a WiFi IoT Robotic Shield

Quick Start handbook

Thank you for buying the MuseLab Booster for micro:bit!
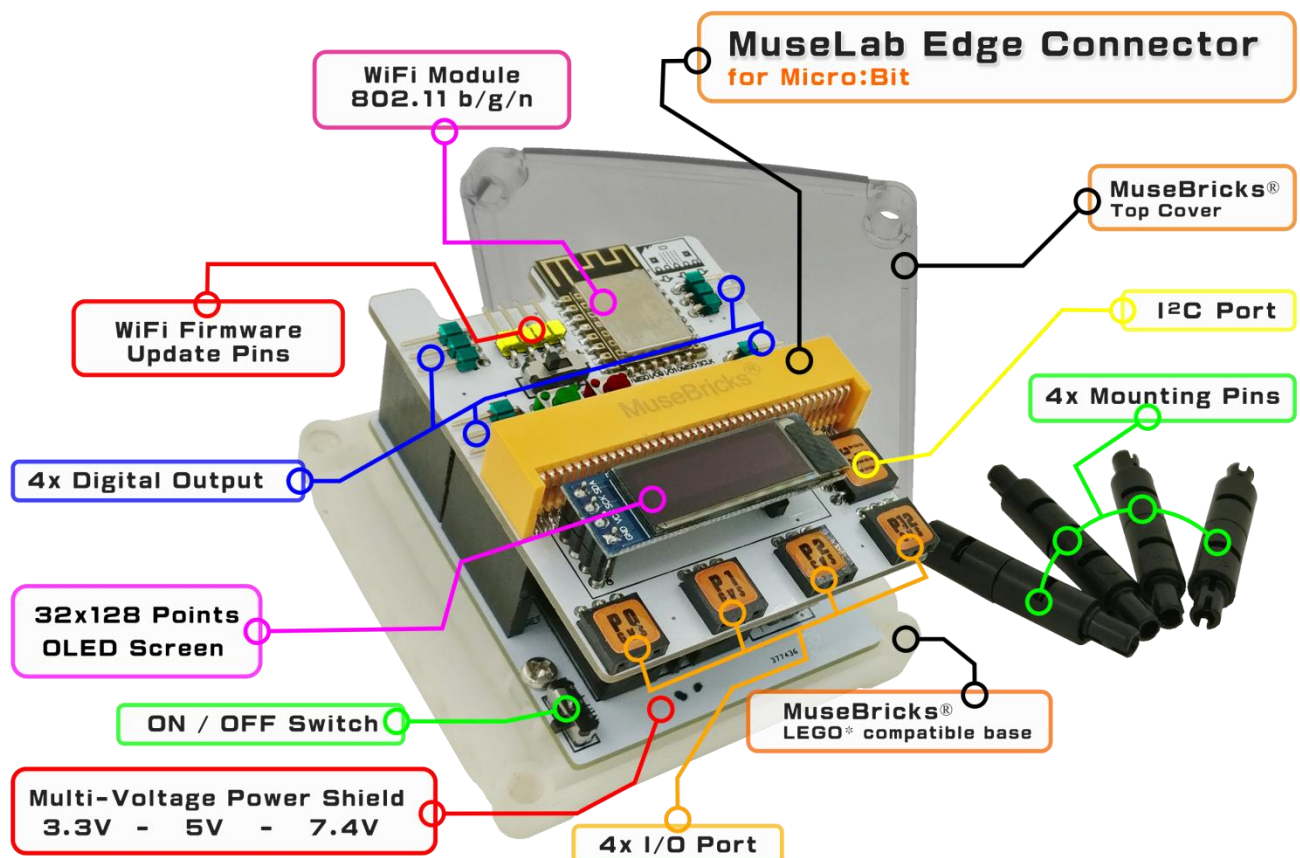
Contents

Introduction

"Muselab **WIFI** IoT Shield" is one of the latest and most powerful IoT shields that is presently available in the market. The shield (with the Muselab edge connector) is developed by MuseLab. When you insert your Micro bit into the edge connector, your Microbit will be WIFI enabled. In other words, Microbit is able to access the Internet using our MuseLab shield.
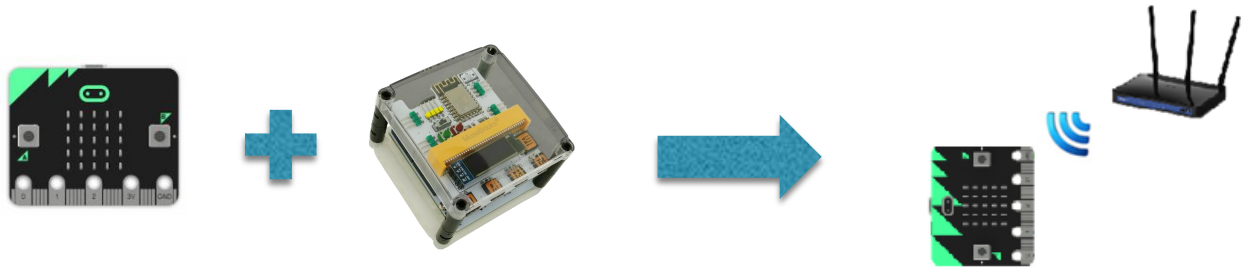
Structure diagram

There is a screen, 3v/5v switch and a WIFI module on the shield. The screen is indeed very useful - it shows the information like IP address and the battery status. For the switch, you can alter the output voltage of the 4 i/o pins.

WiFi Module 802.11 b/g/n

MuseLab Edge Connector for Micro:Bit

MuseBricks® Top Cover

WiFi Firmware Update Pins

I²C Port

4x Mounting Pins

4x Digital Output

32x128 Points OLED Screen

ON / OFF Switch

MuseBricks® LEGO* compatible base

Multi-Voltage Power Shield 3.3V - 5V - 7.4V

4x I/O Port

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There are 4 input/output pins, 1 I2C pin for you to do the project! You can insert different input like light and sound sensors. For output, you can use LED, buzzer, servo and so on.
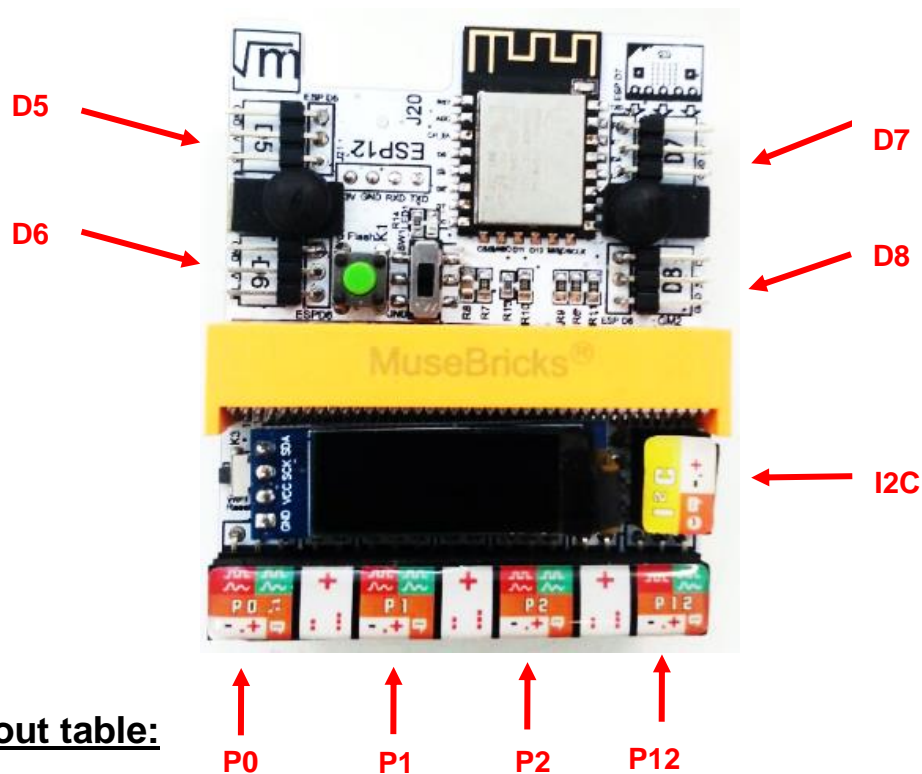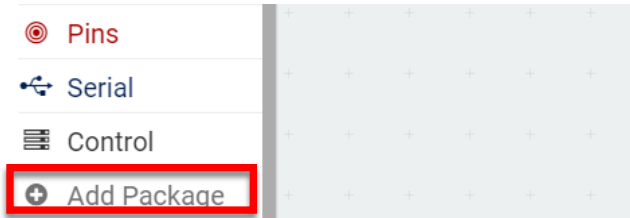

Detailed pinout table:

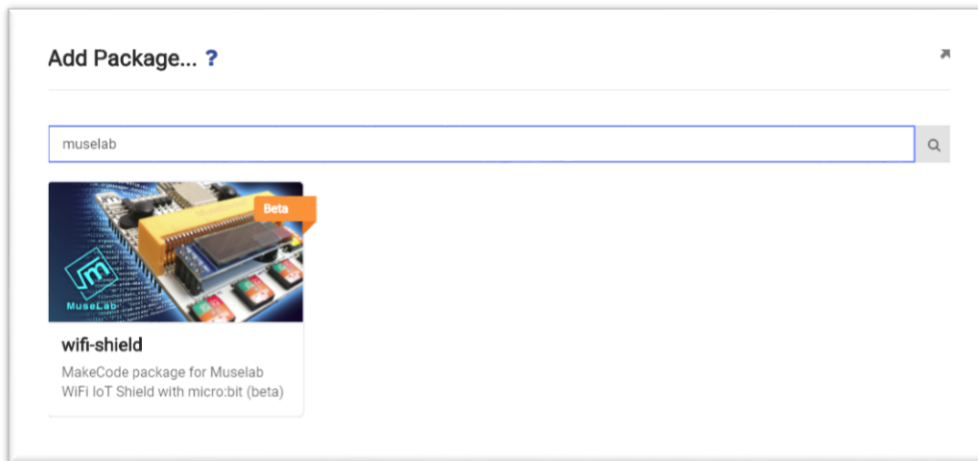| Module	Pin	Remarks
General	3V/5V	
	GND	
I/O	P0	
	P1	
	P2	
	P12	Write only
Servo	D5	
	D6	
	D7	
	D8	
WIFI	P16 (RX)	
	P8 (TX)	
I2C	P19 (SCK)	
	P20 (SDA)	

How to program Booster on micro:bit

➢ To program Muselab modules with micro:bit, you will need to add the Muselab PXT packages to your makecode environment.
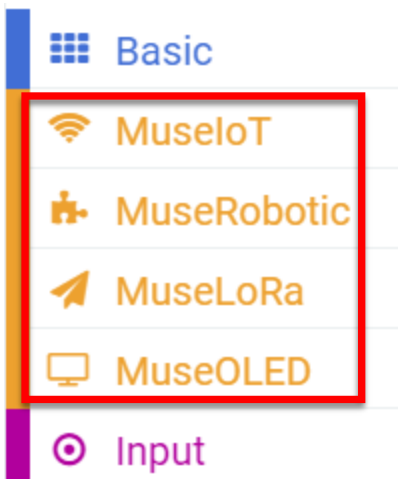
STEP 1: Find the "Add Package" option at the bottom.
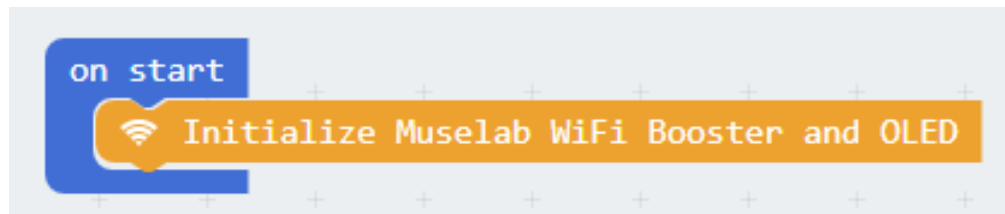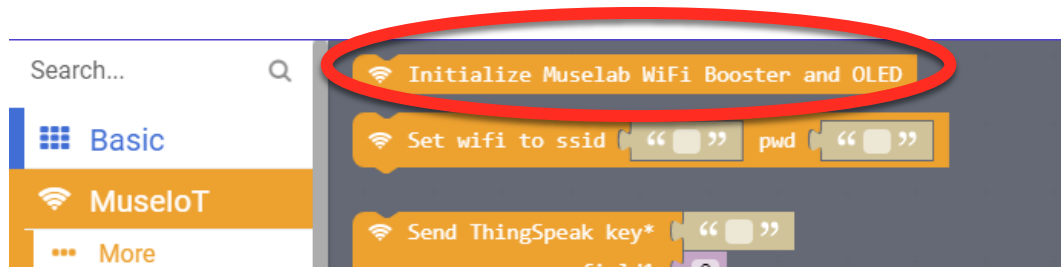

STEP 2. Enter the name "muselab".

STEP 3. You can find 4 more tabs under "Basic" like "MuseIoT", "MuseRobotic" and so on.

FIRST STEP: Connect Wi-Fi

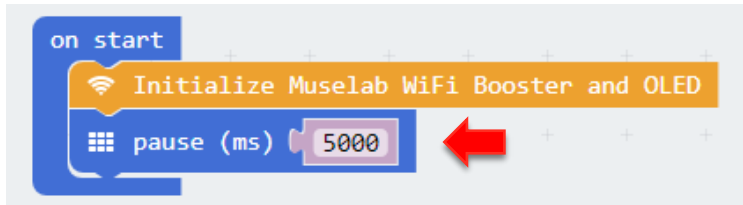Before we go, we have to initialize the Booster.

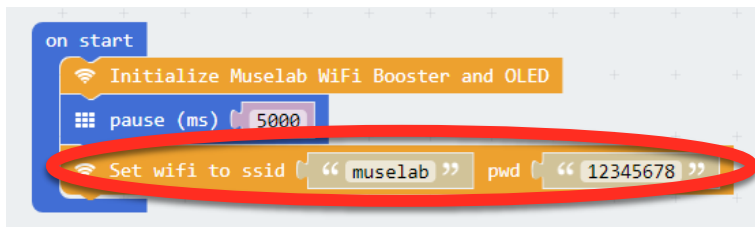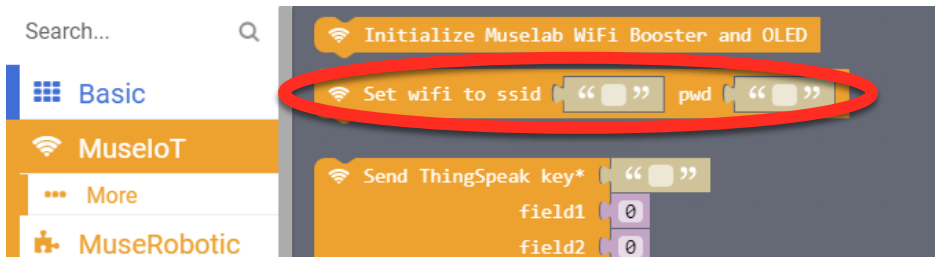STEP 1: Go to MuseIoT -> Initialize Muselab Wi-Fi Booster and OLED

If you open the shield, the screen will show shield information after "Initialize OK". The information contains the version number firmware version number and the battery level.

Initialization

Booster information
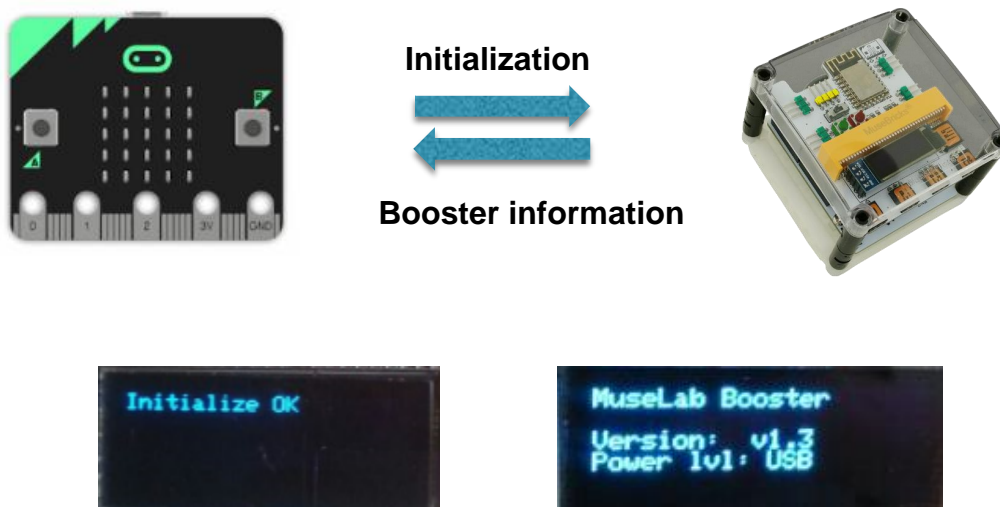
STEP 2: Connect Wi-Fi after 5 second.
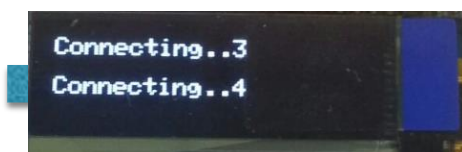

STEP 3: Find the Set wifi to ssid pwd from "MuseIoT" tab.

Result:

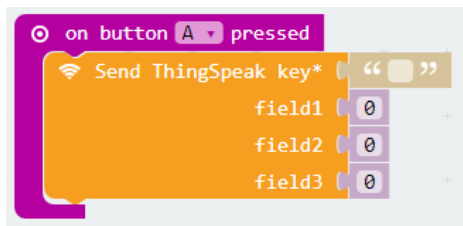➢ **When it is connected, the IP address will be shown.**
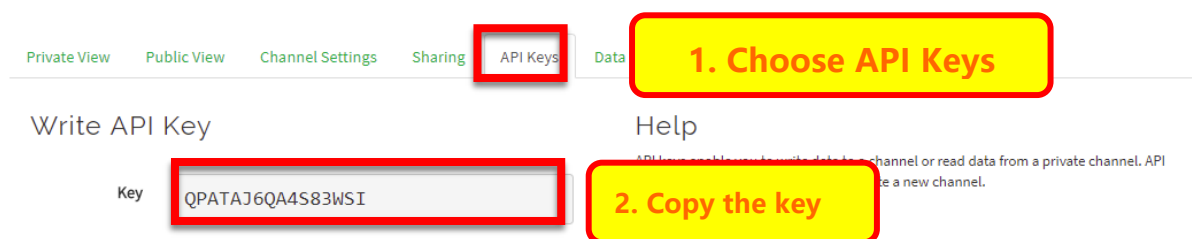

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1. Basic Wi-Fi IoT Service

1.1 Upload data to ThingSpeak

*STEP 0: Please make sure your booster is connected to Wi-Fi successfully.

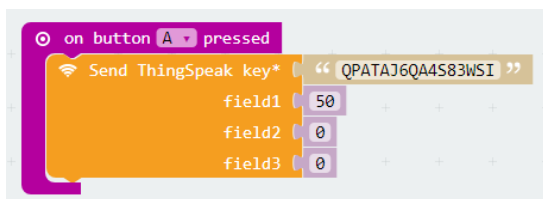STEP 1: Find the "Send ThingSpeak" from "MuseIoT" tab.

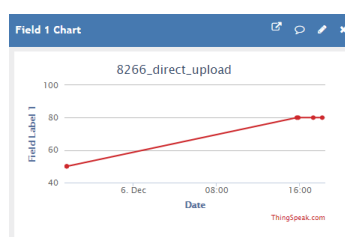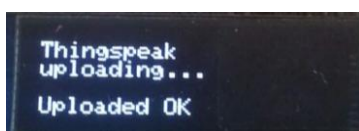STEP 2: Find the Key from ThingSpeak, you need to use your own API key.

STEP 3:

Input the key where "QPATAJ6QA4S83WSI "is the ThingSpeak API key and field1 is the value you want to upload.
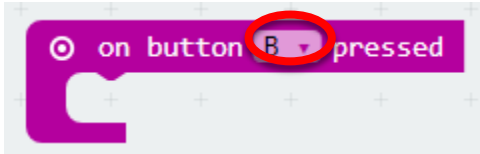

Result:

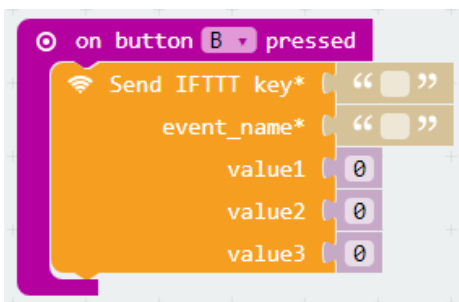➢ **If data is uploaded successfully, "Uploaded OK" will be shown.**

1.2 Send email via IFTTT

*STEP 0: Please make sure your booster is connected to Wi-Fi successfully.

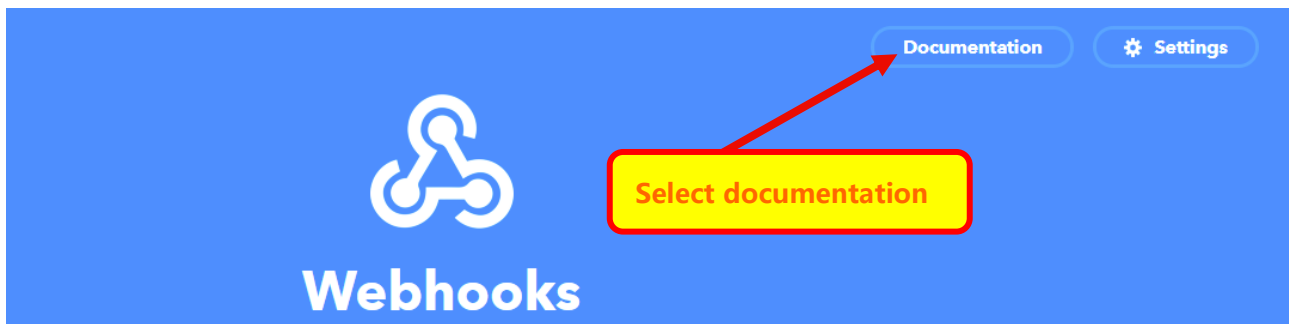STEP 1: Send the IFTTT command by pressing B button.

STEP 2: find the "Send IFTTT" from "MuseIoT" tab.

STEP 3:

Find the IFTTT API key and event name, go to IFTTT page.

Your key is: dl................................xCTPKCxgE

◀ Back to service

This is the key

To trigger an Event

Make a POST or GET web request to:

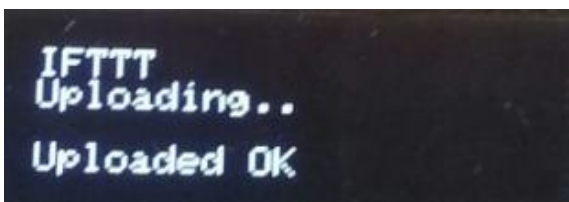https://maker.ifttt.com/trigger/ {event} /with/key/dlJ0cMtOPkAddxCTPKCxgE

STEP 4: Input the information, example

1. IFTTT API key: "dlJ0cMtOPkAddxCTPKCxgE".
2. value 1 or value 2: the value you want to send with.
3. event_name: the event you want to trigger.
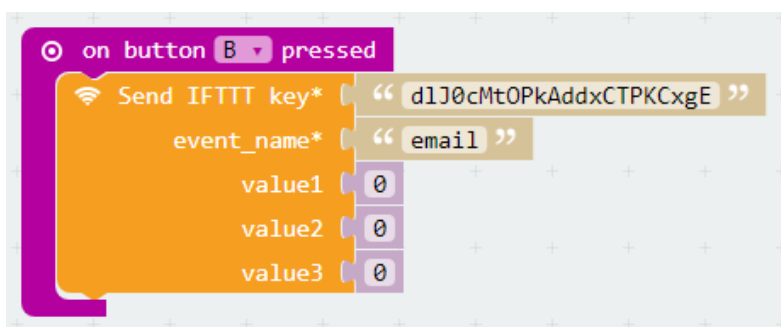
Result:

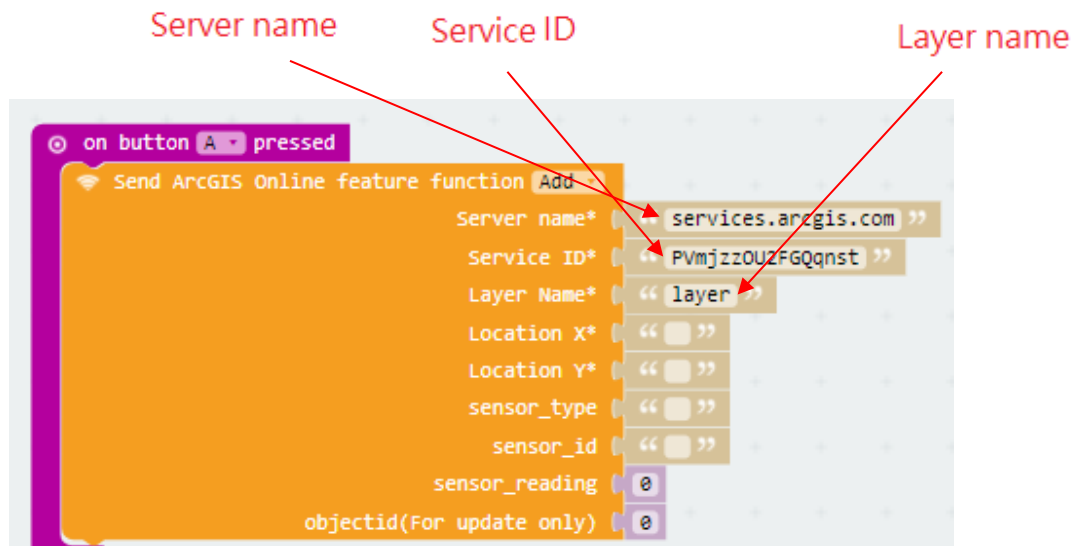➢ **If data is uploaded successfully, "Uploaded OK" will be shown.**
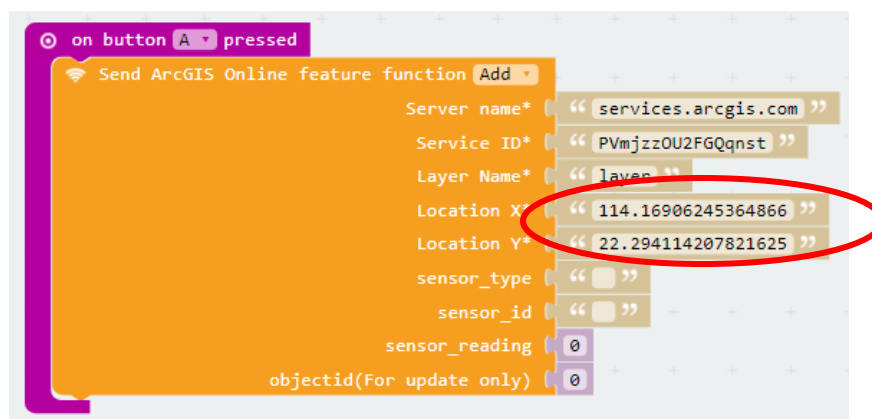
1.3 Upload data to Arcgis map

*STEP 0: Please make sure your booster is connected to Wi-Fi successfully.

Step 1. For this function, we try to add the data to the map first. Take the URL you have just copied from Arcgis map.


Step 2. Find your location x-coordinate and y-coordinate. For this example, it is the location for "Tsim Sha Tsui STAR FERRY" in Hong Kong.
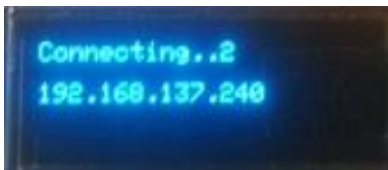
Step 3. Input the data you want to upload. For this example, we upload the temperature.

- sensor_type: Temperature (It is your sensor type, you can define your sensor type)
- sensor_id: 1 (it is sensor id, here we just define it is 1)
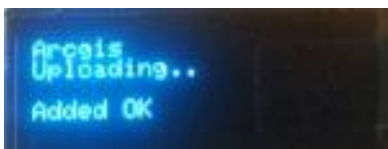- Sensor_reading: microbit temperature
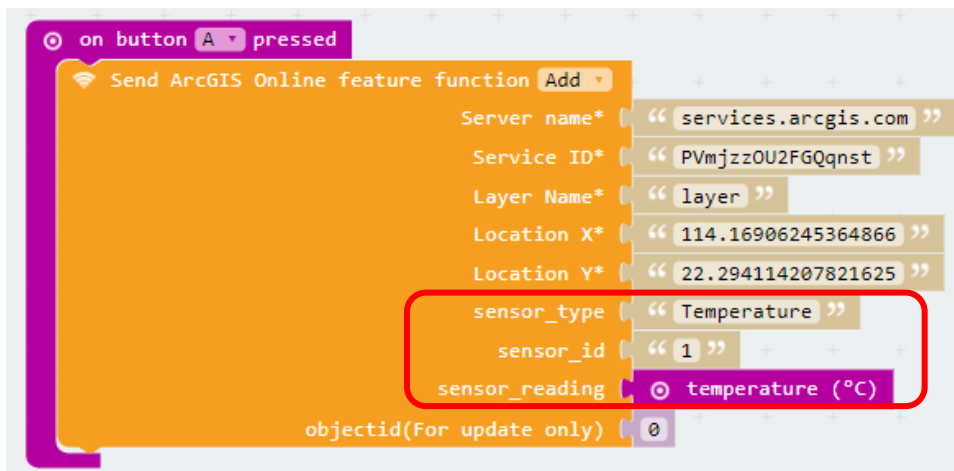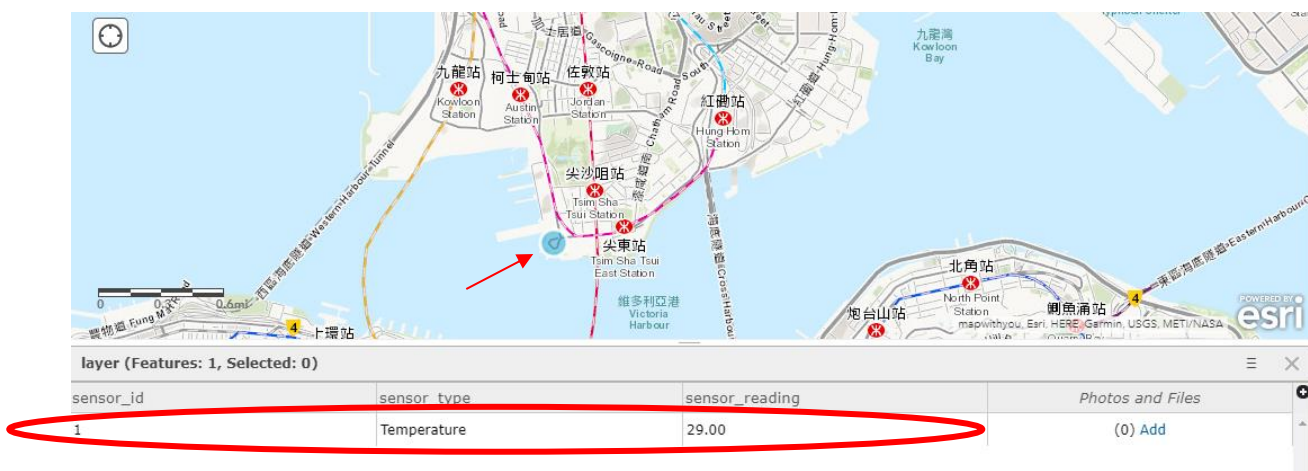

Result:

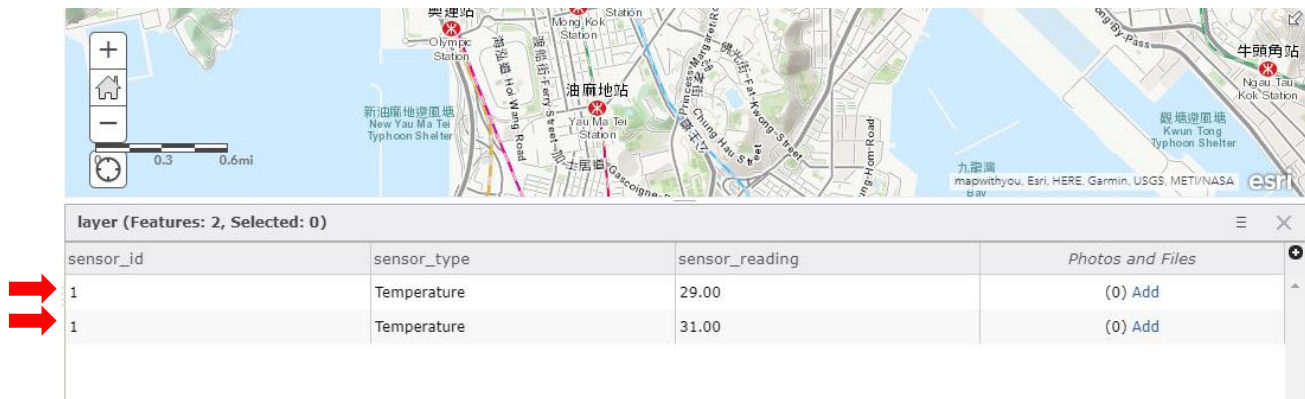After the shield has been connected to the Internet.

Press the button A on the microbit. You will get the below message on the screen.

Go to the map viewer and check, you got the data uploaded!

layer (Features: 1, Selected: 0)

sensor_id	sensor_type	sensor_reading	Photos and Files
1	Temperature	29.00	(0) Add

If you press one more time button, it will be uploaded one more time!

sensor_id	sensor_type	sensor_reading	Photos and Files
1	Temperature	29.00	(0) Add
1	Temperature	31.00	(0) Add

1.4 Send request by generic HTTP

*STEP 0: Please make sure you have done the first step "Connect Wi-Fi" already.
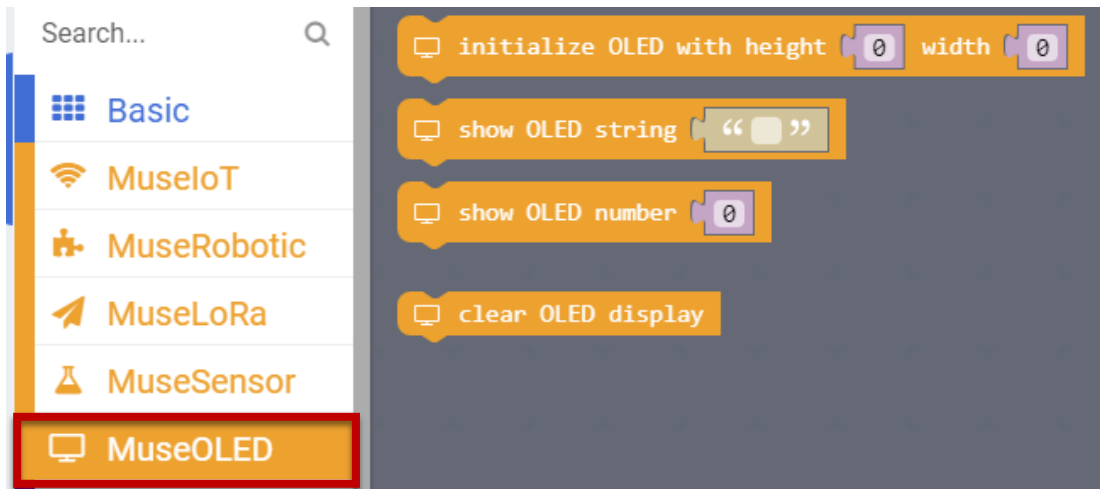
Step 1: Send the request by pressing A button.
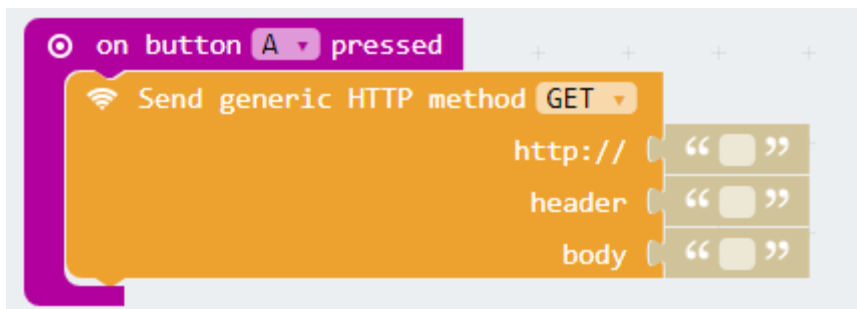
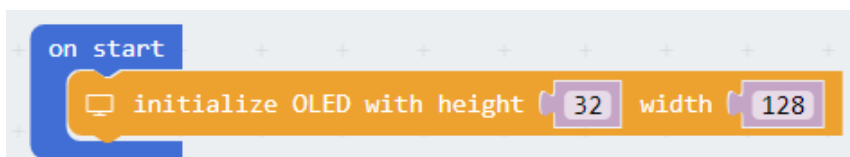For more details, please contact us if you would like to know how to do.

2. Basic I/O and screen

2.1 Print "Hello World" on the screen

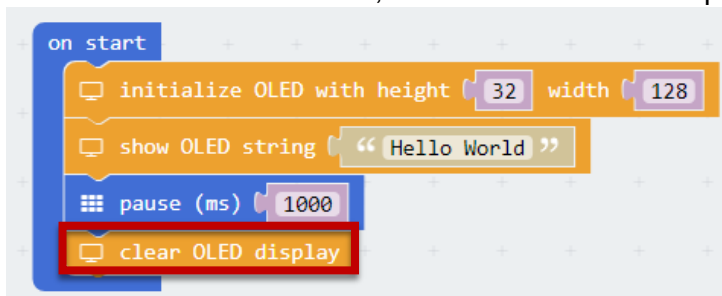STEP 1: After you have added the package before, you can see the MuseOLED in the menu.

STEP 2: Initialize the OLED first. The height is 32 and width is 128.
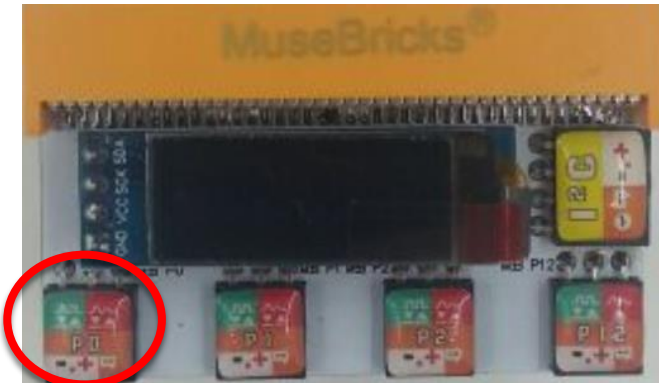

STEP 3: Show the string "Hello World"

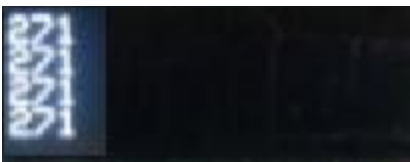STEP 4: To clear the screen, add the "clear OLED display" command.

2.2 Read input value

STEP 1: Insert the input sensor on P0.

Please note that there is label SVG on the pin.
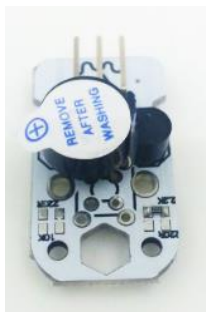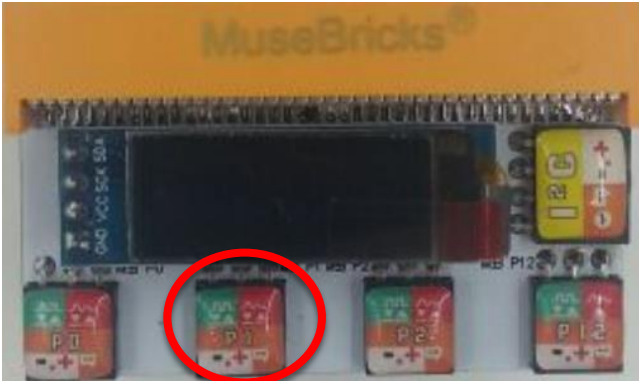

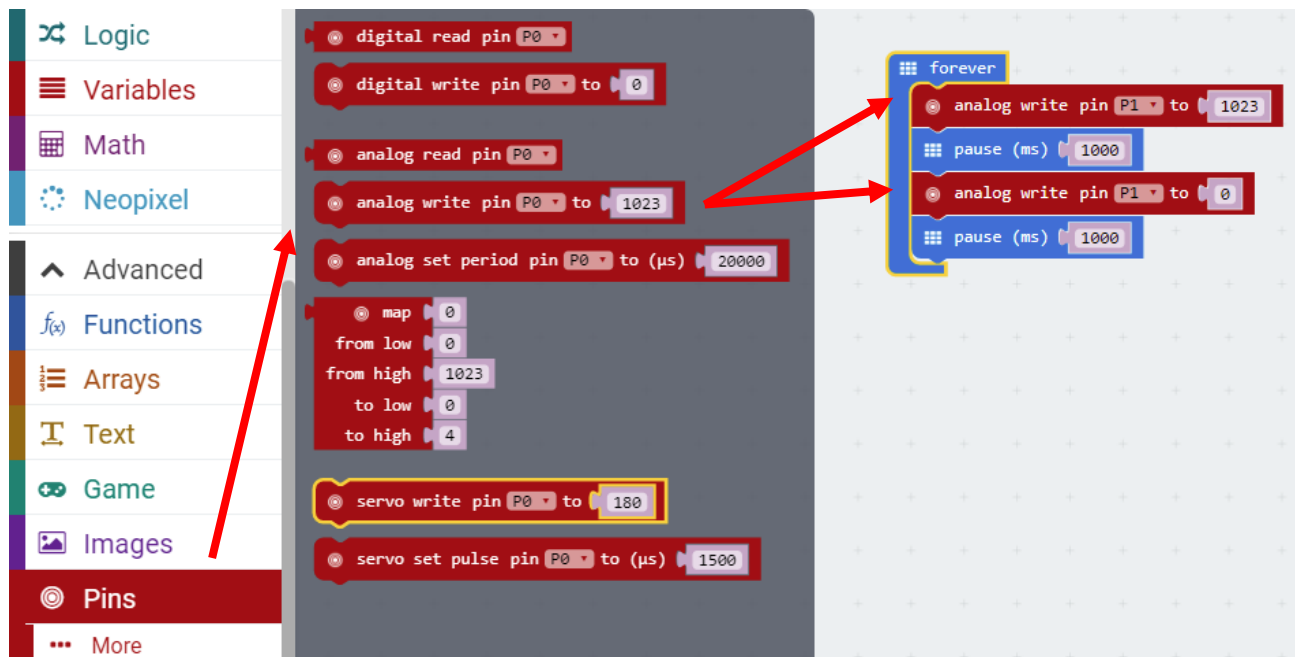STEP 2: Pins -> analog read pin P0

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2.3 Turn on the output

STEP 1: Insert the output on P1.

Please note that there is label SVG on the pin.

STEP 2: Pins -> analog write pin P1 to 1023 and 0 every 1 second repeatedly.

2.4 Control 180° servo

STEP 0: Please make sure you have initialized the booster and OLED.
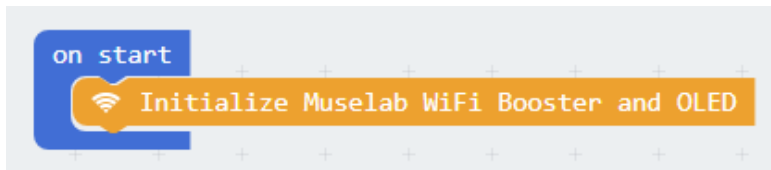
STEP 1: Insert the 180° servo to the D5.
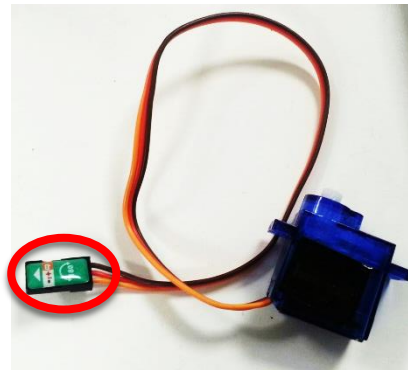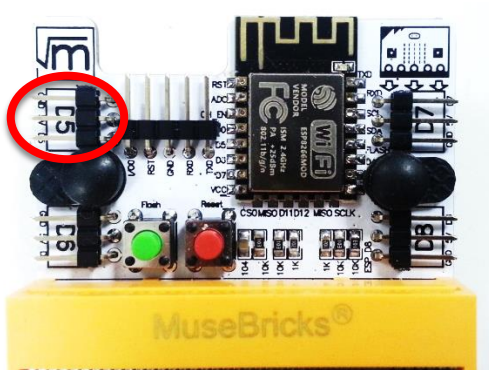
STEP 2: MuseIoT -> More -> control 180° servo pin 5 to degree 0 and 180 repeatedly.

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2.5 Control 360° servo

STEP 0: Please make sure you have initialized the booster and OLED.

STEP 1: Insert the 360° servo on D6.
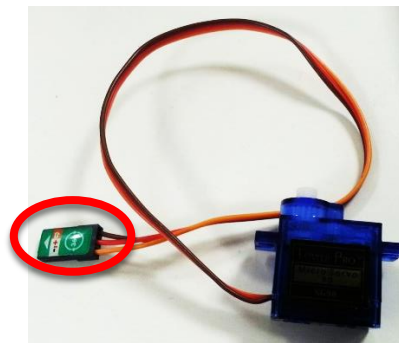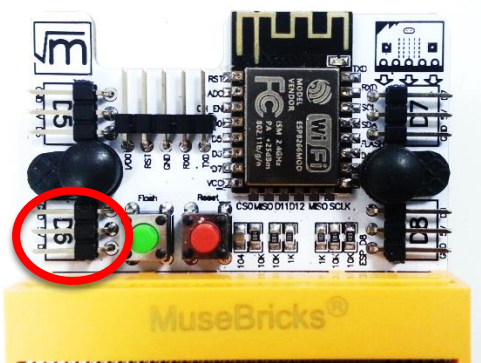
STEP 2: MuseIoT -> More -> control 360° servo pin 6 to speed 100% clockwise and anti-clockwise every 500ms.

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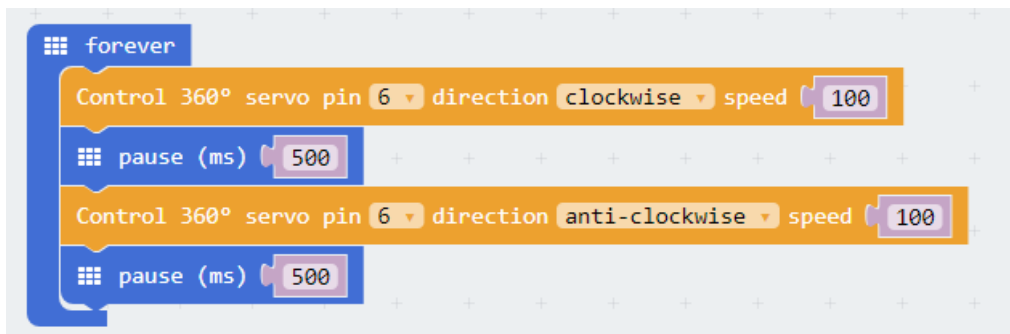
3. Advanced usage: Wi-Fi remote control function

3.1 Start Wi-Fi Remote control

*STEP 0: Please make sure you have done the initialization part from "Connect Wi-Fi" already.

STEP 1: Start the start Wi-Fi remote control function by pressing B button.
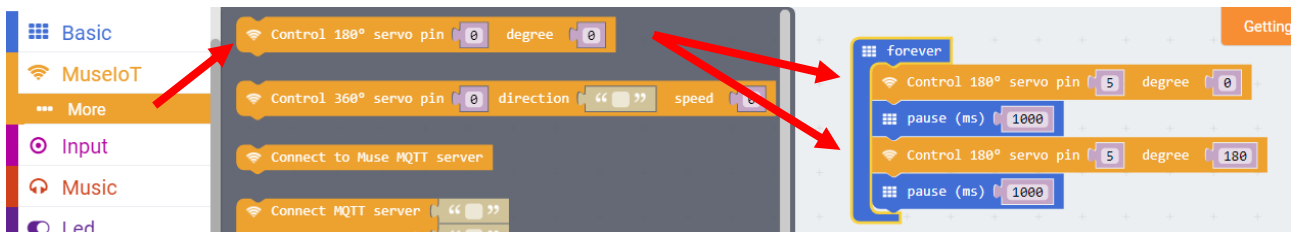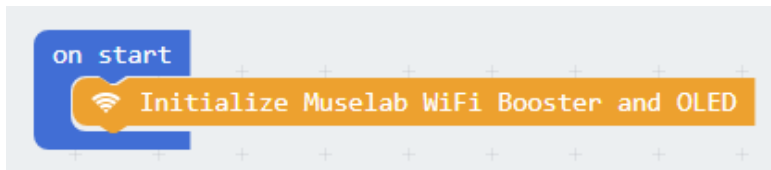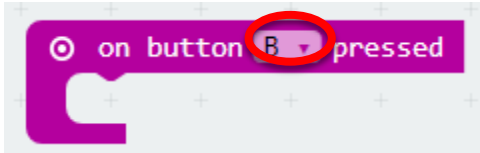

STEP 2: find the "Start WiFi remotr control" from "MuseIoT" tab.
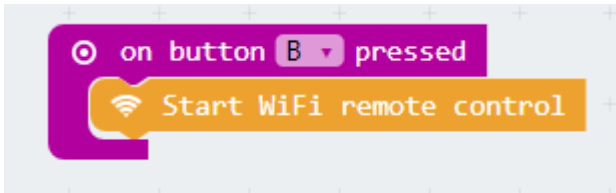
Result:

After the shield has been connected to the Internet.

After you have pressed the B button, you will see the message "Start listen OK" on the screen. This function can be worked only after the booster is connected to the internet successfully.
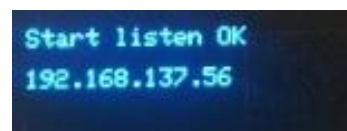
3.2 Set the booster to be hotspot

STEP 0: Please make sure you have initialized the booster and OLED.

STEP 1: Similarly, we need to add 5 second before we start the hotspot.
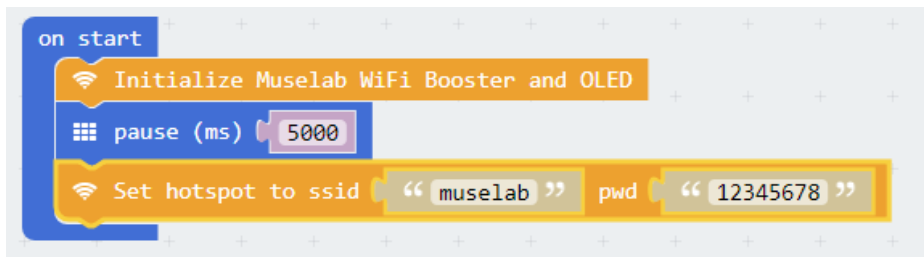
Step 2: Similarly, we start wifi remote control by pressing B button.
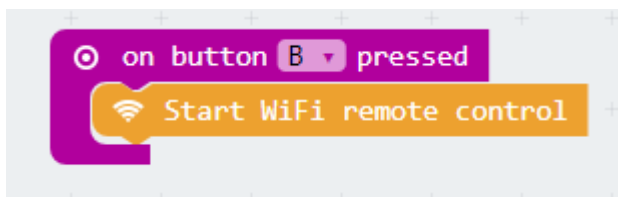
Result:

After the booster start the hotspot successfully, it shows as below.

After you have pressed the B button, you will see the message "Start listen OK" on the screen. This function can be worked only after the shield is connected to the internet successfully.

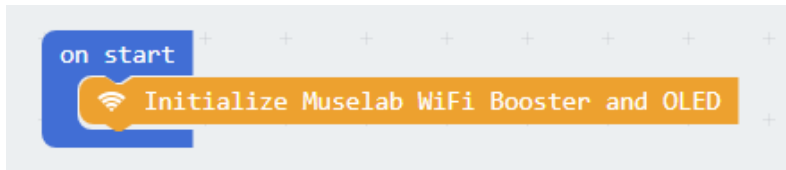# 3.3 Muselab SNAP control booster

STEP 0: Please make sure you have start the Wi-Fi remote control function.

Step 1. Go to http://snap.muselab.cc
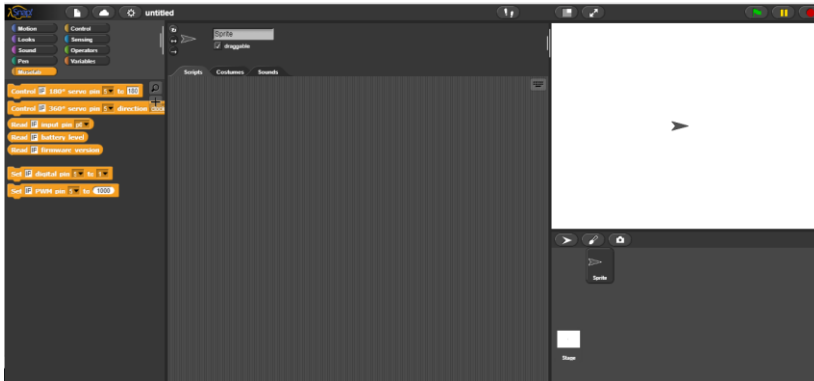
Remarks:

Make sure both the Muselab Booster and the PC running SNAP! are on the same IP networks or otherwise the two cannot communicate.

Make sure you can get a networks ping response from the PC to the Wifi Shield. You can type "ping 192.168.x.y or 10.10.x.y" from the windows commands box and see if there is a reply from the shield.

Step 2. Install a 180 servo on pin 7 of the Microbit Wifi Shield.
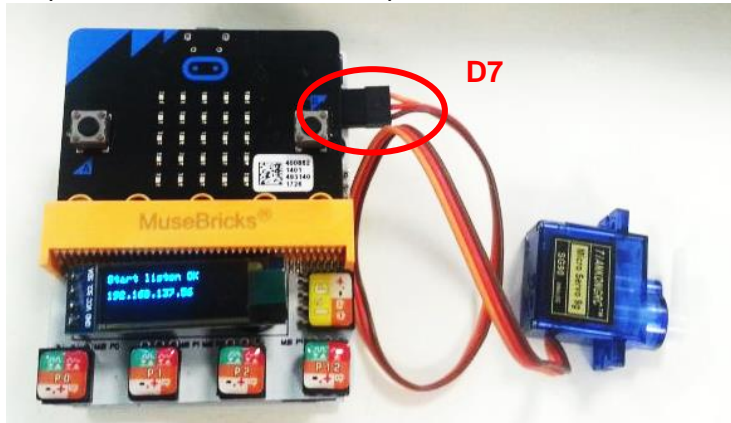
Step 3. Drag a "control IP 180 servo pin 5 to 180" block from the muselab tab from within the SNAP! web page. Type the IP address and select pin7 from the drop-down menu. Double click it.
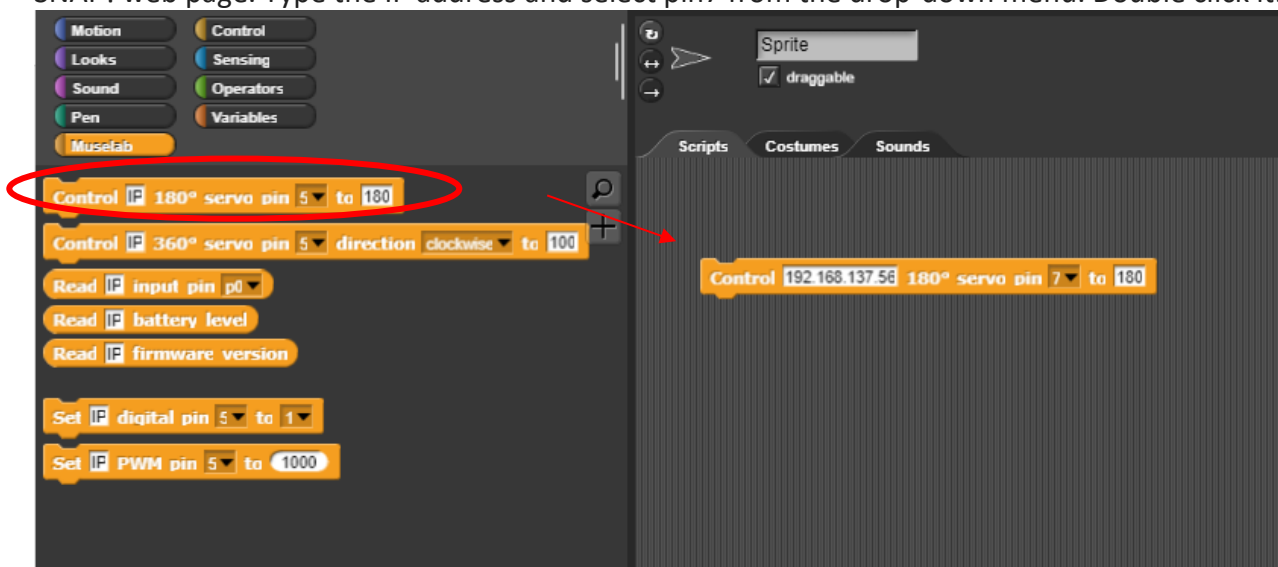
You get the servo turned to 180 degree now!
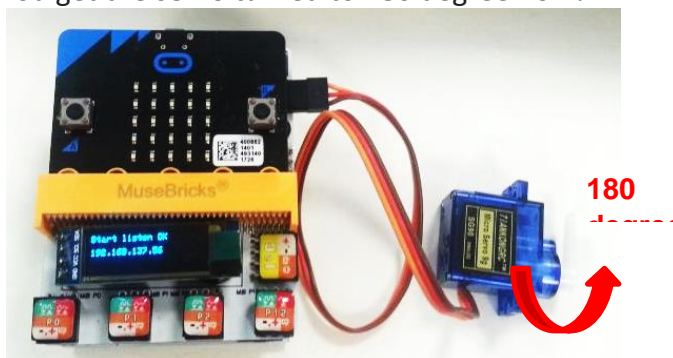
Enjoy your physical coding journey with SNAP! now.

If you want to get the sensor data from snap, it is also possible.

P0

Step 4. Drag a "Read IP input pin p0" block from the muselab tab from within the SNAP! web page. Type the IP address and select pin p0 from the drop-down menu. Double click it.

MAX

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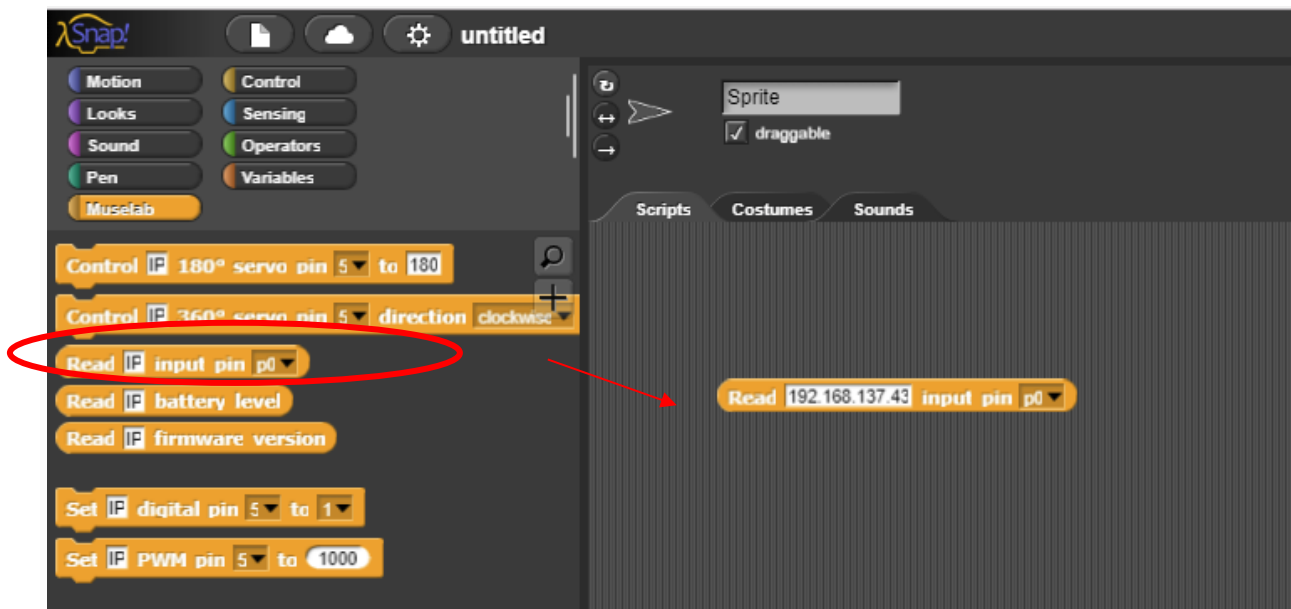
4. LEARN MORE

4.1 Send testing command to Booster

*STEP 0: Please make sure you have done the first step "Connect Wi-Fi" already.

STEP 1: Send the "send AT test" command by shaking it!
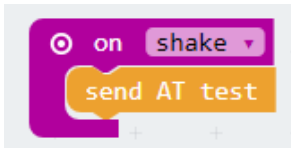
STEP 2: Send the command by shaking it!
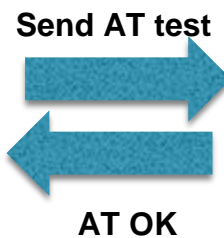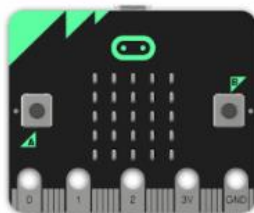
If you open the shield, the screen as shown below "AT+OK" will be returned.
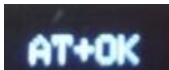
4.2 Get battery level

*STEP 0: Please make sure you have done the first step "Connect Wi-Fi" already.

STEP 1: Send the "Get battery level" command by pressing P0 pin!
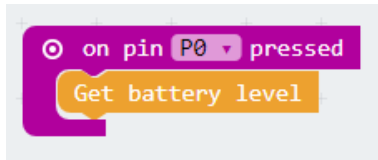
STEP 2: Send the command by pressing P0 pin!

Get battery lv

62.3%
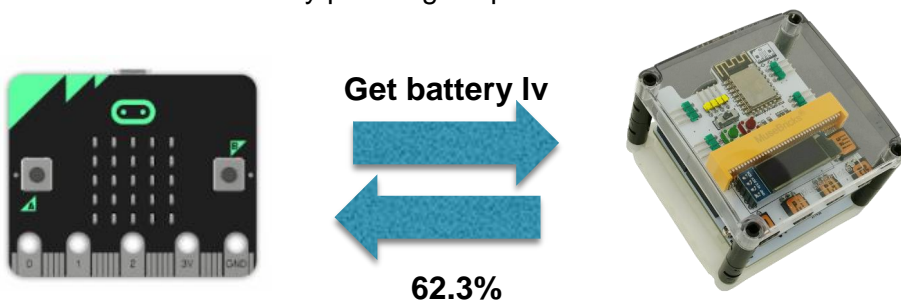
If you open the shield, the screen as shown below. "62.3%" will be returned.
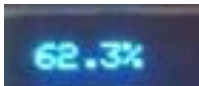
4.3 Get firmware version

*STEP 0: Please make sure you have done the first step "Connect Wi-Fi" already.

STEP 1: Send the "Get firmware version" command by Pressing A button!

STEP 2: Send the command by shaking it!
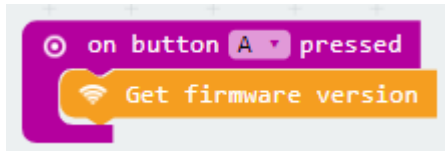

Get firmware version

v1.3
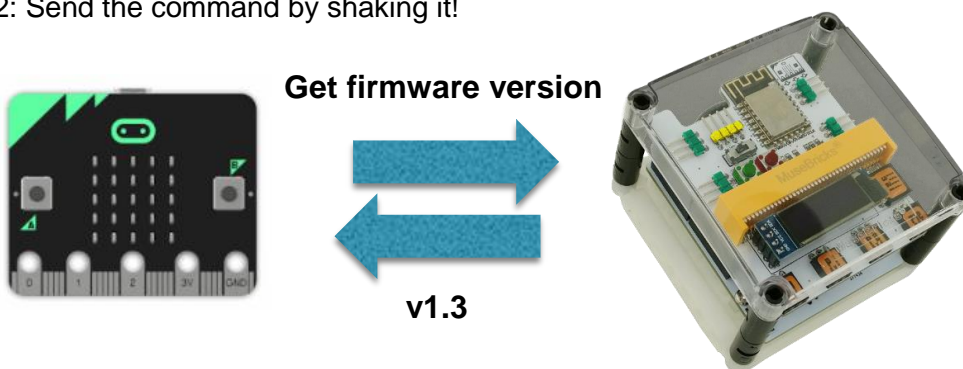
If you open the shield, the screen as shown below "AT+OK" will be returned.

4.4 API Table

No	Function	Command	API Return	Serial return	Remarks	
1	Digital	http://192.168.1.101/?mode=digital&pin=5&intensity=1	digital: 5,1	D5 1 OK	Pin: 5-8	Intensity: 0/1
2	PWM	http://192.168.1.101/?mode=pwm&pin=5&intensity=500	pwm: 5,500	D5 500 OK		Intensity: 0-1023
3	Servo_180	http://192.168.1.101/?mode=servo_180&pin=5&degree=180	servo_180: 5,180	D5 180 OK		Degree: 0-180
4	Servo_360	http://192.168.1.101/?mode=servo_360&pin=5&direction=clockwise&speed=100	servo_360: 5,clockwise,100	D5 100 OK		Direction: clockwise/anti clockwise Speed: 0-100
5	Robot car	http://192.168.1.101/?mode=robot_car&direction5=clockwise&speed5=100&direction6=clockwise&speed6=100&direction7=clockwise&speed7=100&direction8=clockwise&speed8=100				
5	Battery	http://192.168.1.101/?mode=battery	83.1%	Battery: 79.7%	-	-
6	Version	http://192.168.1.101/?mode=version	v1.0	Version: v1.0	-	-

4.5 API Advanced Table

| No	Function	Command	API Return	Serial return	Remarks	
7	M:B Input	http://192.168.1.101/?mode=input&pin=p0	0	p0: 0	Pin: p0-p2	-
8	M:B Digital	http://192.168.1.101/?mode=mb_output&output=digital&pin=12&intensity=1			Pin: 0-2,12-15	Intensity: 0/1
9	M:B PWM	http://192.168.1.101/?mode=mb_output&output=pwm&pin=12&intensity=500			Pin: 0-2,12-15	Intensity: 0-1023
10	M:B Servo	http://192.168.1.101/?mode=mb_output&output=servo&pin=12&intensity=180			Pin: 0-2,12-15	Intensity : 0-180 (Degree)
11	Control 1 M:B Motor	http://192.168.1.101/?mode=mb_motor&motor=0&direction=0&intensity=1000			Direction: 0-1	Intensity: 0-1023
12	Control 2 M:B Motor	http://192.168.1.101/?mode=mb_motor_2&direction1=0&intensity1=1000&direction2=0&intensity2=0				
13	M:B Car	http://192.168.1.101/?mode=mb_car&direction=0&intensity=1023			Direction: 0-5	Intensity: 0-1023
15	Inbound	http://192.168.1.101/?mode=inbound&no=1&string=helloworld			No: 1,2	
16	Inbound command	http://192.168.1.101/?mode=inboundcommand&string=helloworld				
17	Outbound	http://192.168.1.101/?mode=input&pin=outbound1			outbound1 outbound2	

4.6 Q/A

Q1. What to do if I find some error after I have added any package from Muselab?
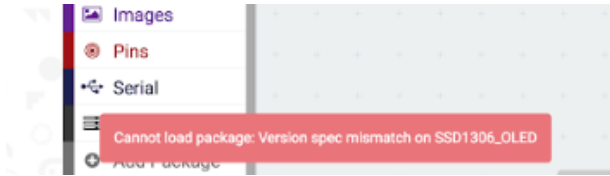
A1. Please new the project and re-add the package again.

Q2. What to do if there are no any wordings shown on the screen after I initialized the booster?
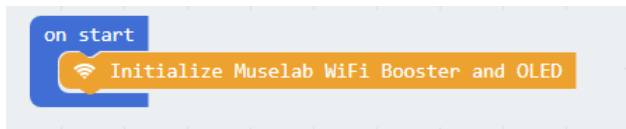
A2. There are few steps that help you troubleshoot it.

1. Re-new the project, re-add the package again. And try.

2. Try to take the micro:bit out from the booster when you are loading the HEX file from your PC.

3. Try to use another micro:bit.

4. If you still find problems, please contact us.

Q3. When I try to show something on the screen, why there are some sequence problem?
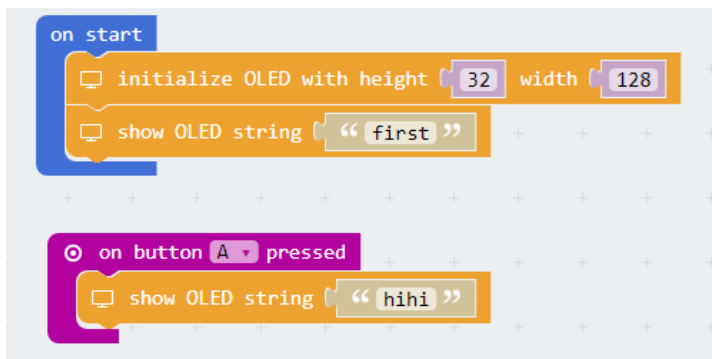
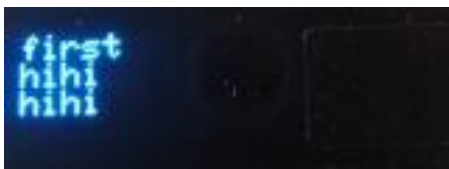A3. Yes, there is a known bug on it. The sequence is as shown below.

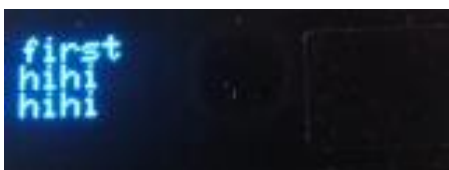1. After you open the booster, it show "first" properly.
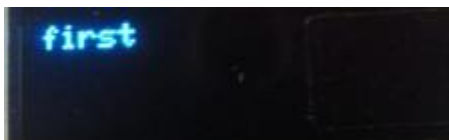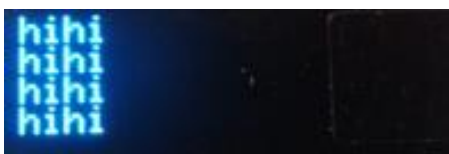

2. Press A button, show nothing.

3. Press one more time A button, show 2 rows immediately.

4. Press one more time A button after step 3, nothing happened again.

5. Press one more time A button, show 2 rows immediately.

Conclusion: There is no problem on showing things on the screen for the first time. After first time, you have to show 2 rows at the same time to prevent nothing happened issue.