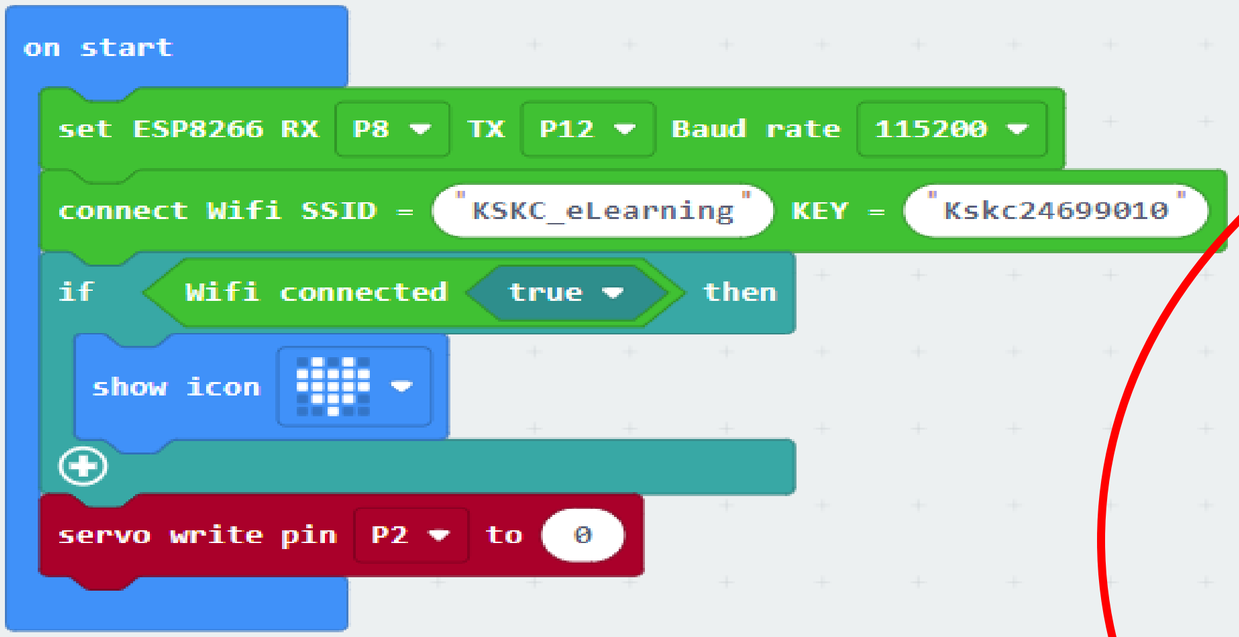
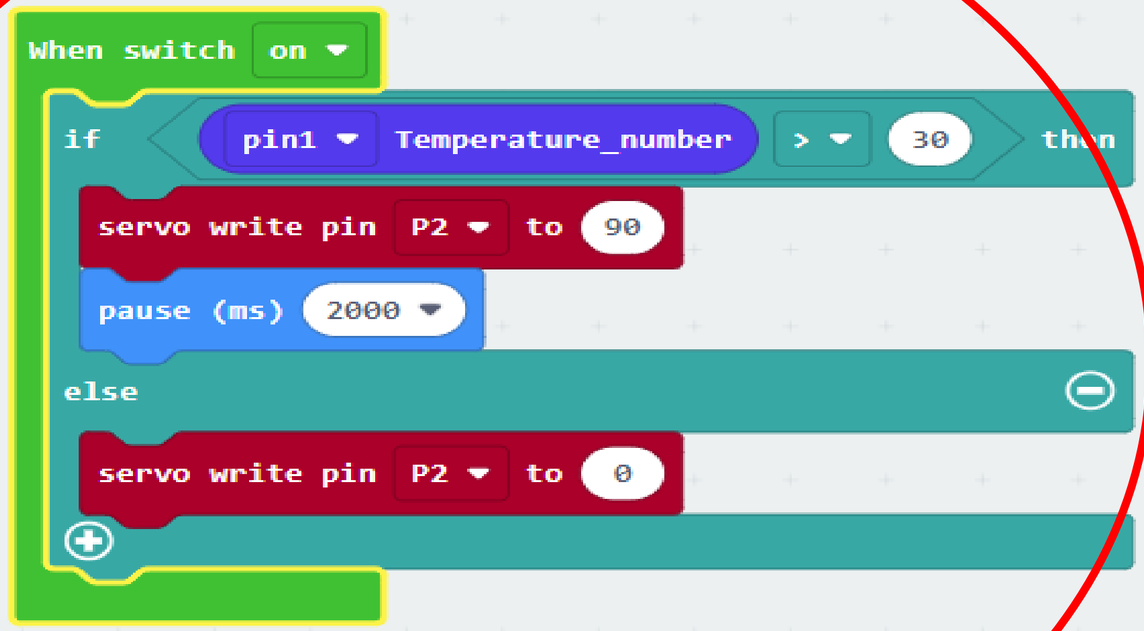
KidsIoT setting(Remote Control)
Analog servo





Link: https://makecode.microbit.org/_bfp49HDt7bJT

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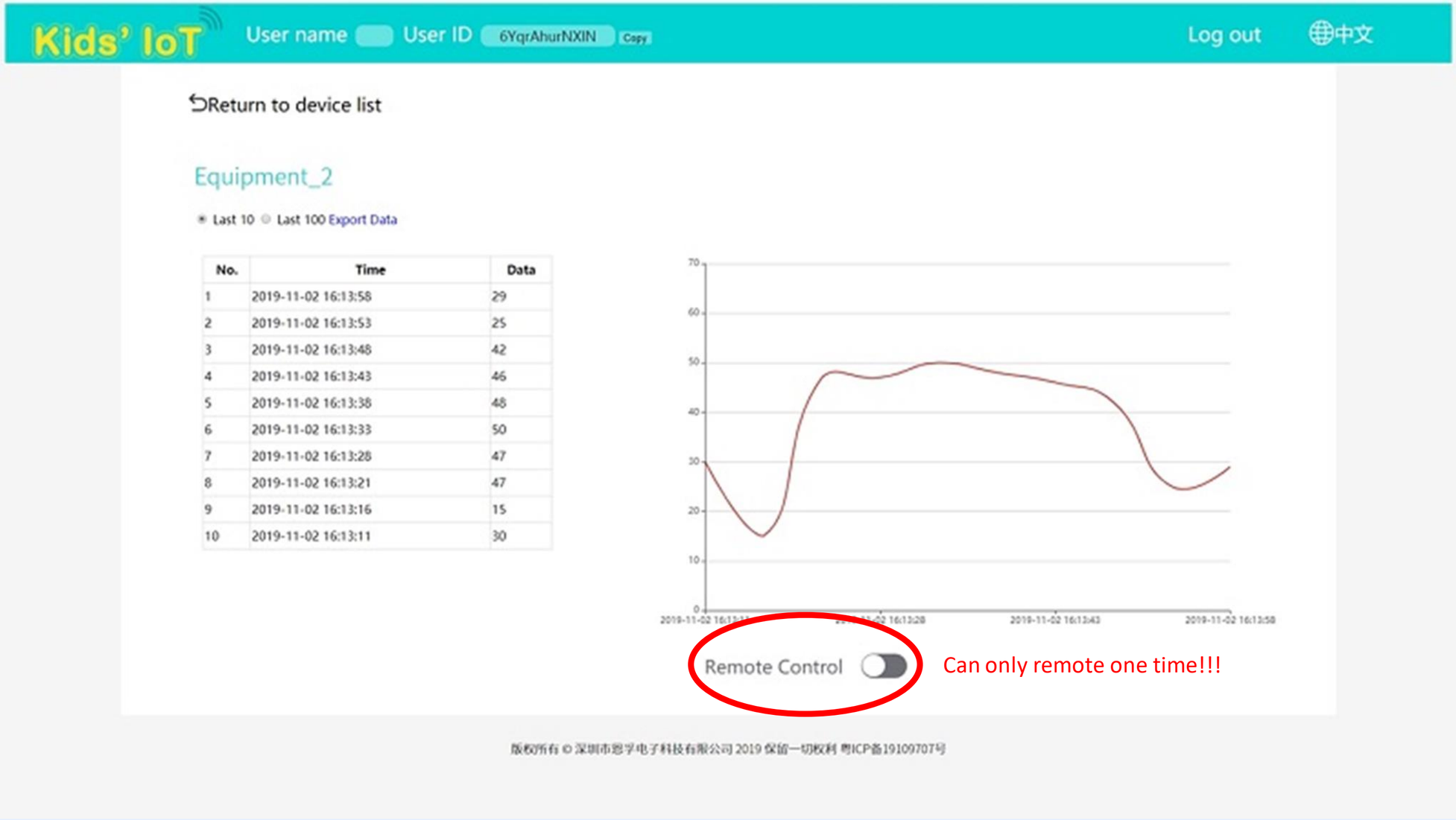
KidsIoT setting(Remote Control)



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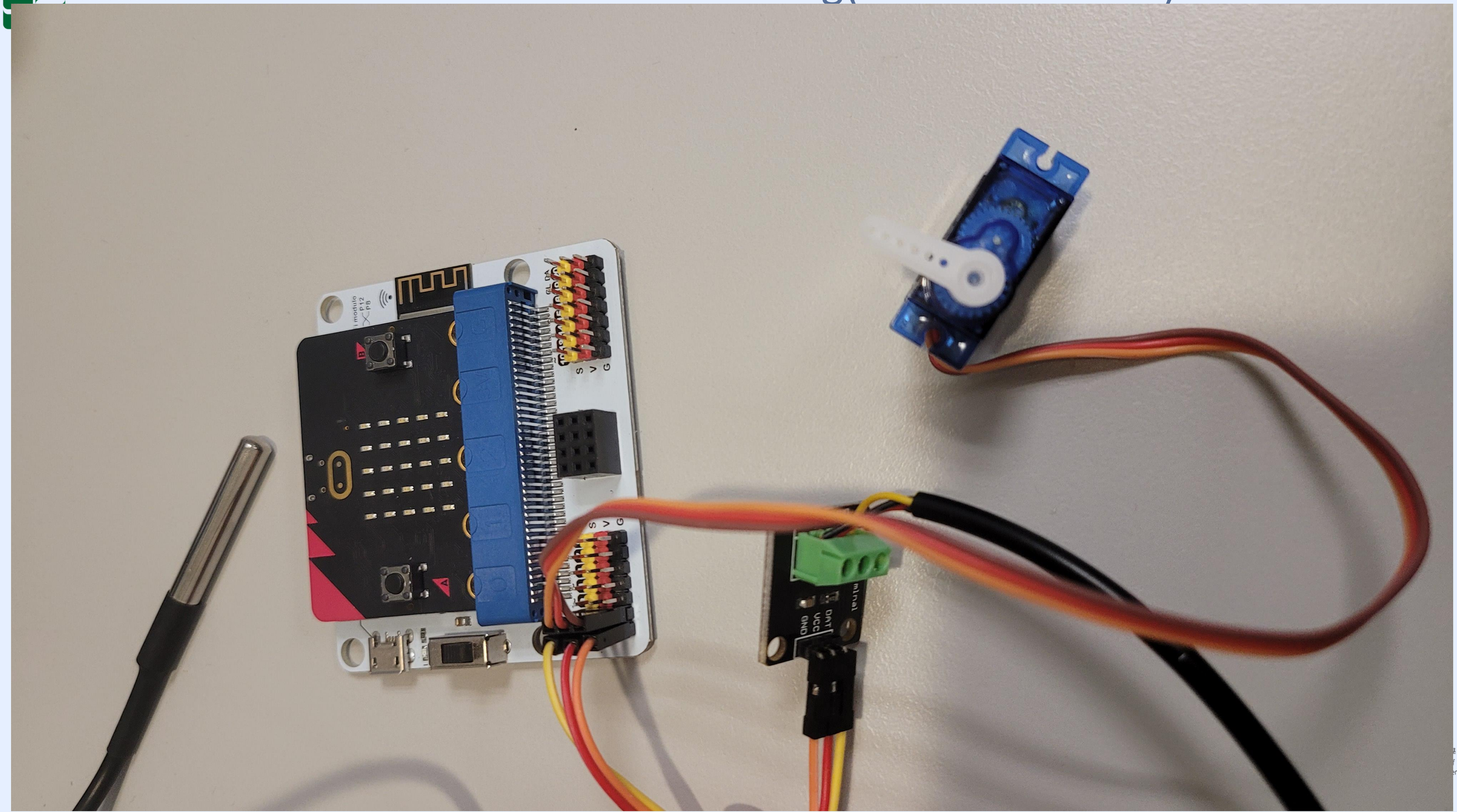
KidsIoT setting(Remote Control)



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3. Assessment in STEM Education

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