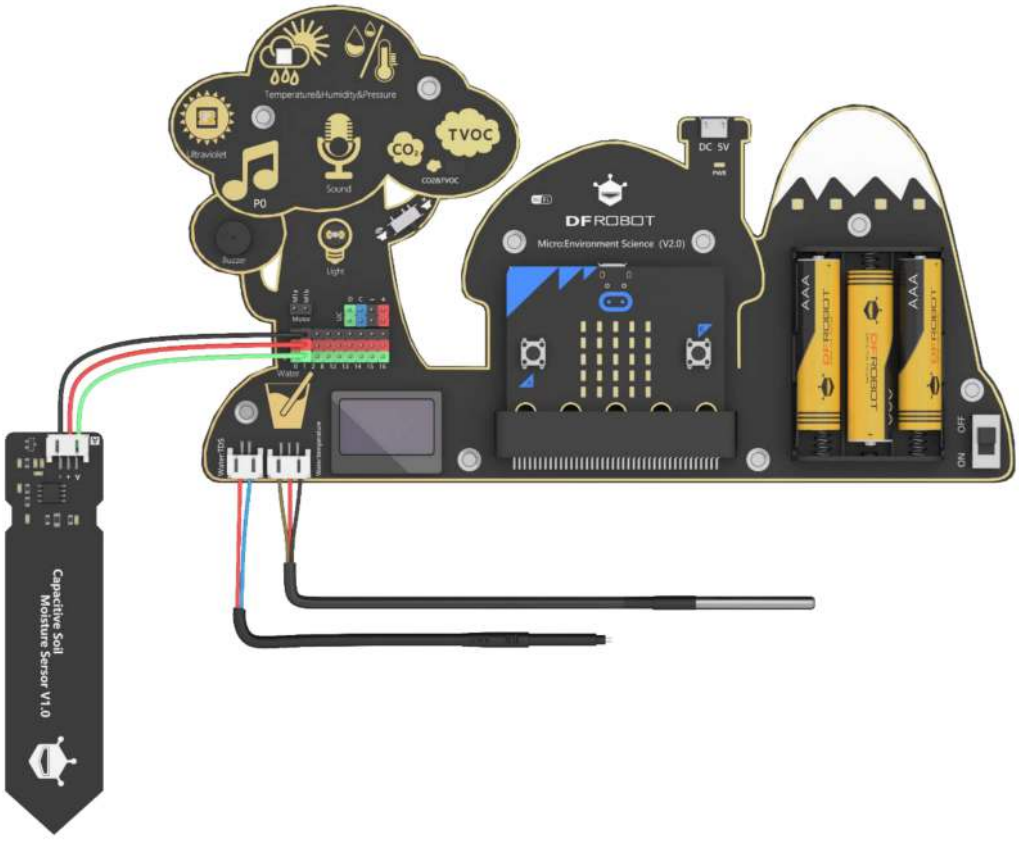
Tutorial of Environment Science Expansion Board for micro:bit -V2.0

Based on MakeCode

(SKU: MBT0034)



www.DFRobot.com

Content

Chapter1: Introduction to Environment Science Expansion Board V2.0

Product Name: Micro: Environment Science (V2.0)

SKU: MBT0034

Product Link:

Introduction

This micro:bit-based expansion board, specially designed for Maker education, allows students to measure environmental conditions for scientific experiments by using rich on-board sensors. It aims to provide a platform for students to learn theory with practices and bring science education closer to daily life!

Integrated sensors include UV sensor, temperature sensor, humidity sensor, air pressure sensor, sound sensor, light sensor, water temperature sensor, and a TDS (Total Dissolved Solids) water quality sensor, soil moisture sensor, etc.

V2.0 Update

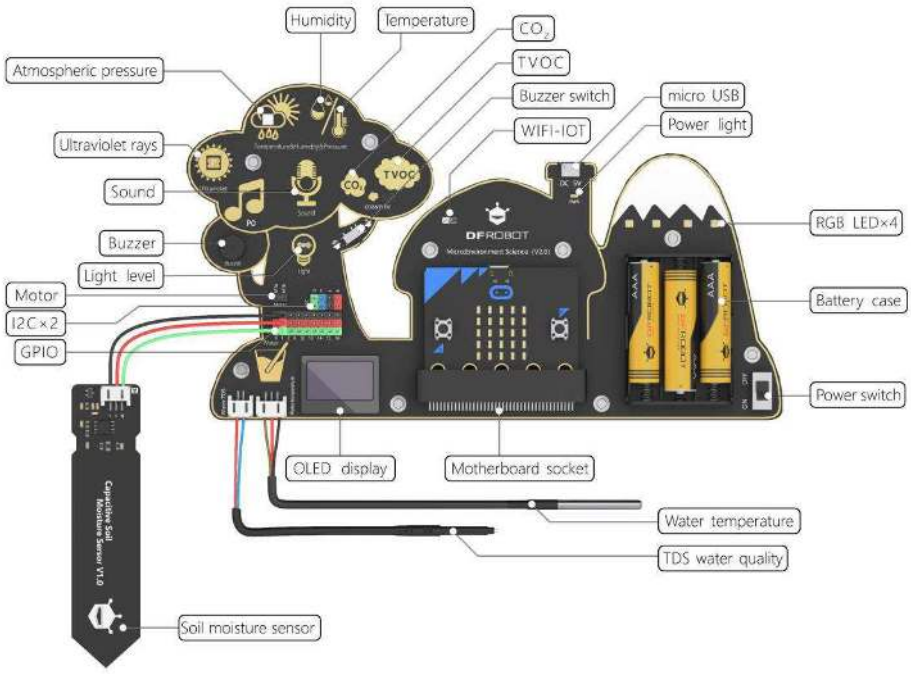
1. Comes with WiFi-IoT card, support IoT platforms such as IFTTT, ThingSpeak, EasyIoT
2. Supports for the measurements of TVOC and CO2
3. MicroUSB power supply port, more convenient for classroom teaching
4. Onboard 4-way RGB lights
5. 1-way motor driver
6. More powerful chip and more IO ports
7. Greatly optimized OLED display program, more convenient and flexible to use
8. The color sensor is removed from the list

Specification

1. High Integration Density(14 function modules): atmospheric pressure, temperature, humidity, harmful gases, carbon dioxide, ultraviolet rays, light, sound, water quality, water temperature, soil humidity, buzzer, RGB light, OLED display, and motor driver.

2. IoT Function: able to be accessible to famous IoT platforms such as IFTTT, ThingSpeak, and EasyIoT through the WIFI-IoT card.
3. The interesting shape of the tree makes the classroom teaching more vivid and fun.

Board Overview



Parameters

Power Supply: MicroUSB (5V) /Three 1.5V AAA Batteries (4.5V)

Because the power consumption of WIFI-IoT card is relatively large, it may not work properly if the AAA battery is low. Please use MicroUSB port to supply power to ensure normal operation of the product.

Digital Port Output Voltage: 3.3V

GPIO: P0 P1 P2 P8 P12 P13 P14 P15 P16 I2C×2

ML8511 UV Sensor

Operating Temperature: -20℃~70℃

Sensitive Area: UV-A, UV-B

Sensitivity Wavelength: 280-390nm

BME280 Environment Sensor

Operating Current: 2mA

Operating Temperature: -40℃~+85℃

Temperature Measuring Range: -40℃~+85℃ ,Resolution 0.1℃ ,Deviation±0.5℃

Humidity Measuring Range: 0~100%RH, Resolution 0.1%RH , Deviation±2%RH

Response Time of Humidity Measurement: 1S

Atmospheric Pressure Measuring Range: 300~1100hPa

Waterproof Temperature Sensor

Temperature Display Range: -10℃~+85℃ (Deviation±0.5℃)

Operating Temperature Range: -55℃~125℃

Query Time: less than 750ms

TDS Water Quality Sensor

The TDS probe should not be used in water above 55℃.

The TDS probe should not be placed too close to the edge of the container, as this will affect the accuracy.

CCS811 Air Quality Sensor

Operating Temperature Range: -40℃~85℃

Operating Humidity Range: 10%RH~95%RH

CO2 Measuring Range: 400ppm~8000ppm

TVOC Measuring Range: 0ppb~1100ppb

Capacitive Soil Humidity Sensor

Operating Voltage: 3.3V-5.5V DC

Output Voltage: 0-3.0V DC

Connector: PH2.0-3P

RGB Light

RGB Light Model: WS2812

Port: P15

Light Sensor

Output Date Type: analog value

Data Range: 0-1023

Buzzer

Dimension: 9mm in diameter

Model: passive buzzer

Port: P0

Sound Sensor

Output Date Type: analog value

Data Range: 0-1023

OLED Display

Dimension: 0.96”

Display Color: blue

Pixels: 128 × 64

Full-screen Lighting Consumption: about 22.75mA

Motor Driving

Driving Mode: PWM

Compatible Motor: Low Power DC Motors such as N20 Gear Motor and 130 Gear Motor

WIFI IoT

Wireless Mode: IEEE802.11b/g/n

Encryption Type: WPA WPA2/WPA2–PSK

Frequency: 2.4GHz

Built-in Protocol: TCP/IP protocol stack

Supported IoT Platform: EasyIoT, IFTTT, ThingSpeak, SIoT

Status Indicator:

Red: disconnected

Blue: connecting

Green: connected

Dimension: 196mm*110.6mm/7.72*4.35”

Programming Platform: MakeCode, Mind+

Chapter2: MakeCode graphical programming

Here we assume that you have mastered how to use MakeCode to program the micro:bit board. Therefore, we mainly introduce the functions and programming methods of the McQueen Mechanic. The basic use of MakeCode will not be repeated.

Link and Library

MakeCode Programming Platform: https://makecode.microbit.org

Natural and Science IoT Library :

https://github.com/DFRobot/pxt-DFRobot_Environment_Science

Module Function Instruction

	**Request Data** **Instruction:** Request to read the sensor data once. This module is generally placed in the loop module to execute repeatedly to keep data up-to-date.
	**Read the Ultraviolet Intensity** **Instruction:** Read the value of the ultraviolet intensity. The output value is of string type. If the value is required to participate in the programming, it should be transferred to the number type by the specific block first. **Data Type :** If the data is

	required to participate in the programming, transfer it to number first.
	**Read the Ambient Light Intensity** **Instruction:** Read the light intensity via the onboard light sensor, **Data Type:** (Number)
	**Read the Water Temperature** **Instruction:** Read the water temperature in unit Celsius, correct to1 decimal place. Plug the water temperature sensor into the board before using it. **Data Type:** If the data is required to participate in the programming, transfer it to number first.
	**Read the Environment Temperature** **Instruction:** Read the Environment Temperature, correct to 1 decimal place. **Data Type :** If the data is required to participate in the programming, transfer it to number first.

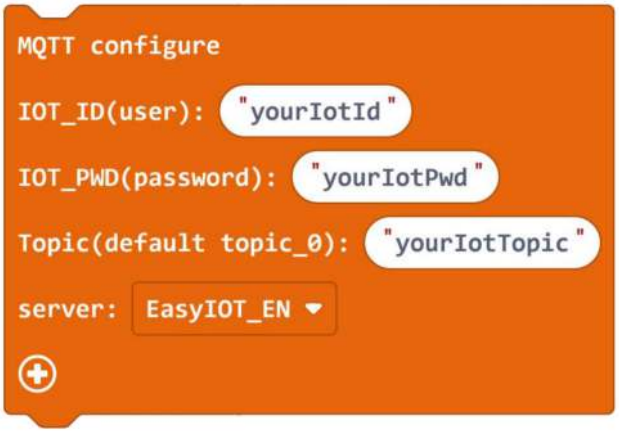
	**Read the Environment Humidity** **Instruction :** Read the environment humidity in unit %, correct to 1 decimal place. **Data Type :** If the data is required to participate in the programming, transfer it to number first.
	**Read the Atmospheric Pressure** **Instruction:** Read the atmospheric pressure in unit kPa, correct to 1 decimal place. **Data Type:** If the data is required to participate in the programming, transfer it to number first.
	**Read the TDS Value** **Instruction:** Measure the TDS, and plug the TDS probe before using it. **Data Type:** Number
	**Set the K Value of the TDS** **Instruction:** If the TDS value is not accurate, this module can be used to adjust the

	measured value. This block is not obligatory.
	**Set the K Value of the TVOC & CO2** **Data Type:** If the TVOC and CO2 values are not accurate, this module can be used to adjust the measured value. This block is not obligatory.
	**Read the CO2 Value** **Instruction:** Read the value of CO2 in the environment. **Data Type:** Number
	**Read the TVOC Value** **Instruction:** Read the value of TVOC in the environment. **Data Type:** Number
	**OLED Displays Characters at Specified Positions** **Instruction:** OLED Displays Characters at Specified Positions. The data type must be character. If it Is number, it should be transferred to character first.
	**OLED Displays number at Specified Positions** **Instruction:** OLED

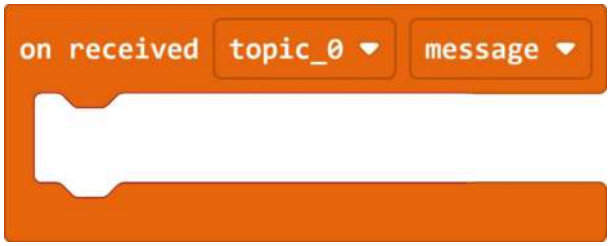
	Displays number at Specified Positions. The data type must be number. If it Is character, it should be transferred to number first.
	**Clear the contents of the specified location of the OLED** **Instruction:** Clear the specified columns and rows in OLED. It is usually used to refresh the displayed content at a fixed location. A clear operation could cause the contents of the cleared location to blink at a fixed frequency.
	**Clear the contents of the specified row of the OLED** **Instruction:** Clear the specified row in OLED. It is usually used to refresh the display in a row. A clear operation could cause the contents of the cleared location to blink at a fixed frequency.
	**Control the Direction and Speed of the**

	Motor's Rotation **Instruction:** Control the direction and speed of rotation of the DC motor connected to the Motor port. The speed range is 0~255. When the speed is 0, the motor will not rotate.
	**Control the Stop of the Motor** **Instruction:** Stop the DC motor connected to the Motor port.
	**Adjust the Brightness of the RGB Light** **Instruction:** Set the brightness of the 4 RGB lights. The range is 0~255. During use, if the brightness of the RGB light is too high, you can embed this block into the "on start" block to lower the display brightness.
	**Set the Three Primary Colors of The RGB Light** **Instruction:** Accurately adjust the color displayed by the RGB light by setting the values of the three primary colors of red, green, and blue.

	**Specify the Range of Serial Numbers RGB Lights keep ON** **Instruction:** Specify the serial number range of the RGB LEDs turning ON. 1~4 is optional. For example, select 2-3, NO. 2 and NO.3 RGB LED will light up.
	**Specify the Color of a specified RGB Light** **Instruction:** Specify the color of a specified RGB led in the 4 lights. 1-4 is optional. You can directly select the color block, or use the "Set Three Primary Colors of the RGB Lights" block.
	**All RGB Lights Display the Same Color** **Instruction:** Set all the RGB LEDs light up in a specified color. You can directly select the color block, or use the "Set Three Primary Colors of the RGB Lights" block.
	**Set the RGB Lights to Display a Rainbow Effect.** **Instruction:** Set 4 RGB lights to display with rainbow color effect. Fill

	in the degree of the color difference in the number box. The number range is 1 to 360. The larger the interval, the greater the difference. And different data intervals have different color effects.
	**Turn off All RGB Lights** **Instruction:** Turn off all the RGB lights.
	**Configure the WIFI Parameters** **Instruction:** Set the WIFI parameters. In one program, it only needs to be set once. Place it in "on start" block. **Name:** Full in the WIFI name **Password:** Full in the WIFI password
	**MQTT Configuration** **Instruction:** If the IoT platform uses MQTT protocol (EasyIoT, SIoT and ect.), then this block is required for MQTT configuration. **IOT_ID(ID):** Full in the ID of the IoT platform **IOT_PWD(password):** Full in the password of

	the IoT platform **Topic (the default is topic_0):** Fill in the code generated in the Topic on the MQTT platform. **Server Options:** EasyIoT_CN, Easy IoT_EN, SIoT **IP Address:** You need to click the "+" to check this content, Easy IOT_CN and Easy IOT_EN do not need to be filled in and modified, the default is okay. SIoT needs to fill in the IP address correctly.
	**New MQTT Subscription** **Instruction:** On the IoT platform of MQTT protocol such as Easy IoT, it is possible to create multiple topics. Besides, different Topics can be selected for data operation. When using this block, we need to create a corresponding Topic on the IoT platform. We can create 5 Topics at most. Fill the text box with the code corresponding to the Topic column. **Options:** topic_0,

	topic_1, topic_2, topic_3, topic_4
	**The Program to Be Executed after Receiving Message Sent by MQTT Platform (Event Trigger Mode)** **Instruction:** Execute the program after receiving the message sent by MQTT IoT platform. This Block is an event-triggered mode. When the event is triggered, a string type data with variable name "message" will be received. **Option:** topic_0, topic_1, topic_2, topic_3, topic_4
	**Configure the Event Name and Key of IFTTT** **Instruction:** First, you need to create an event on IFTTT, and then fill in the corresponding event name and key in this block.
	**Send A Message to IFTTT Platform** **Instruction:** Send string information to the IFTTT

	platform, with a total of 3 values
	**Configure the ThingSpeak Key** **Instruction:** Fill in the key of ThingSpeak platform. The key need to be generated on the ThingSpeak platform first.
	**Send Message to ThingSpeak** **Instruction:** Send string information to ThingSpeak. You can click the "+" to send multiple string messages simultaneously.

1. Measurement of Temperature and Humidity and The Comfort Level

Introduction

The example codes below are used to read temperature and humidity values, and display the real-time temperature and humidity on the OLED. When the temperature and humidity exceed the comfort level of human body, the micro:bit LED screen will show a "×", and if the comfort level is within the range of human body, it will show a "heart".

Sample Program: Measurement of Temperature and Humidity and Estimation of Comfort Level

Program Link: https://makecode.microbit.org/_ifULzwcC8U4y

Program Screenshot:

2. Measurement of Atmospheric Pressure

Introduction

Read the value of atmospheric pressure and display it on the OLED in unit kPa.

Sample Program: Atmospheric Pressure Detection

Program Link: https://makecode.microbit.org/_7A5HkkUJdXsd

Program Screenshot:

3. Measurement of Sound Intensity

Introduction

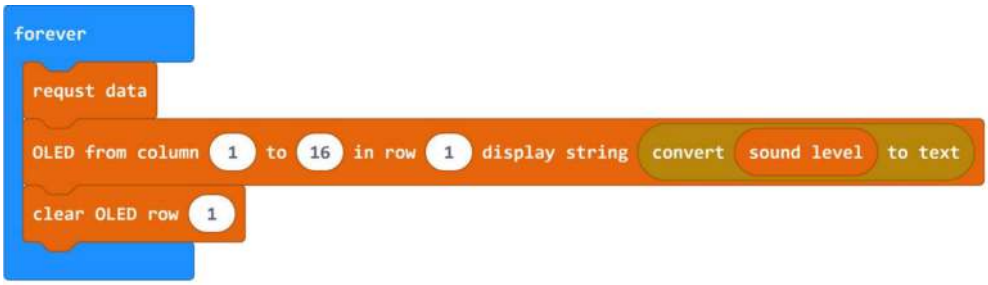
In this part, we are going to learn the measurement of sound intensity through two samples.

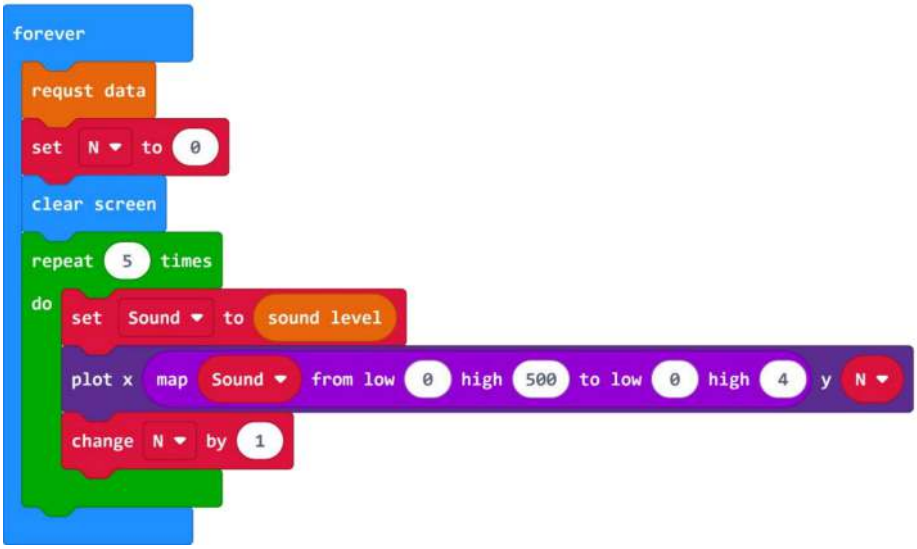
Sample Program 1: Sound Dynamic Display

Convert the acquired sound to the information that how many LEDs of micro:bit panel would light up. The louder the sound is, the more LEDs will be turned on at the LED screen from left to right.

Program Link: https://makecode.microbit.org/_Ky7VPWaY15wT

Program Screenshot:



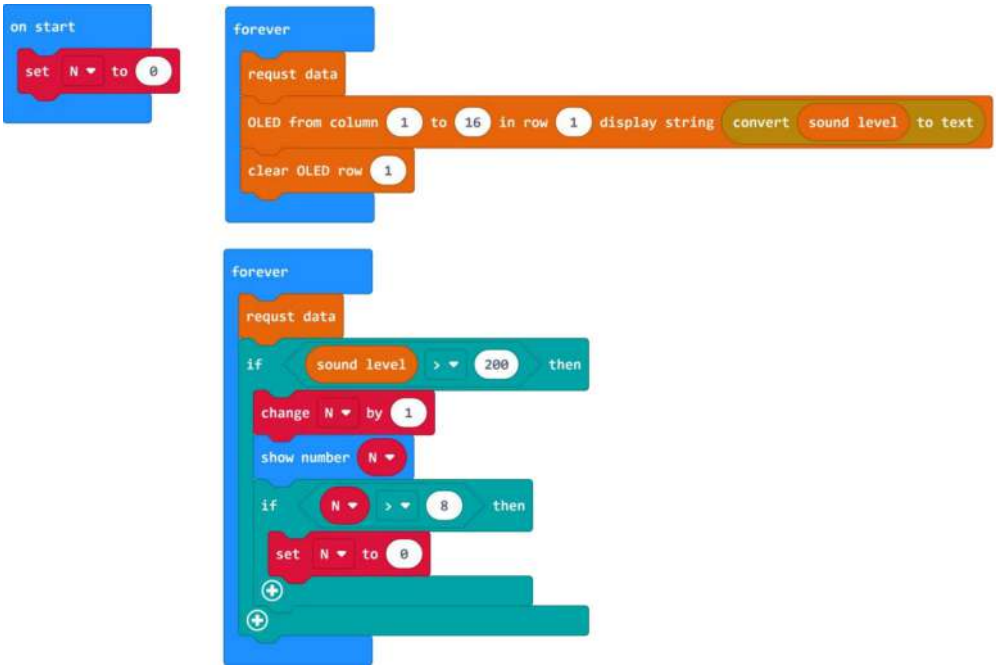


Sample Program 2: Clapping Counter

Record clapping times(1~9) and display the corresponding number on the micro:bit LED Screen, meanwhile, display the sound intensity on the OLED display in real-time.

Program Link: https://makecode.microbit.org/_0bdDDRV8pDXz

Program Screenshot:



4. Measurement of Light Intensity

Introduction

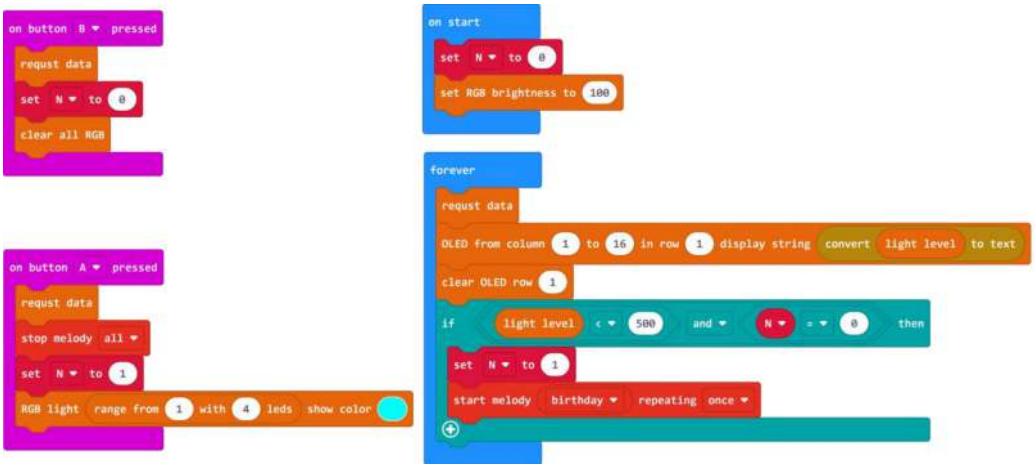
In this chapter, we are going to learn the measurement of light intensity value and make an interesting light-controlled clock.

Sample Program: Interesting Light-Controlled Clock.

The program simulates a scenario in which sunshine hits the sensor in the morning and the loudspeaker plays music to remind you that it is time to get up. Then you press button A, the music stops, and the bedside lamp lights up. When you press button B, the lamp goes out and the program enters the next round of waiting.

Program Link: https://makecode.microbit.org/_TsVbYTEXj6Vj

Program Screenshot:



5. Measurement of Ultraviolet Rays

Introduction

Ultraviolet radiation, which is directly invisible to our eyes, is the general term for radiation of wavelengths in the electromagnetic spectrum from 10nm to 400nm. Excessive ultraviolet ray intensity can damage human's skin and harm health.

In this chapter, the program will use a UV sensor to measure the UV intensity and determine whether it exceeds the specified value. If so, the servo will rotate to simulate the electric curtain closing to block the UV.

Sample Program: Measurement of Ultraviolet Rays and Automatic Curtain-Closing System

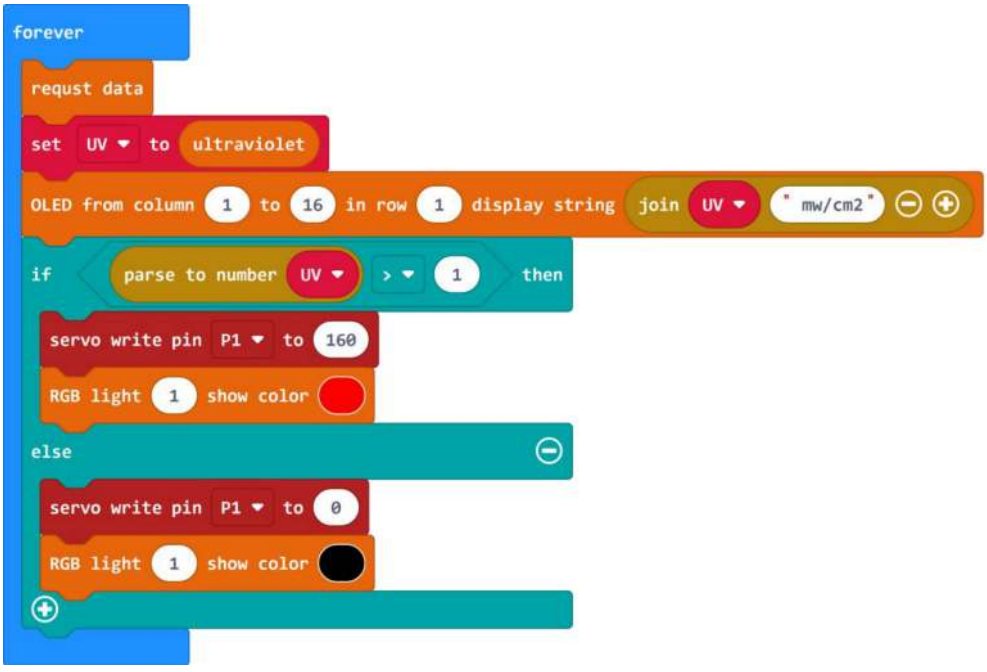
This program will read the UV intensity and display it on the OLED. The unit of UV intensity is mw/cm2. Besides, when the intensity reaches 1.0 or above, the servo will be activated to simulate closing the curtain.

Note: The servo in this sample should be purchased separately.

Link: https://www.dfrobot.com/product-1338.html

Program Link: https://makecode.microbit.org/_gDAaf5VpX1Ht

Program Screenshot:



6. Measurement of TVOC

Introduction

TVOC refers to the organic compounds whose saturated vapor pressure exceeds 133.32 Pa at room temperature. Its boiling point is between 50 to 250℃ at room temperature, and it exists in the air in the form of evaporation. Its toxicity, irritation, carcinogenicity and special odor, will affect the skin and mucous membrane, and produce acute damage to human body.

TVOC Reference Value:

TVOC Concentration (ppd)	Human Physiological Reaction
<50	Normal
50-750	May be irritable
750-6000	Uncomfortable and headaches may occur
>6000	Headaches and other neurological problems

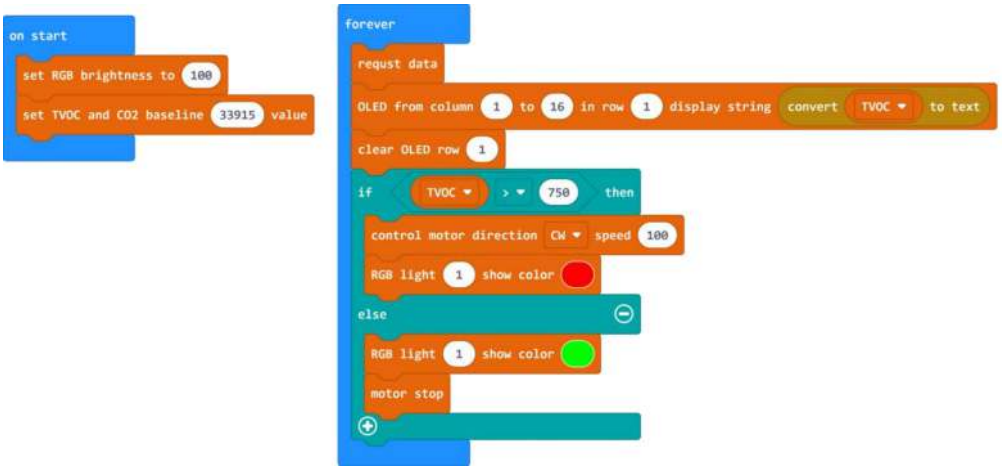
Sample Program: TVOC Gauge

This program will read the TVOC value and display it on the OLED. When it exceeds 750, the program will turn on the motor to ventilate the room.

Note: the motor in this program should be purchased separately.

Program Link: https://makecode.microbit.org/_Dm6PbThoYT77

Program Screenshot:



7. Measurement of CO2

Introduction

Carbon dioxide is a colorless and odorless gas at room temperature. It is denser than air and can dissolve in water. The chemical formula is CO2 and it is one of the main components of the air.

Too much carbon dioxide in the air can cause breathing difficulties and even carbon dioxide poisoning.

CO2 Reference Value:

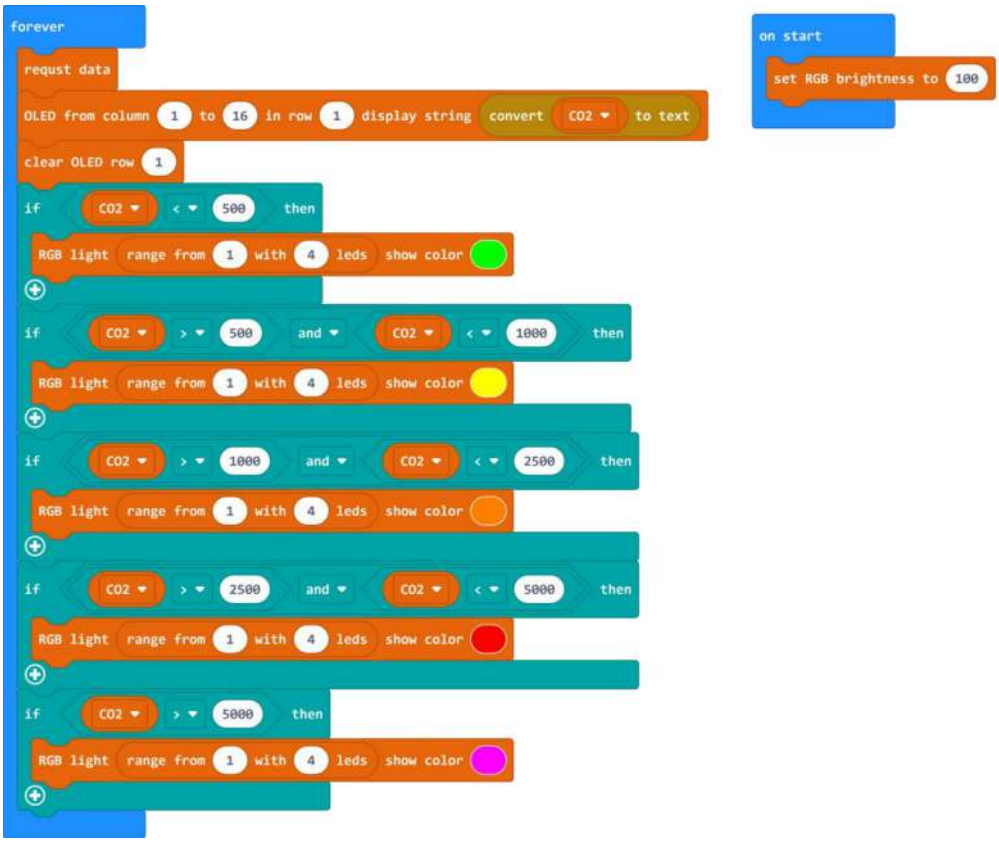
CO2 Concentration	Human Physiological Reaction
<500	Normal
500-1000	Feel the air cloudy
1000-2500	Feel sleepy
2500-5000	Bad for health
>5000	Rick of poisoning

Sample Program: Carbon Dioxide Tester

This program will read the value of carbon dioxide and display it on the OLED. When the value is below 500, the RGB light shows green; 500-1000 shows yellow; 1000-2500 shows orange; 2500-5000 shows red; above 5000 shows purple. Because the gas we breathe out also contains a lot of carbon dioxide, we can blow to the sensor to observe the significant change of the value.

Program Link: https://makecode.microbit.org/_6JmgDeKRTEMT

Program Screenshot:



8. Measurement of Water Temperature and Application (Conversion between Celsius and Fahrenheit)

Introduction

In daily life, many devices need to measure the water temperature, such as water heater, coffee maker, smart cup, etc. in this chapter, we will use a sensor to measure the water temperature: Water Temperature Sensor.

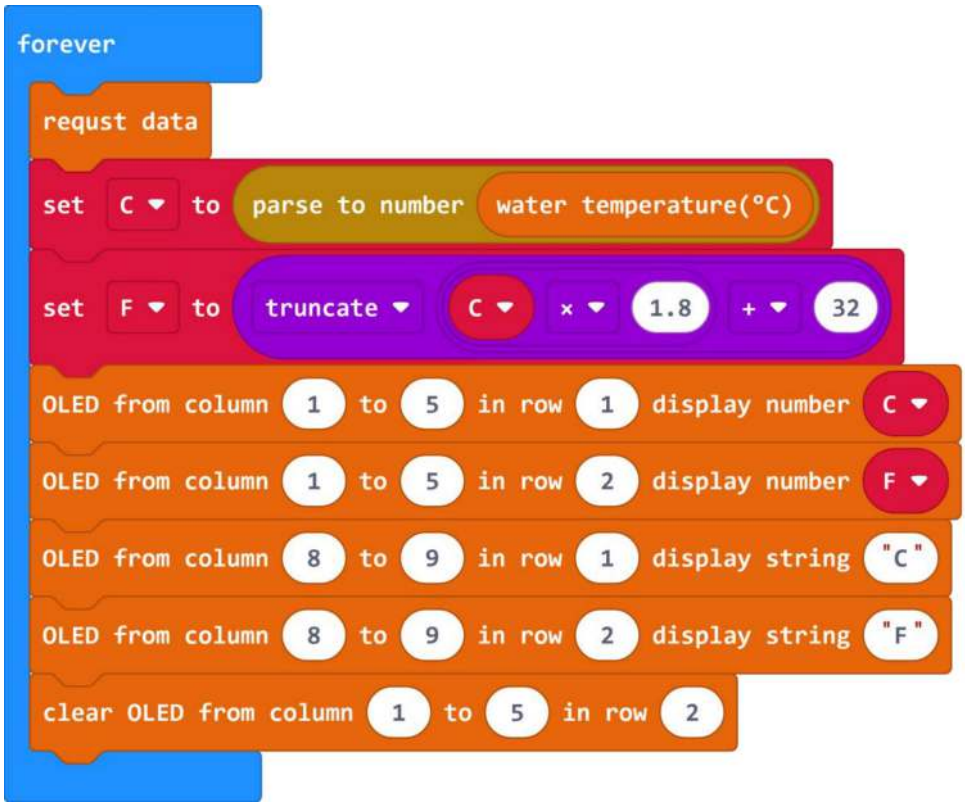
In the program, the default output temperature unit is Celsius. Another unit called Fahrenheit is also widely used. the conversion formula between them is: Fahrenheit = 32+Celsius*1.8

Sample Program: Water Temperature Detector

Write a program to read the water temperature and convert it to Fahrenheit. Then display the value of two units in the OLED.

Program Link: https://makecode.microbit.org/_1YyJtubr6YJx

Program Screenshot:



9. Measurement of Water Quality (TDS)

Introduction

TDS refers to the total dissolved solids. The unit is mg/L, which indicates how many milligrams of the soluble solid are dissolved in 1 liter of water. The higher the TDS value is, the more dissolved substance there is in the water.

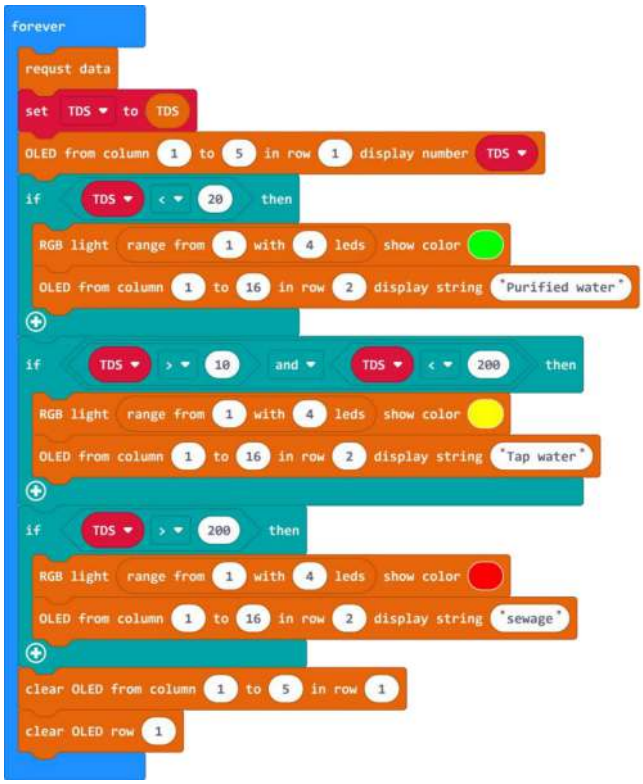
TDS value partly reflects the purity of the water and grades the water quality. The lower the TDS value, the purer the water; the higher the TDS value, and the more soluble solids in the water. However, it cannot be judged from this that the water with a high TDS value is harmful.

Sample Program: TDS Water Quality Monitor

Monitor the water quality of different water sources and classify the water quality. TDS value below 20 is considered as pure water, 20-200 as tap water, and above 200 as sewage. The OLED will show the classification and the different colors of the RGB lights represent different grades.

Program Link: https://makecode.microbit.org/_7k2Xx4MJKLsk

Program Screenshot:



Chapter3: Applications of IoT Platform

In this chapter, we will use WIFI-IoT card, and connect to the IoT platform via WIFI. Due to the high consumption of WIFI-IoT card, if the power of AAA battery is low, The WIFI will not work well. Please use USB port to supply power.

There are three states of the WIFI-IoT card indicator: red means WIFI disconnected; blue means WIFI connecting; green means connected successfully. Only when WIFI connection is successful, can we connect to and communicate with the IoT platform.

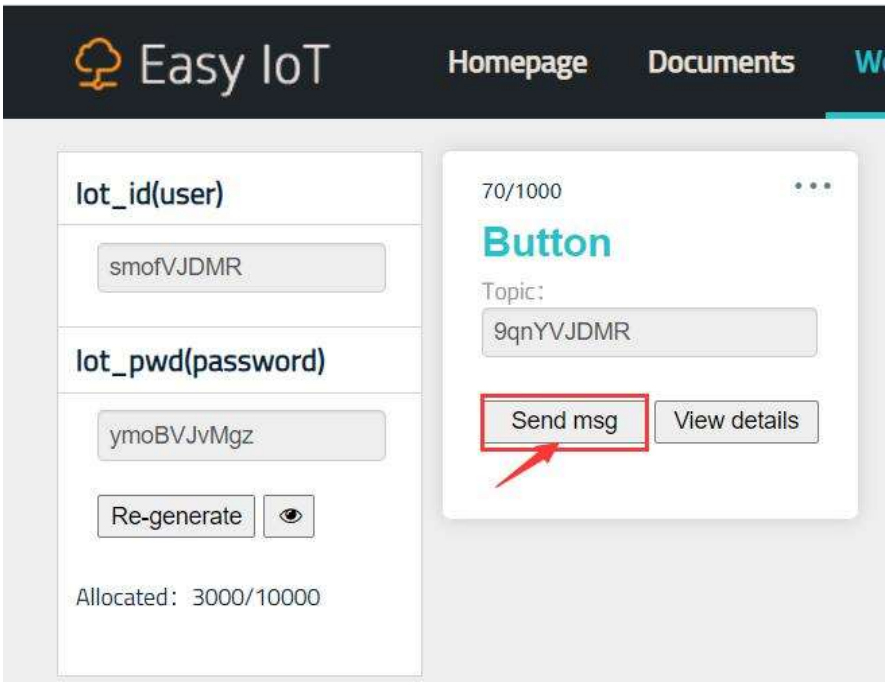
Example Project 1: IoT Environment Detection System (Based on Easy IoT)

Based on Easy IoT platform, the project saves the temperature and humidity data in the IoT platform via WIFI. When the digital instruction "1" is sent to the Easy IoT platform, the temperature and humidity value will be read and uploaded to Easy IoT platform via WIFI. If you need to read other values of other sensors, such as UV, harmful gases, etc., the principle and method are the same.

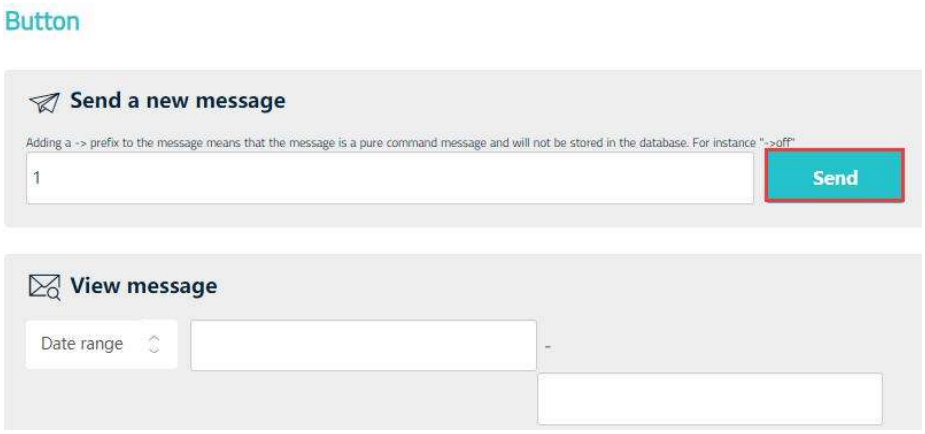
Settings of Easy IoT Platform:

1. Open the Easy IoT official website: http://iot.dfrobot.com/

2. Sign up and log in the Easy IoT platform. Three sequence number will be generated automatically: ID, PWD, and Topic. Fill in the corresponding number in the program.



3. Click "Send msg" to enter the interface. Input number "1" in the box, and click "Send".



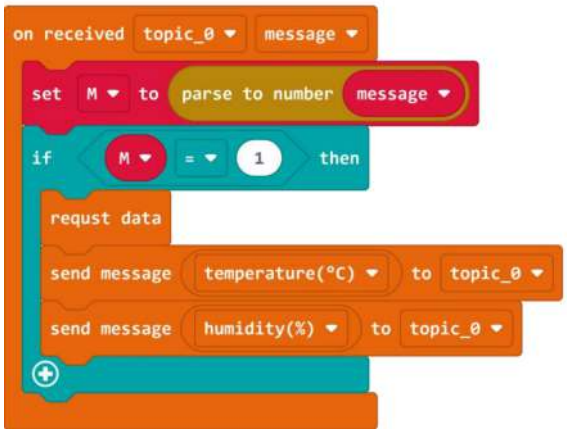
4. Click "View details", enter the detailed interface and you can see the data of temperature and humidity values returned.

Latest news

Time	Message
2021/1/4 8:53:41	28.2
2021/1/4 8:53:32	51.4
2021/1/4 8:53:22	1

Program Link: https://makecode.microbit.org/_Woh7HuMdD6hz

Program Screenshot:



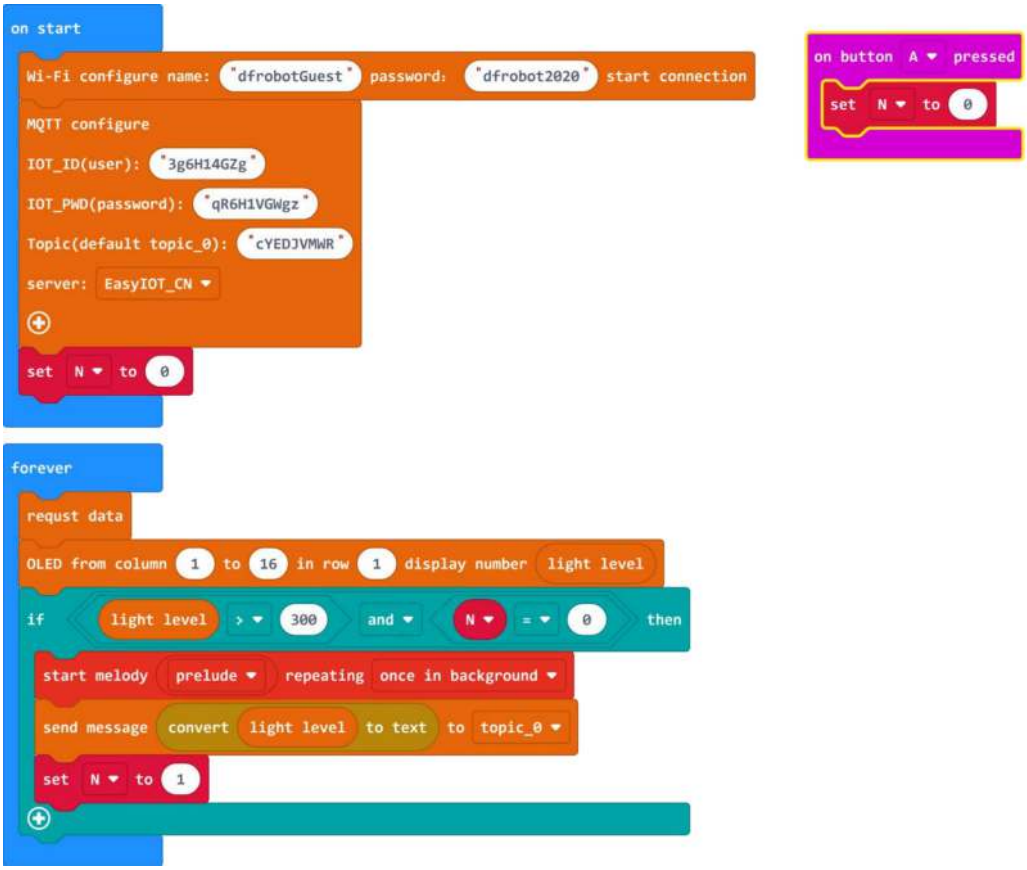
Sample Project 2: Light-Sensitive Automatic IoT Clock (Based on Easy IoT)

Introduction:

Sunshine hits the sensor in the morning and the loudspeaker plays music. The light intensity value will be upload to Easy IoT. Press button A on the main board, the program will enter the next round of waiting.

Program Link: https://makecode.microbit.org/_Eda4TbaAFXqg

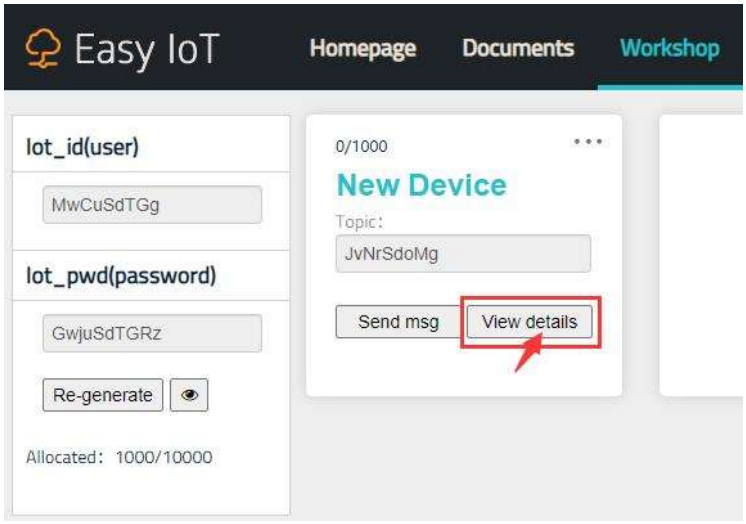
Program Screenshot:

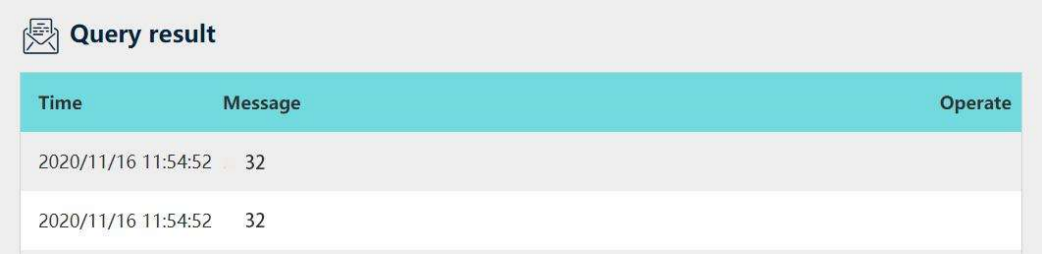


Program Execution Result:

1) When you shine a flashlight at the sensor, the buzzer will play music and the current value will be sent to the Easy IoT platform via WIFI.

2) Click "View details" at the position that the following figure shows to enter the detailed website to view the received data.





3) Press button A on the main board, the program will restore the waiting state, wait for the light to reach a certain level before playing music and sending data again.

4) Refresh the page on the IoT platform to view the latest data.

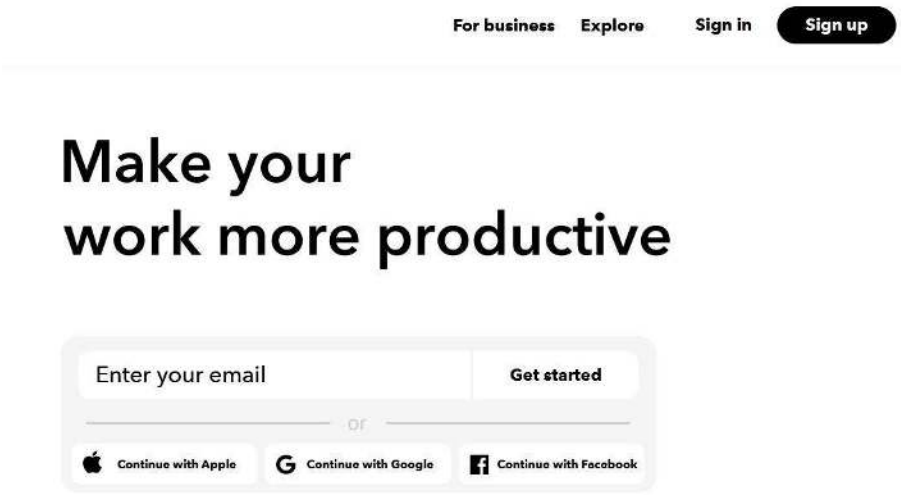
Sample Program 3: IoT Greenhouse Environment Alarm (Based on IFTTT)

1-1 Introduction

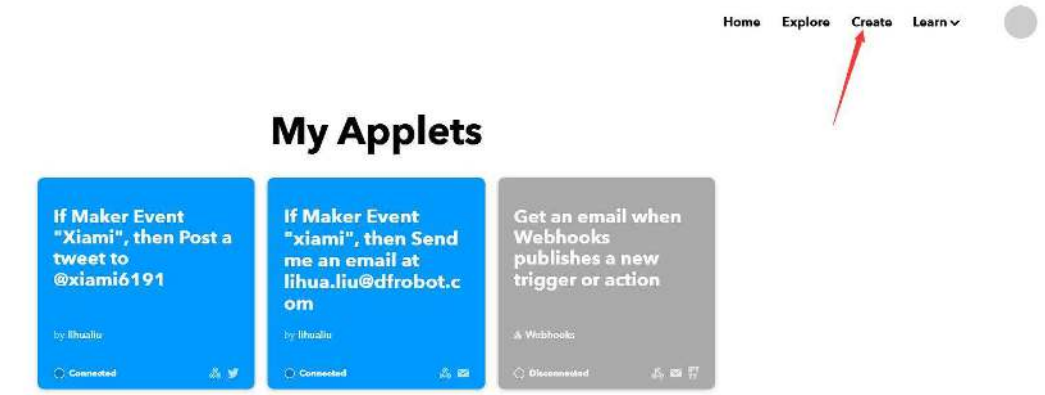
This project simulates the environment monitoring system of the greenhouse. After starting up, the system will automatically detect the temperature, humidity and soil humidity in the current greenhouse, and display them on the OLED. If the values exceed a certain range, the data will be sent to the mailbox set before via IFTTT platform.

1-2 Settings of Sending Message from IFTTT End

Open the IFTTT official website https://ifttt.com/ click sign in to log in.

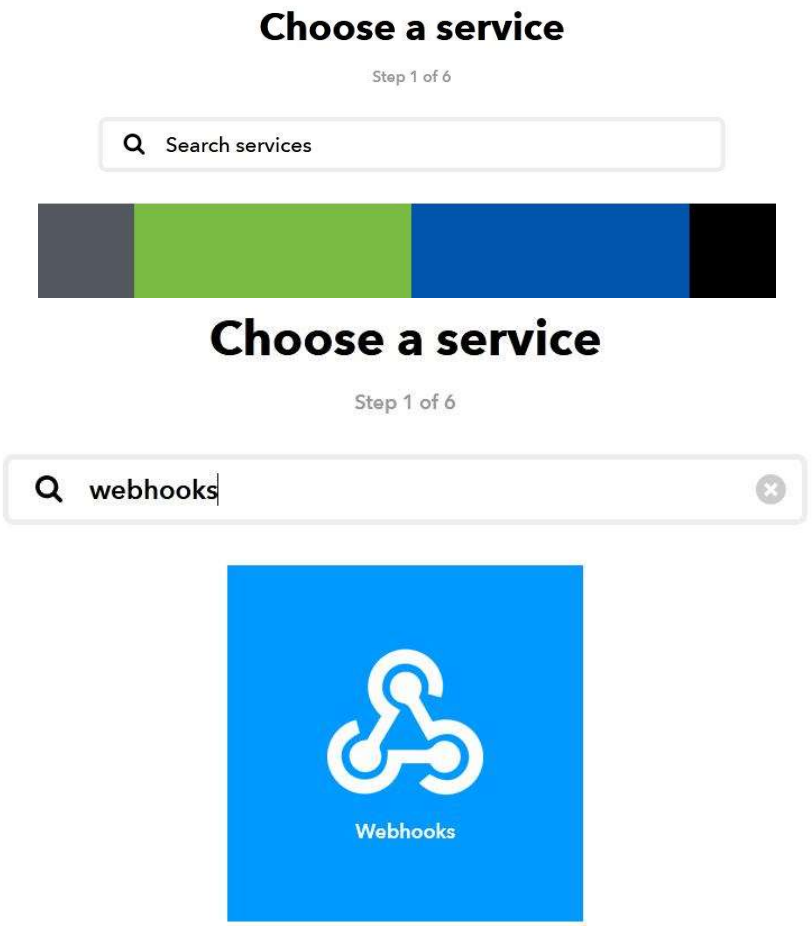


After logging in, operate as the following picture shows

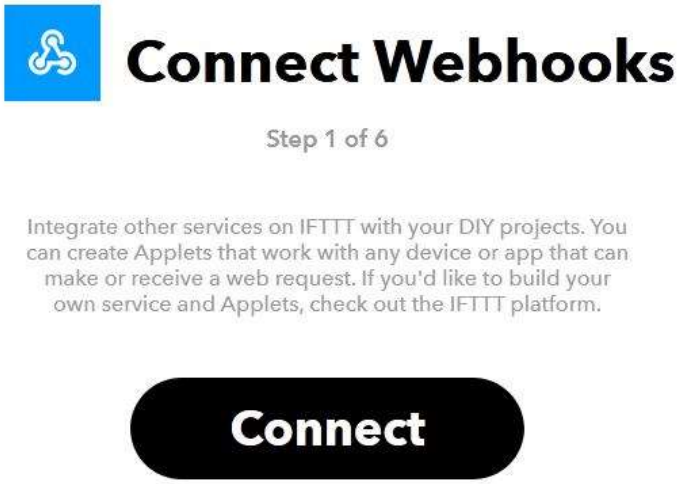


Click “Create your own” and you will see the interface like this:

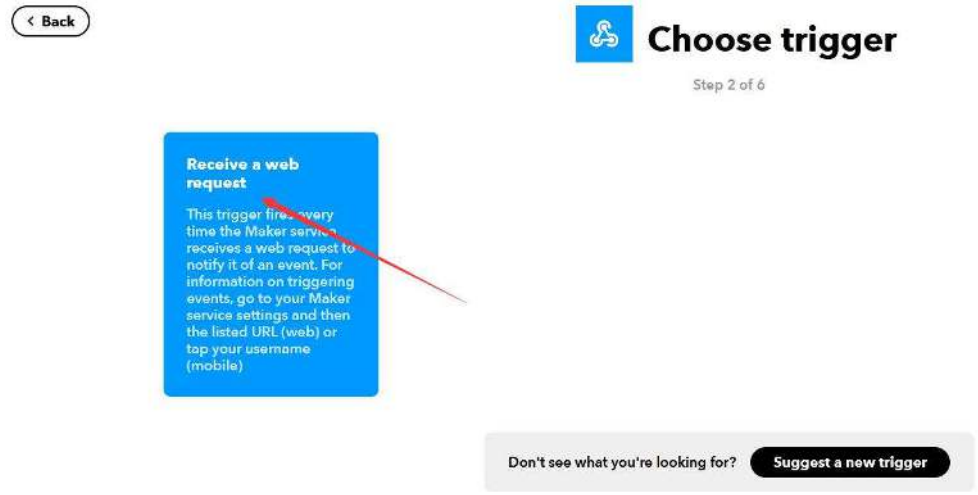
Click “This” to configure it and search “webhooks” in the box.



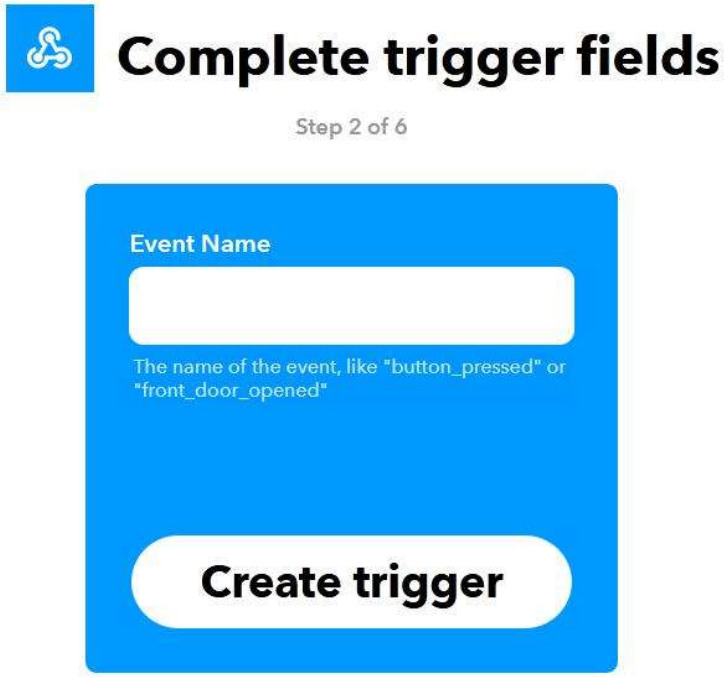
If it is the first time, the page will display as shown below. Click "Connect", and choose "Receive a web request", fill in the "Event Name" to finish the creation of "This".



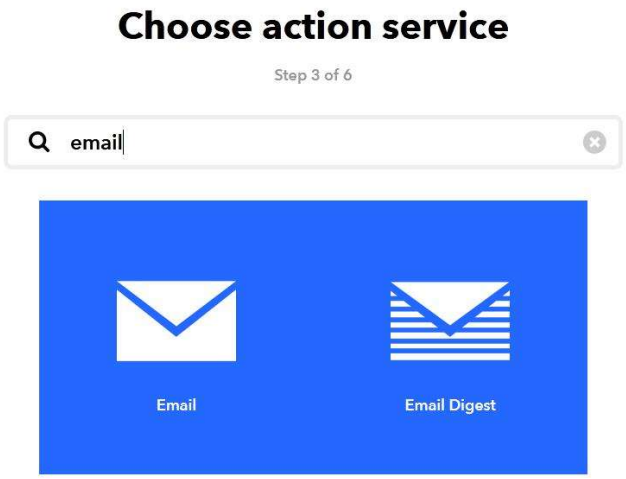
Click "Receive a web request"



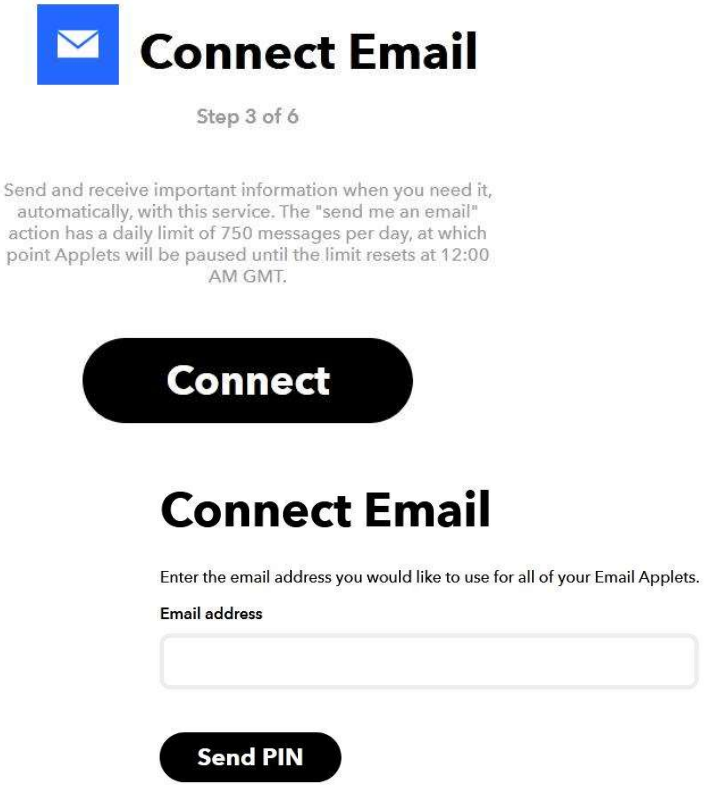
Fill out the "Event Name" to finish the creation of "This".



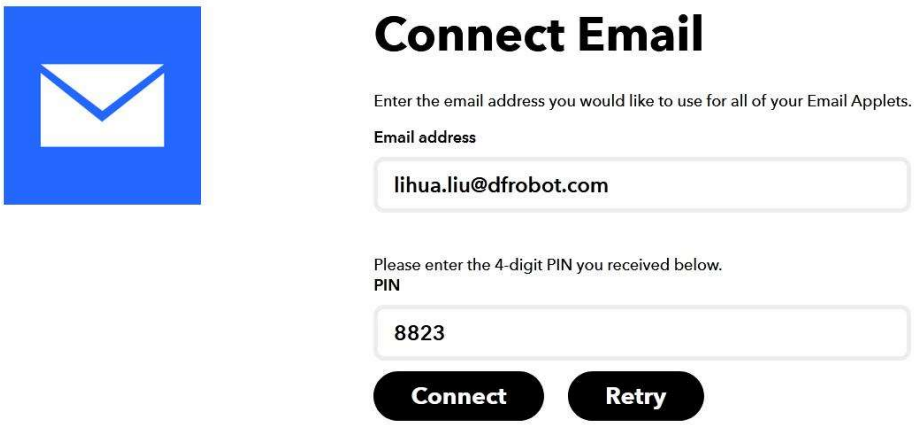
When finished, it will return automatically. Then click "That" to configure it, search "Email" and click the "Email" on the left.



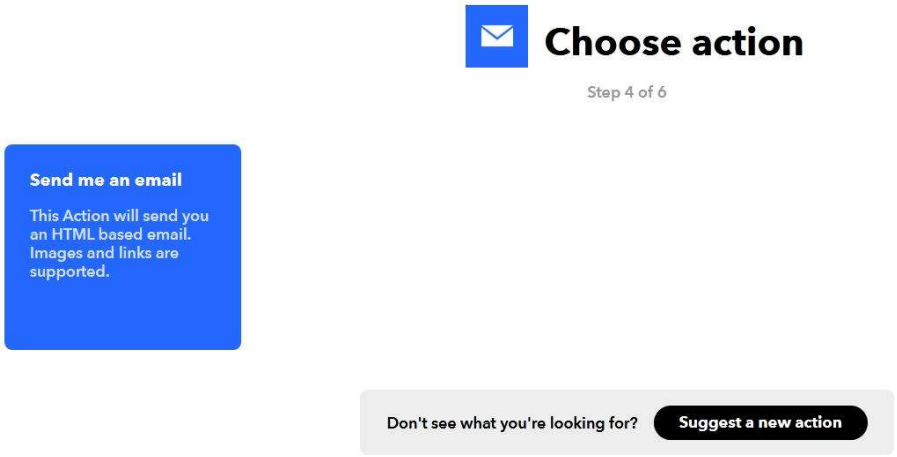
Click "Connect" and fill your email address in "Email address" box. Click "Send PIN" to send a PIN code to your own email.



Check the PIN code in your email, fill it in and click "Connect".

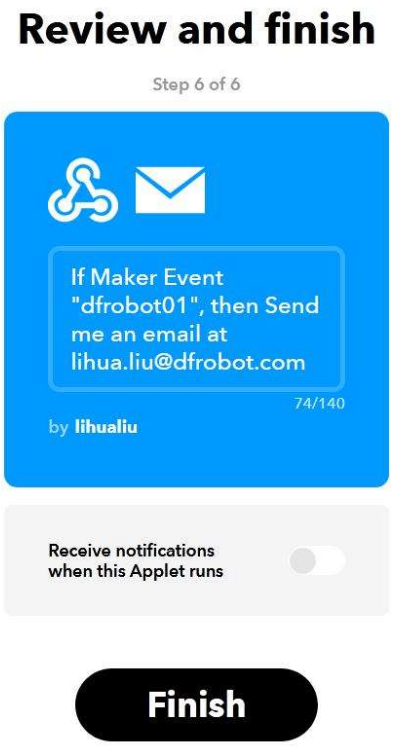


Enter the mailbox setting step, click "Send me an email"

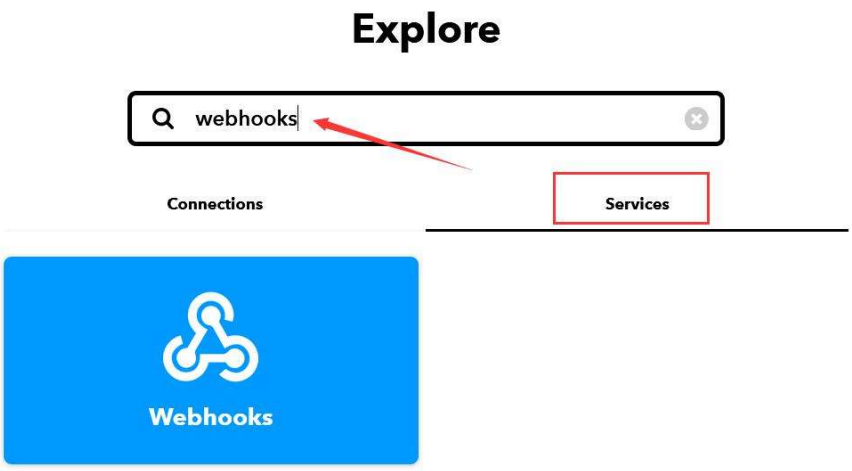


In this interface, it is to write the content of the email that needs to be sent to you. Here we directly choose the default. Then click "Create action" to complete the creation.

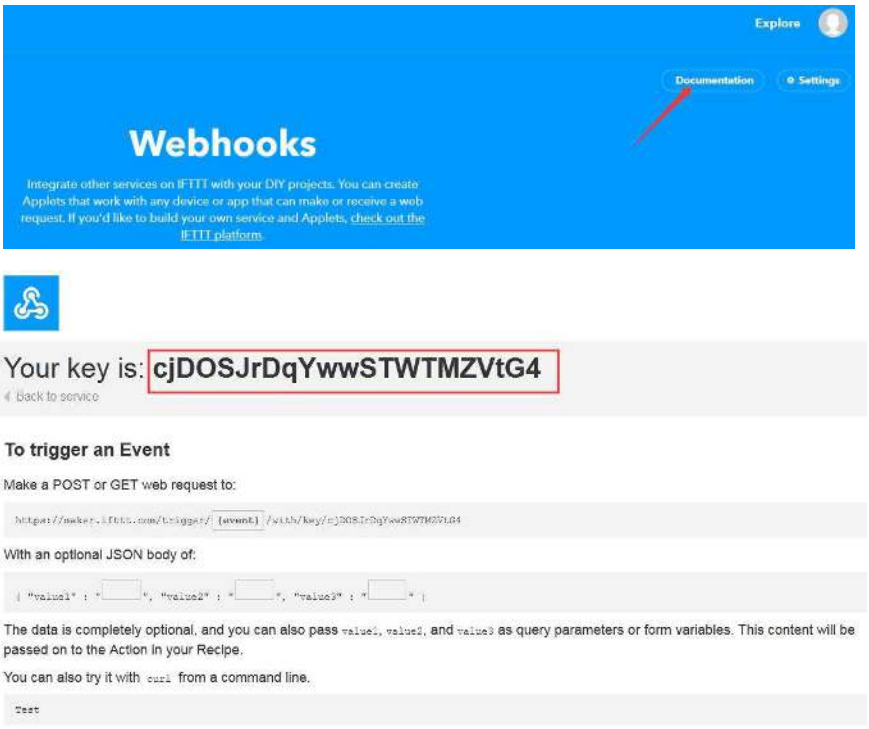
Click “Create action” to enter the following interface:



View the key: Click the “Explore” on the upper right corner, search “webhooks” in that page and switch to “Services”, then click “Webhooks” icon to enter



After entering webhooks, click “Documentation” to view the key, as shown below:

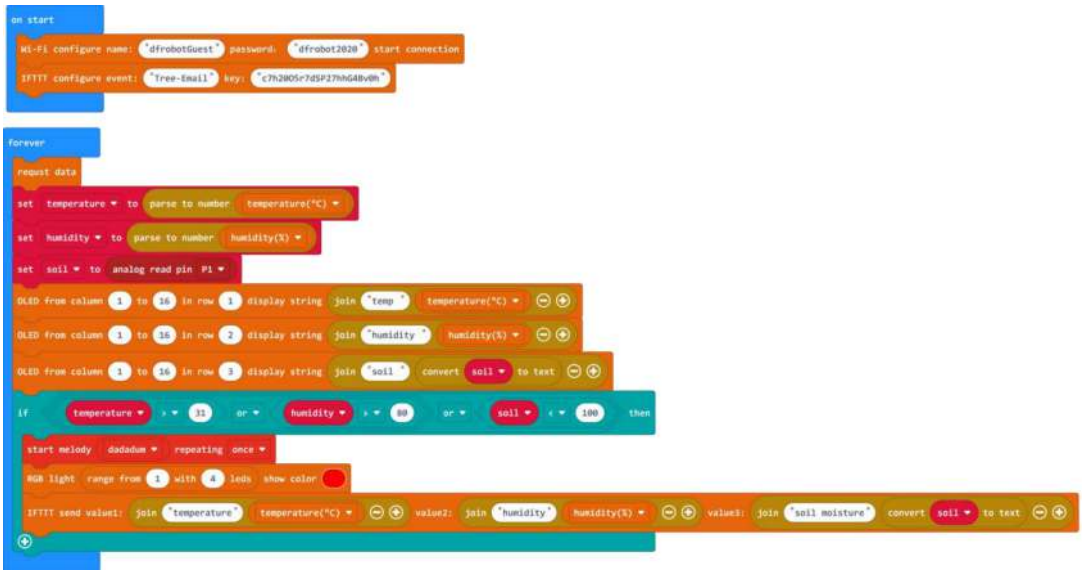


1-3 Program Link

https://makecode.microbit.org/_b3kUxjRTrfeU

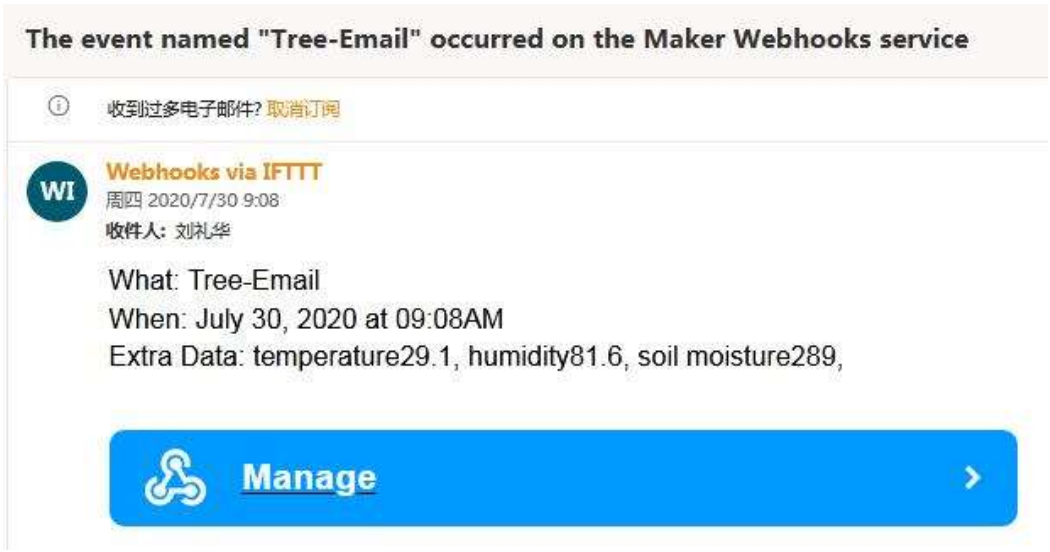
Note: when in use, please modify the WIFI configuration in the program as well as the ID and key in IFTTT to yours, so that it can be used.

1-4 Program Screenshot



1-5 Program Execution Result

After downloading the program, turn on the power, and the sensor will start to detect the current temperature, humidity, soil humidity, and other values related to the greenhouse environment. All the values will be displayed on the LOED. When the temperature exceeds 31℃, or the humidity exceeds 80%, or the soil humidity is below 100, a message will be sent to your default mailbox via WIFI-IoT and IFTTT platform. All the RGB lights will turn on in red and the buzzer will buzz. The mail you received will be similar like the one shown below:

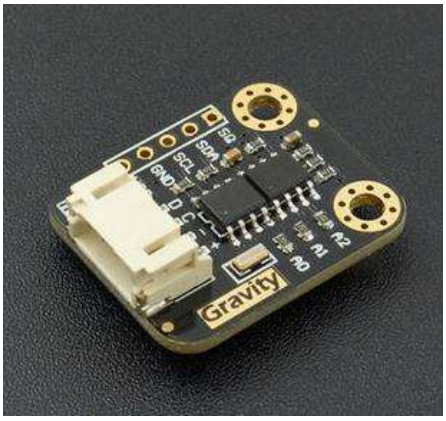


Sample Project 4: IoT Sunshine Intensity Recorder (Based on ThingSpeak)

Introduction

This project will read the local light and UV intensity at regular intervals, and upload the data to ThingSpeak and generate a curve graph. Through the analysis of the graph, we can basically inform the relationship between sunlight and UV intensity.

Note: The clock module in this project should be purchased separately.



Link: https://www.dfrobot.com.cn/goods-535.html

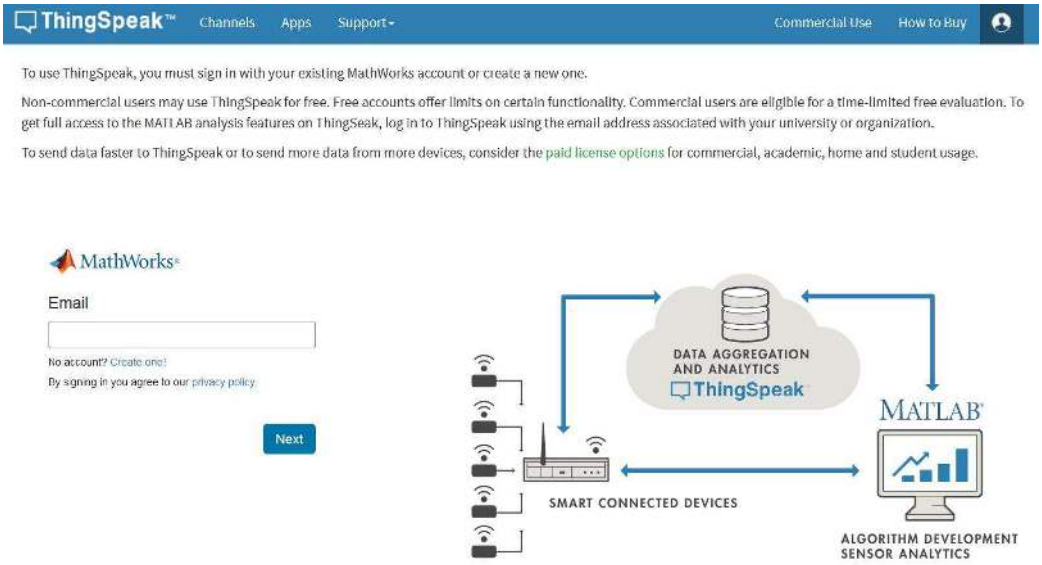
MakeCode Library of Clock Module:

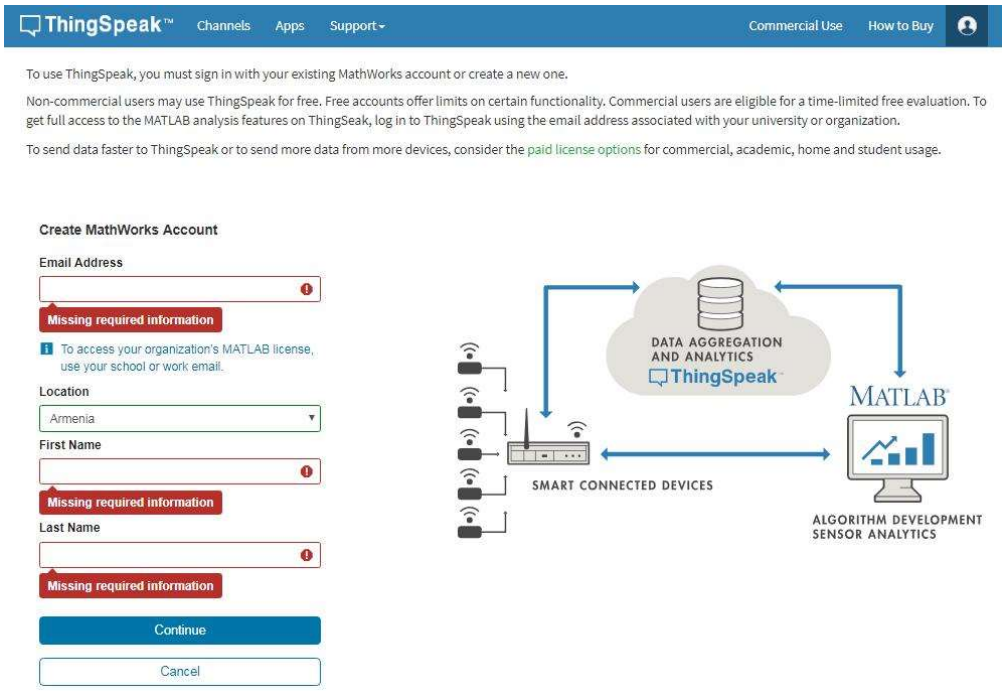
https://github.com/tangjie133/pxt-DFRobot_SD1307

Operation Steps

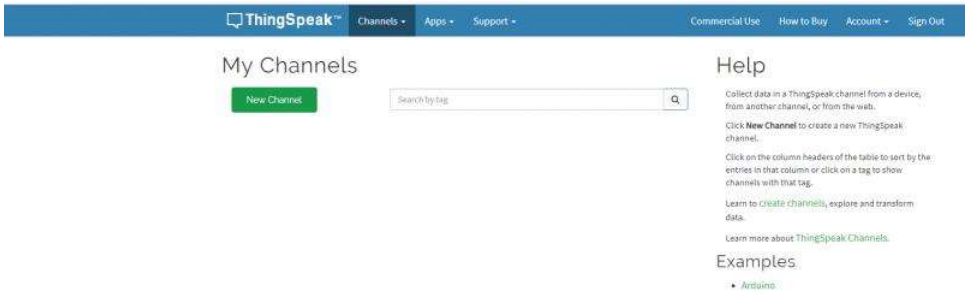
1) Open the ThingSpeak website: https://thingspeak.com/ and click the profile at the upper right corner to enter the sign in/up interface.

2) Sign up in the following interface for the first use. You can sign up after filling the correct email address and verifying it.

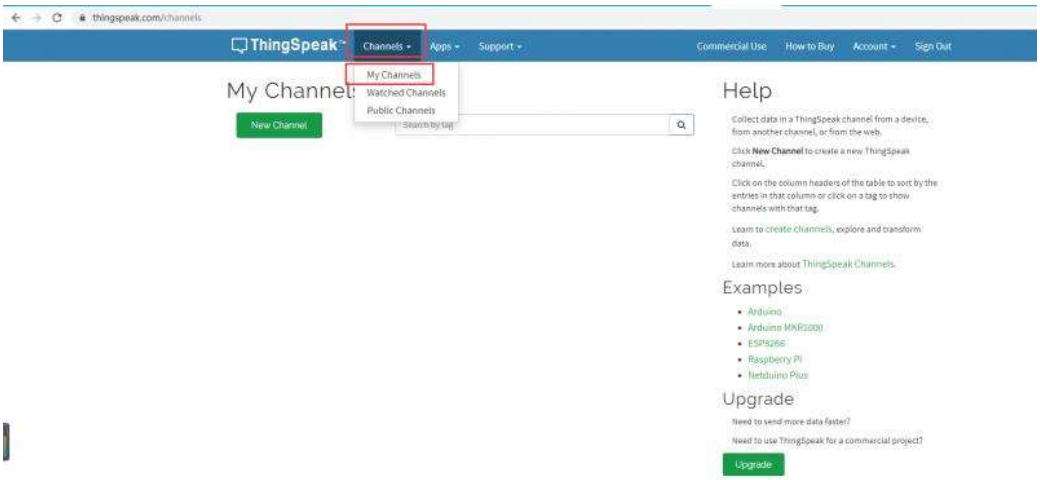




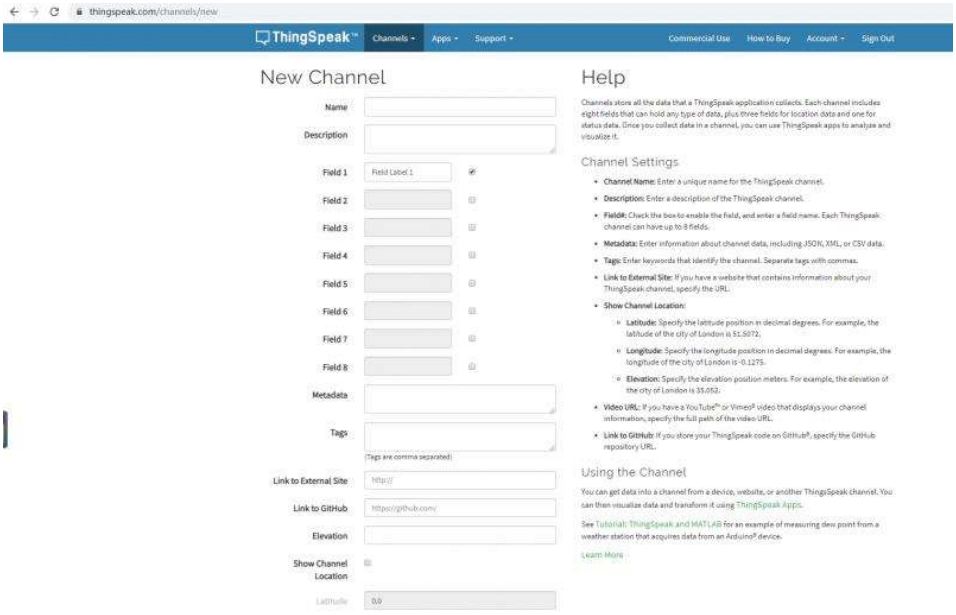
3) After signing up and logging in, you will find the following interface:



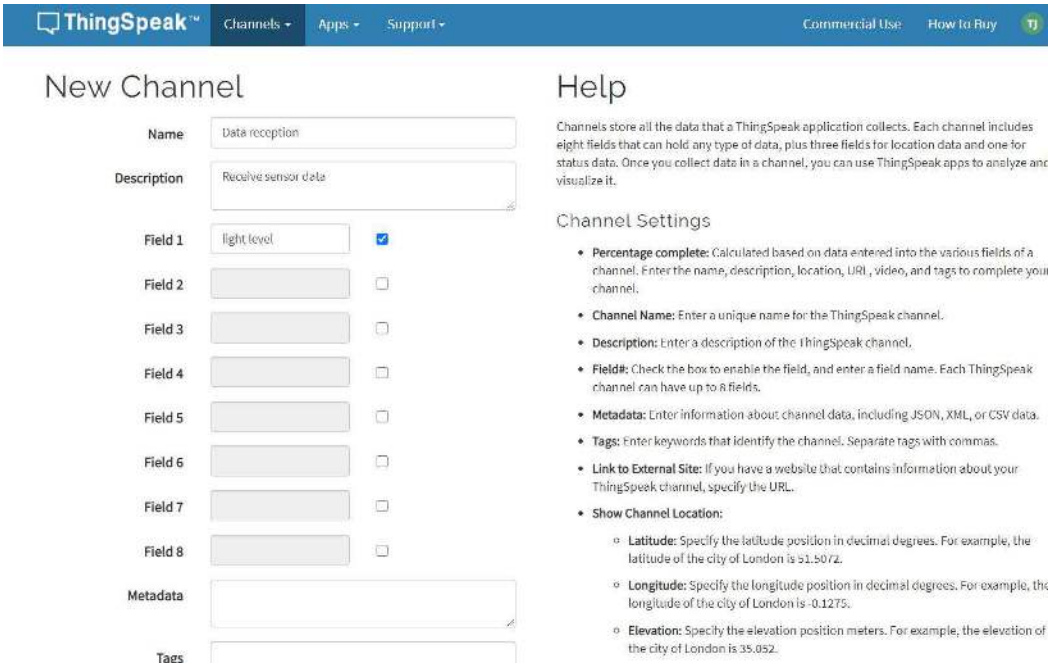
4) If not, you can click "Channels", there will be a drop-down menu. The above interface can also be found by Clicking "My Channels".



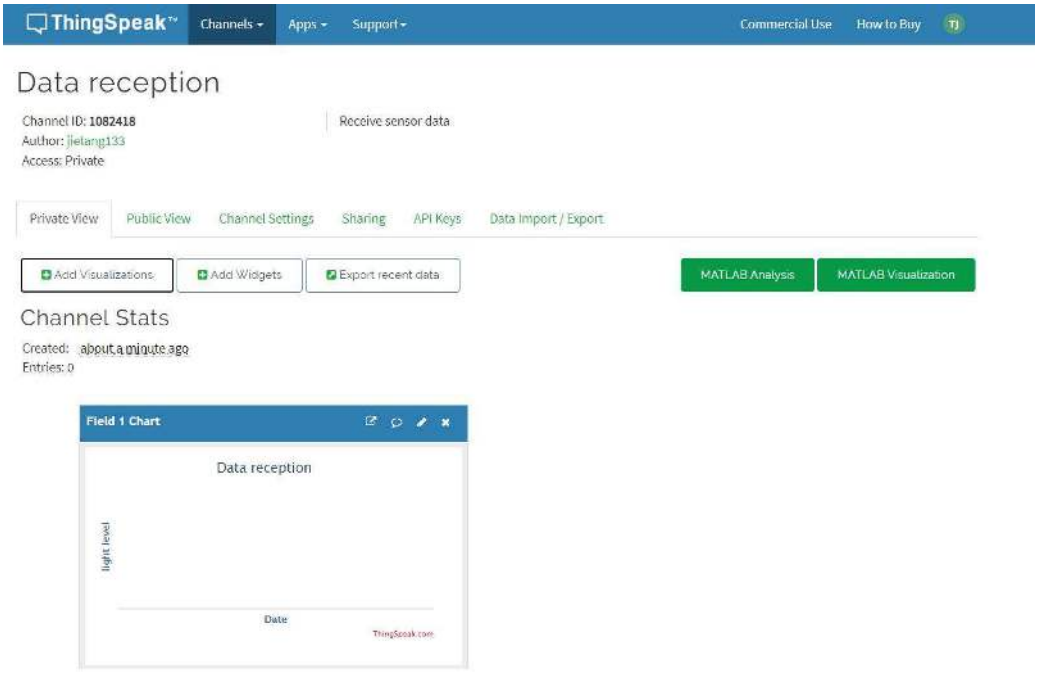
5) After the previous steps, we can create the channels. Click "New Channels", you can see the following interface.



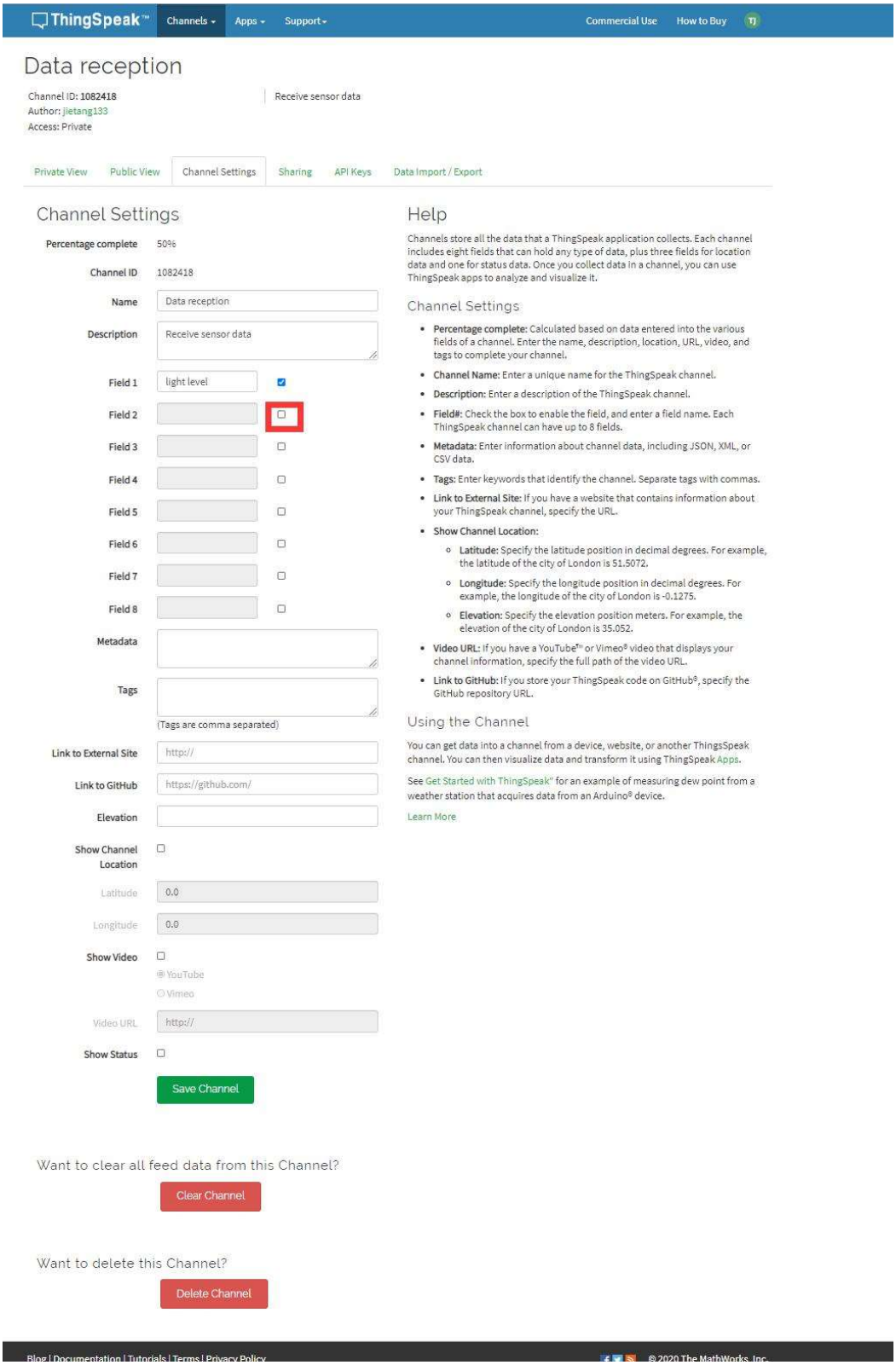
6) Here we need to fill the name, Description, and tick the number of fields. In the MakeCode library, the field is the same as that in channels, so you just need to tick the corresponding numbers. In this project, we only upload the light intensity to the channel, so just tick one. The name of the field also can be customized, here we name it as "light level". Once you have done that, you can save the channels. Here is the channel I created.



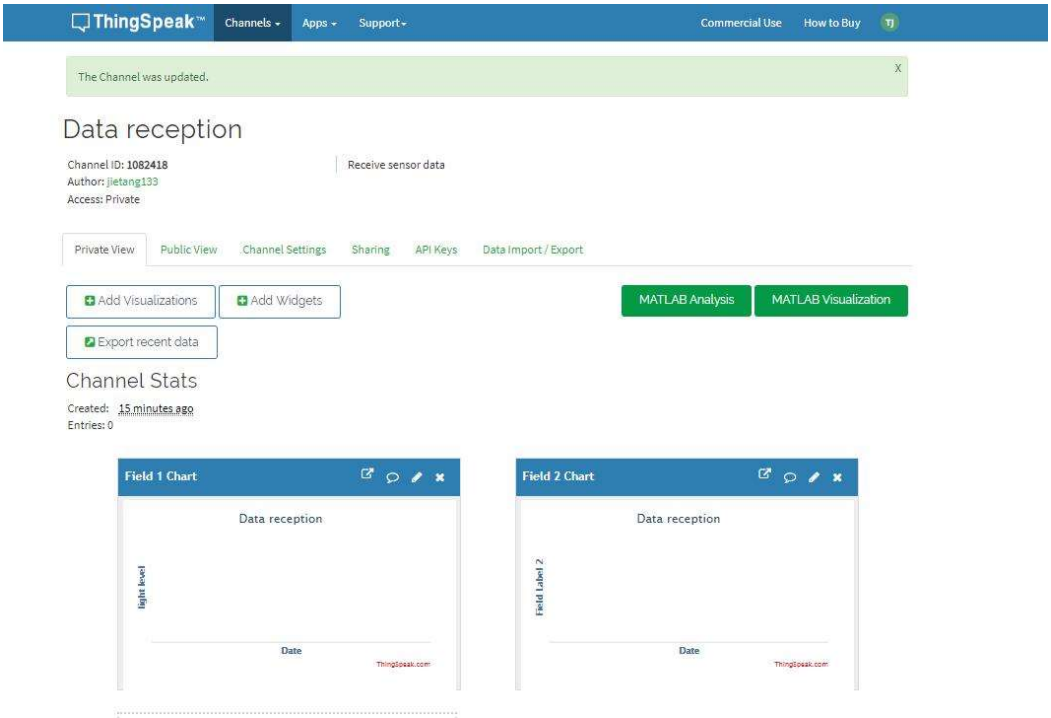
7) After saving, the channel is created. The channel created is as follows:



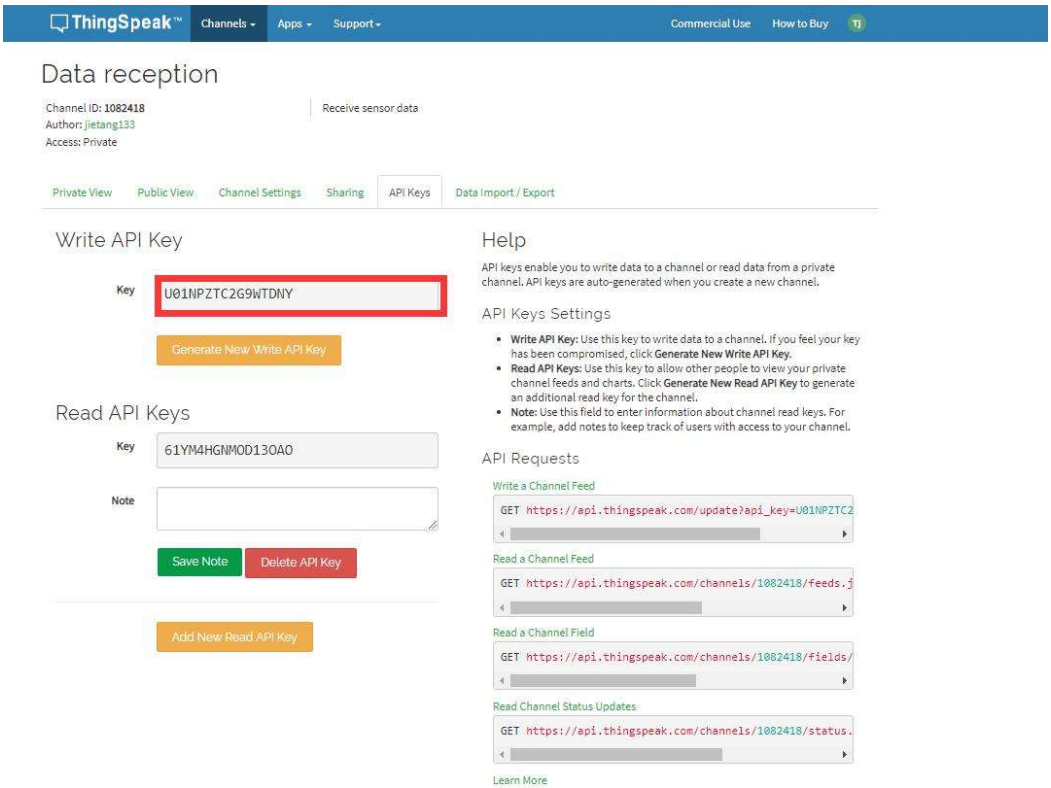
8) If you want to upload more data, click "Channel Settings", and then tick the "box" behind the "Field" and save. You can also delete channel or clear data in this interface.



The effect after adding channels:

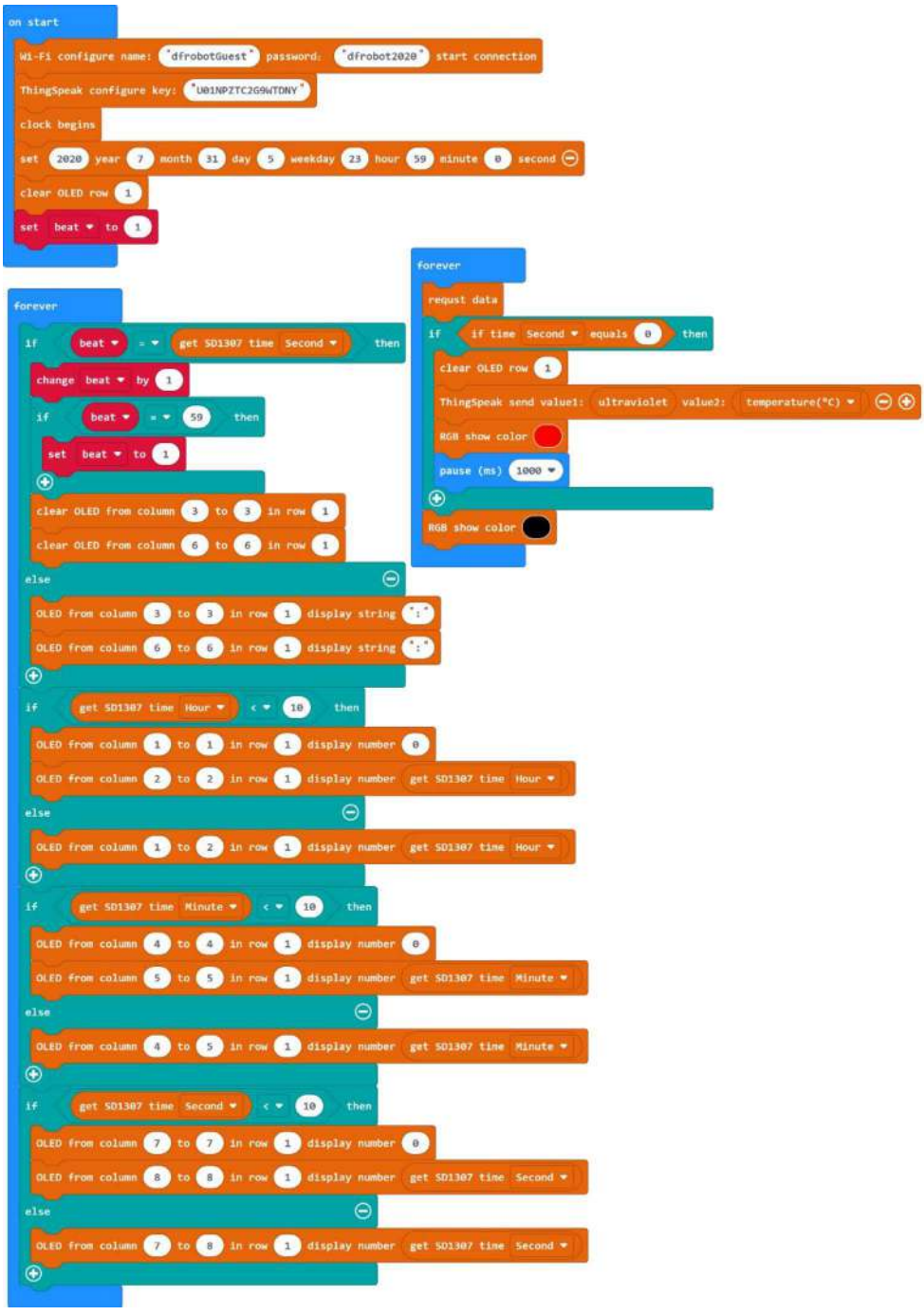


9) Click "API Keys" and you can check the key of the corresponding channel. The key in the red box will be used in the program below.



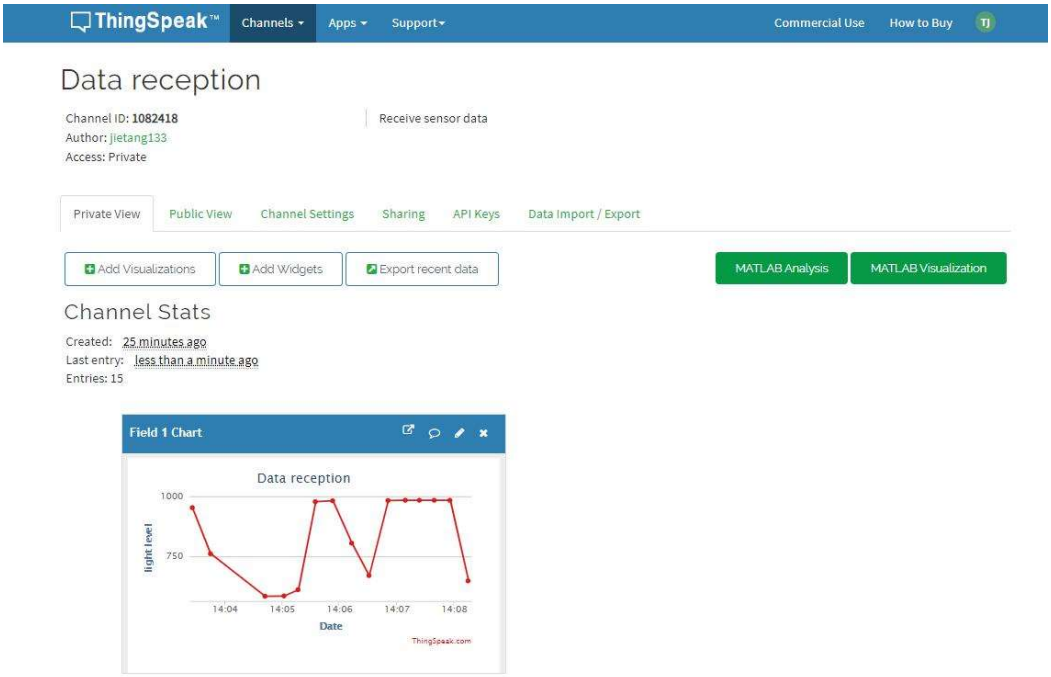
Program Link: https://makecode.microbit.org/_LdsAUxFKHH4h

Program Screenshot:



Program Execution Result:

After the program is executed, the IoT platform will automatically generate a curve graph based on the date uploaded at regular intervals. In this case, the data will be uploaded every 5 seconds, and the length of time can be adjusted according to the actual situation.


ThingSpeak™
Channels
Apps
Support
Commercial Use
How to Buy
Data reception
Channel ID: 1082418
Author: jietang133
Access: Private
Receive sensor data
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: 25 minutes ago
Last entry: less than a minute ago
Entries: 15
Field 1 Chart
Data reception
1000
750
light level
14:04
14:05
14:06
14:07
14:08
Date
ThingSpeak.com