# Smarthon Smart House Kit for micro:bit

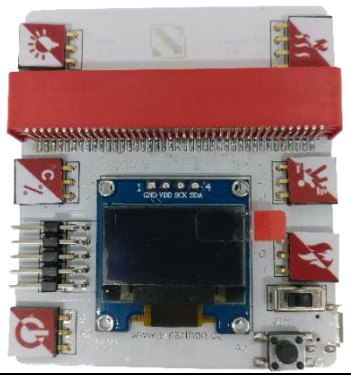
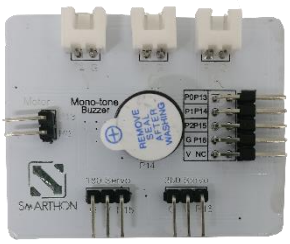
# User Guide

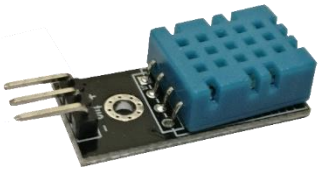
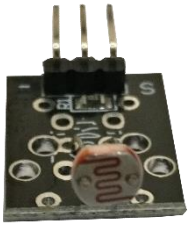
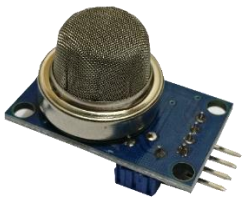
## About Smarthon Smart House Kit

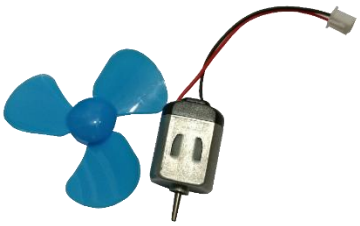
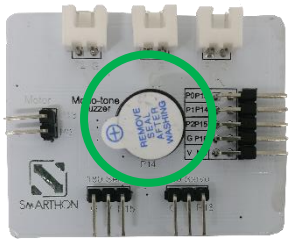
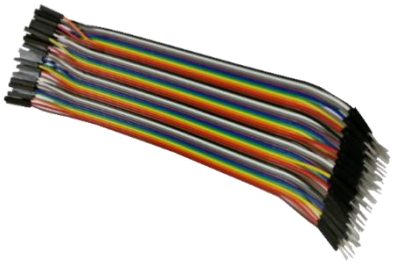
Smarthon Smart House Kit for micro:bit is a collaboration of computing and engineering with art for users to design and build a smart house model. This educational tool contains 7 sensors and 7 actuators that cover all the basic areas of the smart house, including security, home automation, and comfortable living as well as energy management features. Let's start to develop your prototype.

# Contents

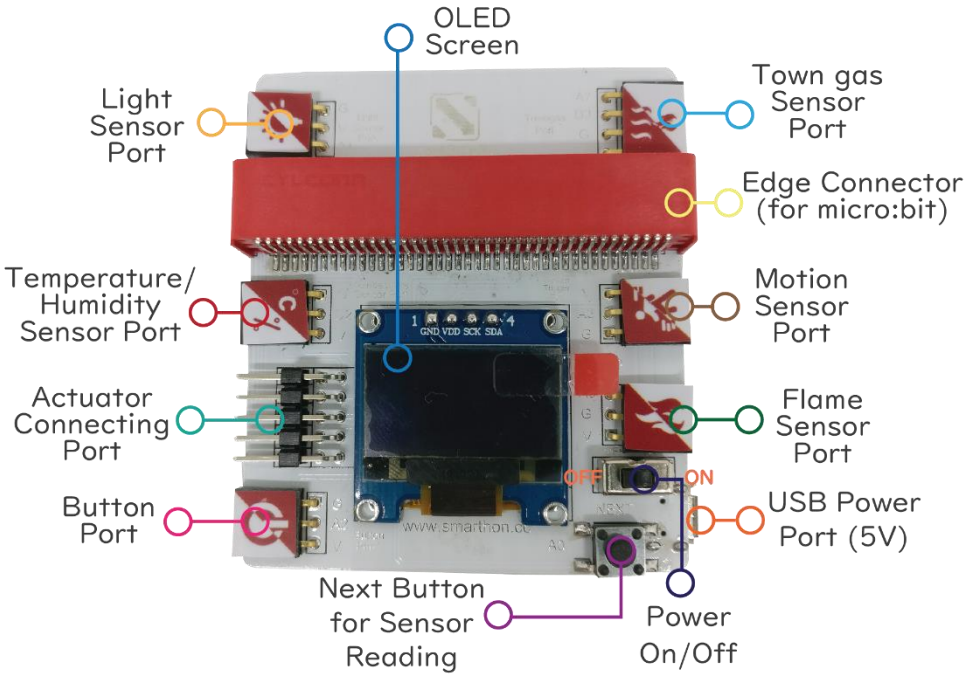
# Product Introduction – Kit components

| | | |
|---|---|---|
| 1 | Multiple Sensor for smart house<br><br>The Multiple Sensor for smart house is a board consolidating all sensor ports for building up a smart house. The instant value of all sensors can be read on the monitor screen in the board. Plugging micro:bit on the board, then all sensors can communicate with it. |  |
| 2 | Multiple Actuator for smart house<br><br>The Multiple Actuators for smart house is a output board with a buzzer and 6 ports, including three different light ports, a motor fan port, a 180° servo port as well as a 360° servo port. To use the 10P connecting wire to connect Multiple Sensors and Multiple Actuators, then Multiple Actuators can execute direct or conditional commands of the micro:bit. |  |
| 3 | Connecting Wire<br><br>The 10P connecting wire is a bridge between Multiple Sensors and Multiple Actuators. Connecting wire must be at the same direction when it uses. |  |
| 4 | Multiple Sensor Base<br><br>This is a simple base for placing Multiple Sensor board. |  |
| 5 | Button<br><br>Button is a generic sensor and you can use this colourful button to build different applications in the smart house project. For example, you can simply press the button to open and close the door or turn on and turn off the LED light. |  |

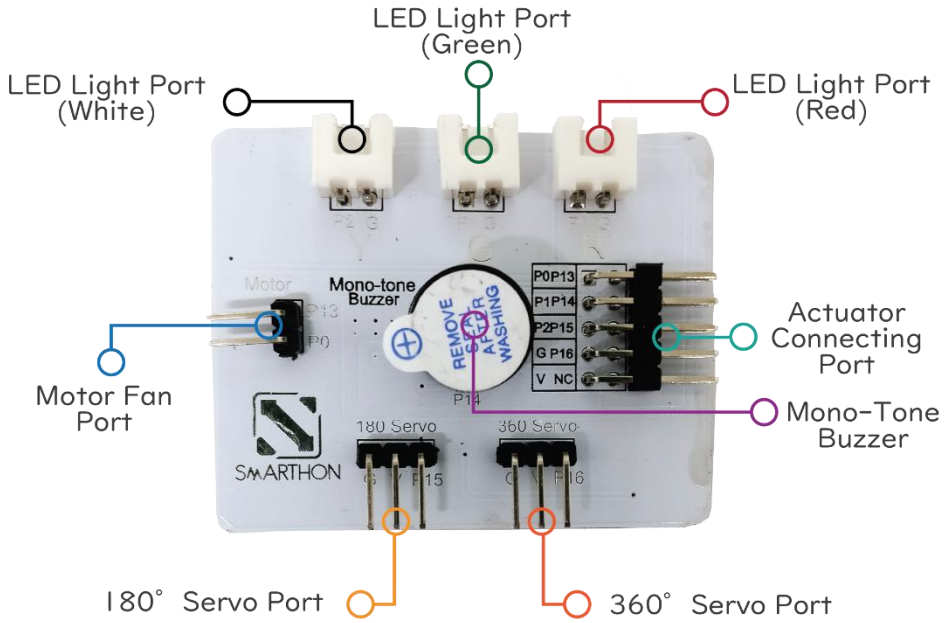
| | | |
|---|---|---|
| 6 | Temperature and Humidity Sensor<br><br>The two sensors are combined in one. This sensor can measure the temperature and moisture level of the ambient conditions. You can use this sensor to execute smart house projects such as turning on the motor fan when it is over 28℃. |  |
| 7 | Light Sensor<br><br>Light sensor is used to detect the light levels in the surrounding environment. This is a key sensor to build an energy-saving themed house such as turning on LED light when it is dark or drawing the curtain when there is a sunshine. |  |
| 8 | Motion Sensor<br><br>Motion sensor is to detect movement in an area and is usually used on the house security system project. If the sensor is tripped, a signal will be sent to your security system's control panel to alert you the potential threat in your house. Or you can apply to other projects, such as save energy by using motion sensor lighting in the house model. |  |
| 9 | Flame Sensor<br><br>Flame sensor is a detector designed to detect and respond to the presence of a flame or fire. It is the linchpin of the fire safety in the house project. |  |
| 10 | Town gas Sensor<br><br>This is a gas leak detector and usually used with the flame sensor. Both sensors are applicable to the projects on the kitchen safety, like if there is gas leakage or fire detected, Led light(red colour) and buzzer will be turn on. |  |

| | | |
|---|---|---|
| 11 | LED Light (Green, Red, Yellow)<br><br>There are 3 different colours - Green, Red and Yellow of LED light modules in this kit. |  |
| 12 | Motor Fan<br><br>Motor Fan is a module to adjust the air-temperature or improve the ventilation in the house. Not only can you turn on or off the motor fan, you are also able to control the speed of the fan on the makecode platform. |  |
| 13 | Mono-tone buzzer<br><br>This is a single tone buzzer placed on the Multiple Actuators board and it is usually for the alarm system. |  |
| 14 | 180° servo<br><br>The 180° servo is a module that has an output shaft and allows the shaft to be positioned at various angles between 0 and 180 degrees. You can use the 180° servo to do the fun project on opening or closing the door. |  |
| 15 | 360° servo<br><br>The 360° servo is similar with the 180° servo while it allows the shaft to be positioned at angles between 0 and 360 degrees. |  |
| 16 | Jumper Wires<br><br>Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect the Multiple Sensors/Multiple Actuators and sensors/actuators to each other. |  |

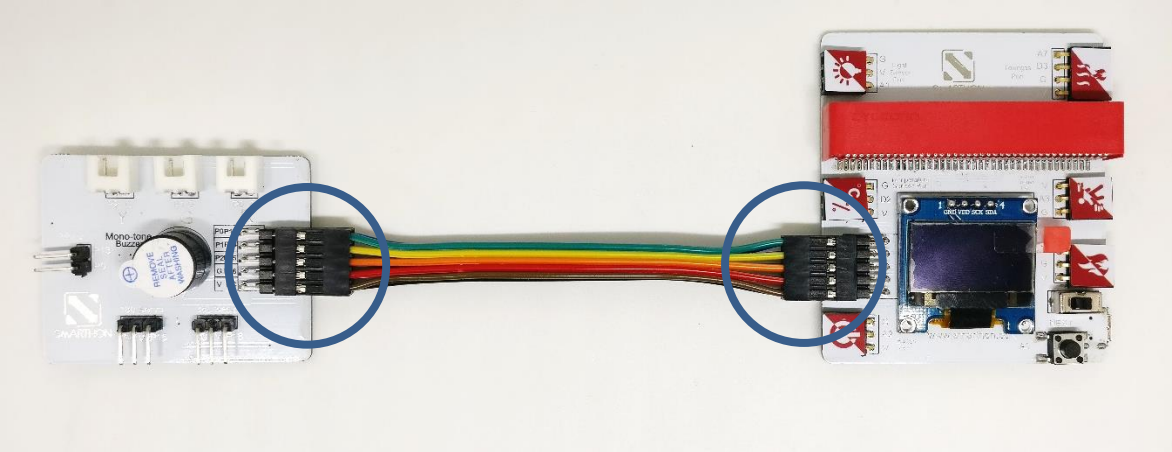
# Introduction for Multiple Sensors for smart house




# Introduction for Multiple Actuators for smart house



# Basic Connection Between Multiple Sensors and Multiple Actuators



*To make sure the connecting wire is on the same direction.

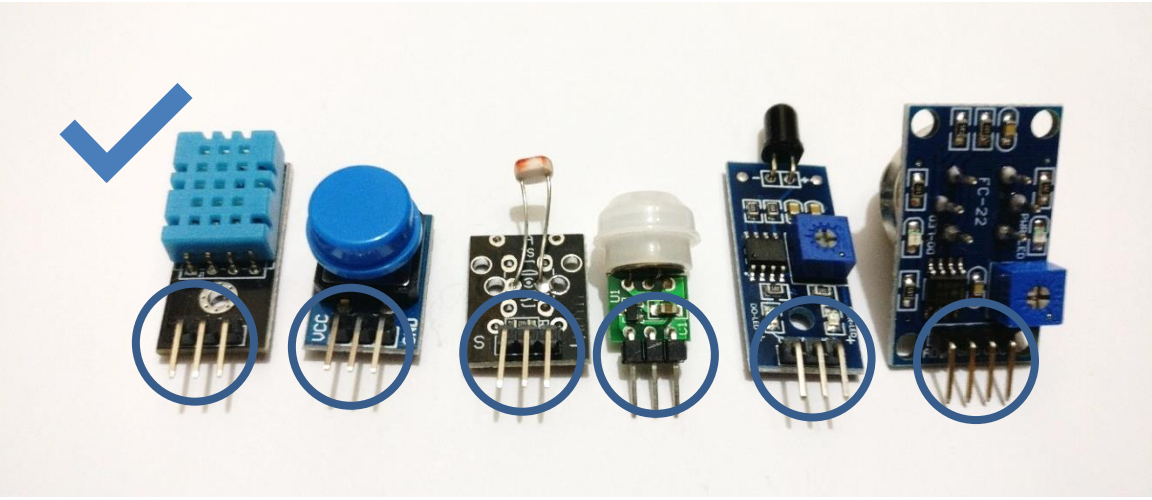
# Hardware User Guide

## A. The Sensors

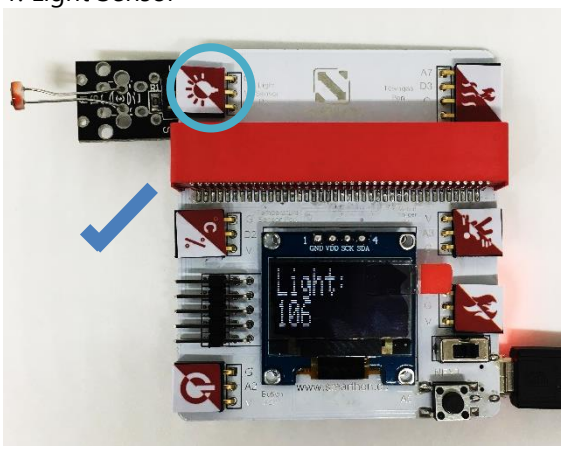
How to connect the sensor modules and Multiple Sensors for smart house?

Please follow the instructions shown below to plug sensor modules into Multiple Sensors correctly to ensure all the modules work effectively.

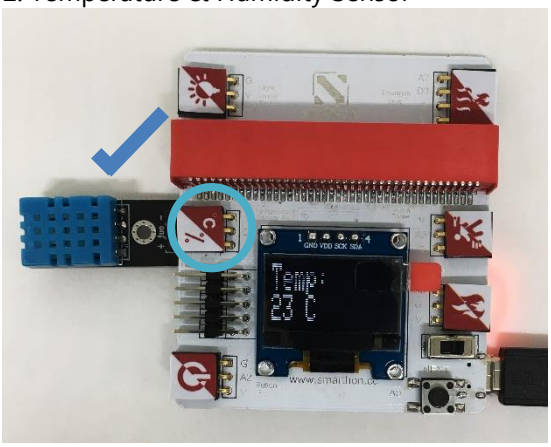
All Sensors:



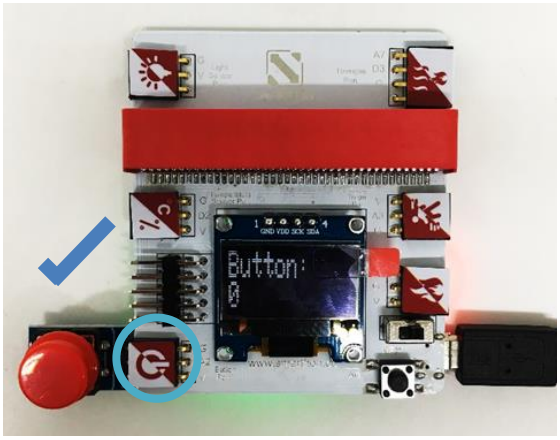
1. Light Sensor



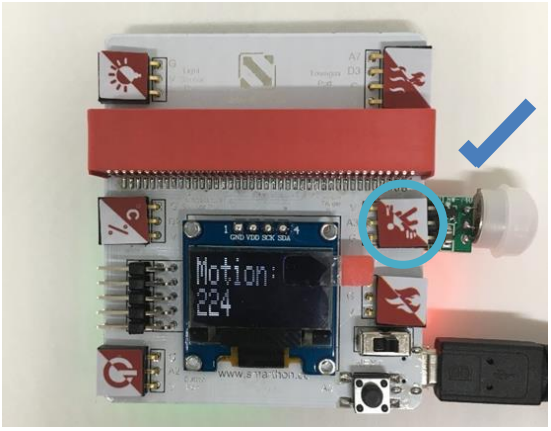

2. Temperature & Humidity Sensor



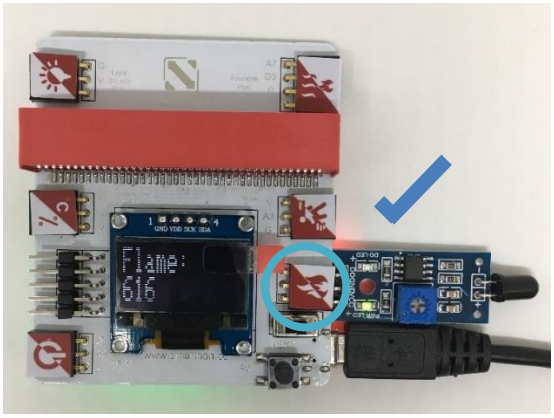

3. Button



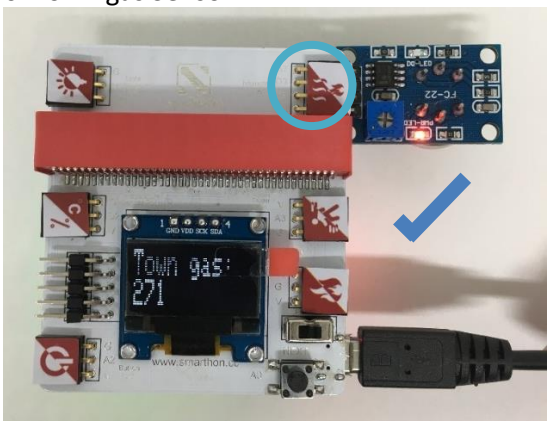

4. Motion Sensor




5. Flame Sensor




6. Town gas Sensor



**Caution! 注意！**

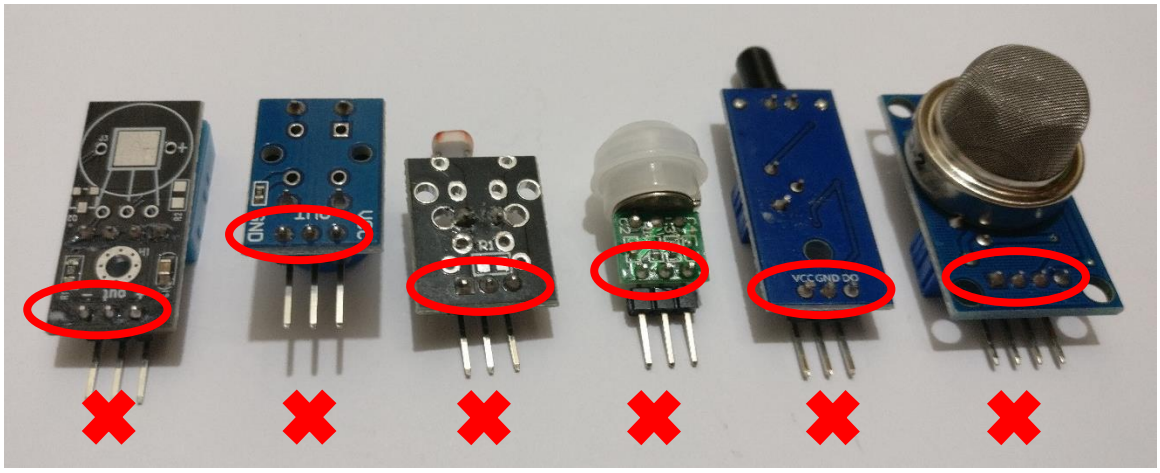
**Incorrect Plug-in: 錯誤示範：**

User should **NOT** plug the sensors into the Multiple Sensors for smart house at incorrect format as shown in below. Incorrectly plugging in the Multiple Sensors will cause:

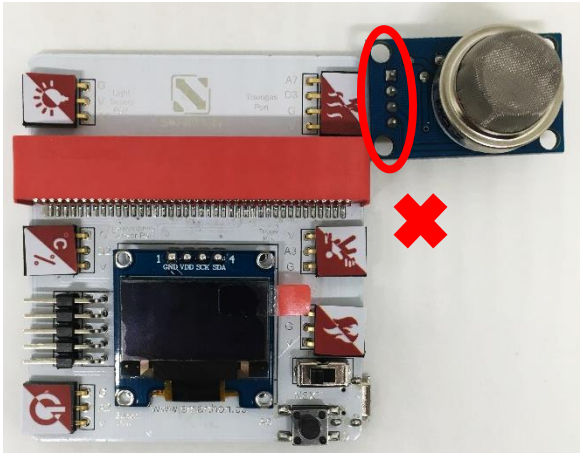
1. an error of the sensor value
2. **electrical short circuit** as well as damage the sensors or Multiple Sensors for smart house

You must always be concerned with your own safety first and cut-off power supply and remove sensors under safe conditions

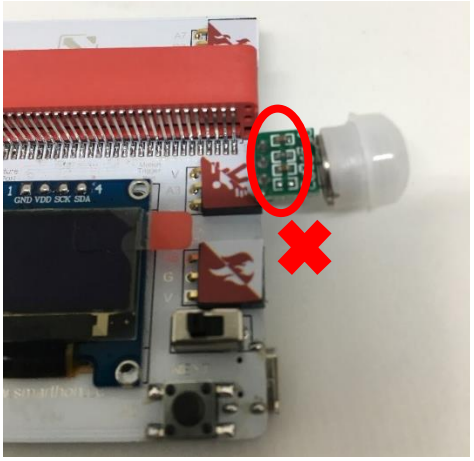
使用者**不應該**以下圖所示方式，把傳感器插入多合一傳感器主板(Multiple Sensors for smart house) 。**把傳感器錯誤插入**，將讀取錯誤數值及有可能讓**傳感器**或**多合一傳感器主板**(Multiple Sensors for smart house) 出現**冒煙及短路**情況。請切勿嘗試！如有任何意外，使用者應首先確保自身安全，並只應在安全及可行情況下移除電源及傳感器！



Incorrect Plug-in Example 1:
錯誤示範例子一：



Incorrect Plug-in Example 2:
錯誤示範例子二：

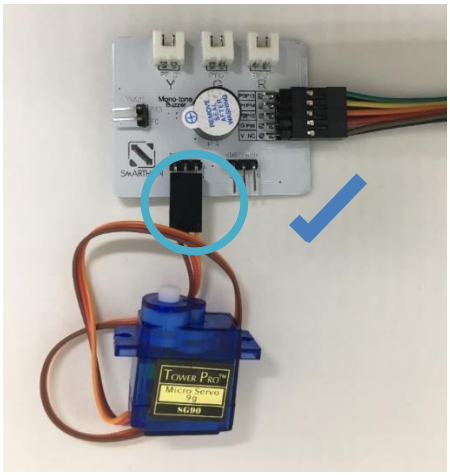


## B. The Actuators

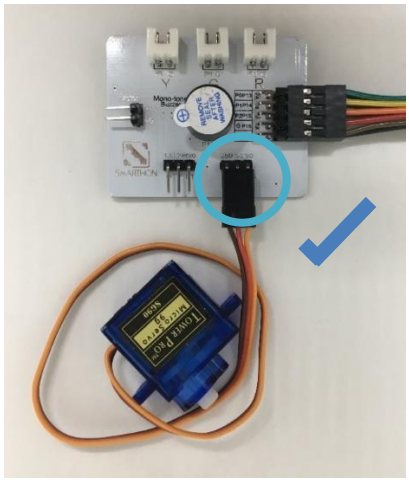
How to connect the actuator modules and Multiple Actuators for smart house?

Please follow the instructions shown below to plug actuator modules into Multiple Actuators correctly to ensure all the modules work effectively.

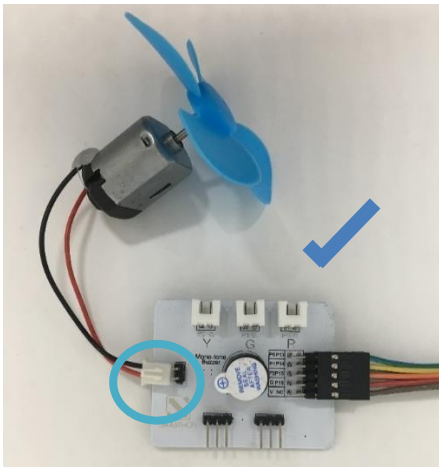
1. 180° Servo



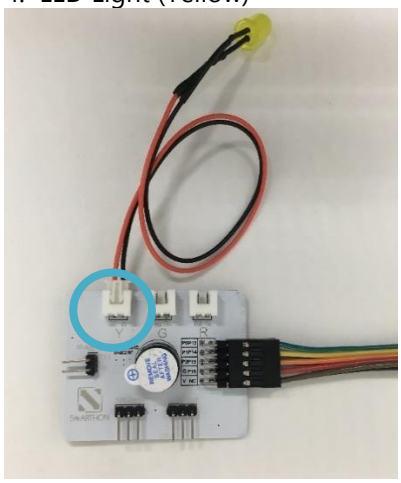
2. 360° Servo



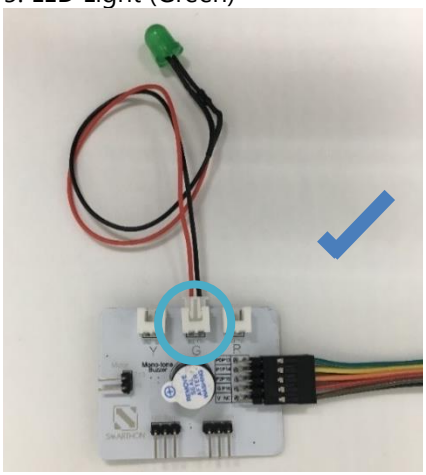
3. Motor Fan



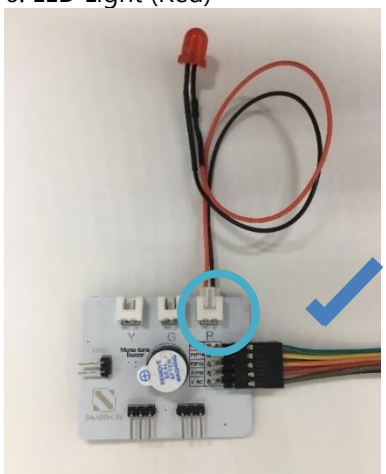
4. LED Light (Yellow)



5. LED Light (Green)



6. LED Light (Red)

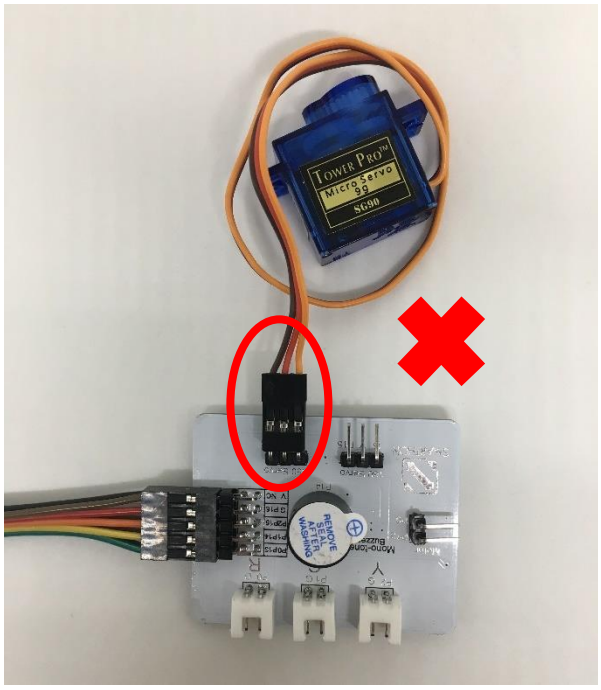


**Caution! 注意！**

Actuators will not work properly if users connect it with the Multiple Actuators incorrectly.

錯誤地把驅動器插入多合一驅動器副板(Multiple Actuators for smart house) ，將令驅動器不能正常運件。

Incorrect Plug-in Example: 例子：



# Reading all the sensors on screen: Button, Temperature & Humidity sensor, Light sensor, Motion sensor, Flame sensor and Town gas sensor

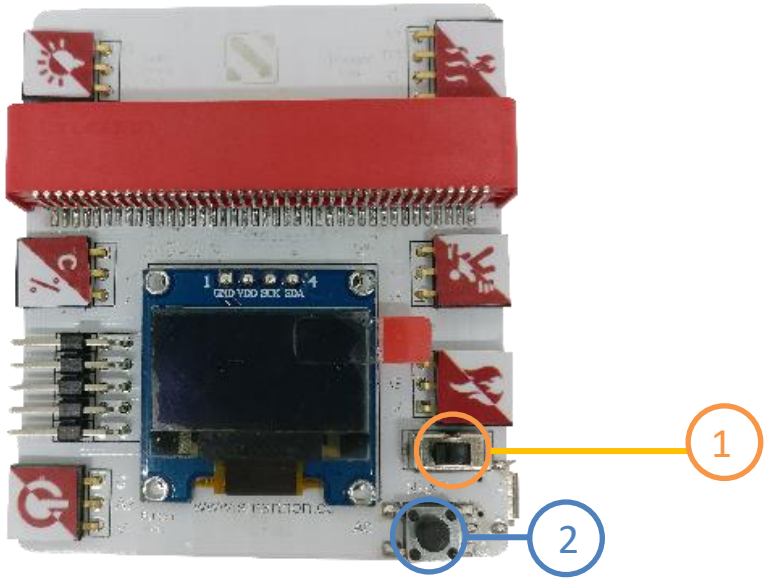
Part List:

1. Multiple Sensors for plant X1
2. Button X1
3. Temperature & Humidity sensor X1
4. Light sensor X1
5. Motion sensor X1
6. Flame sensor X1
7. Town gas sensor X1
8. USB Cable

You should learn how to read the sensor value which is the foundation of the other projects.

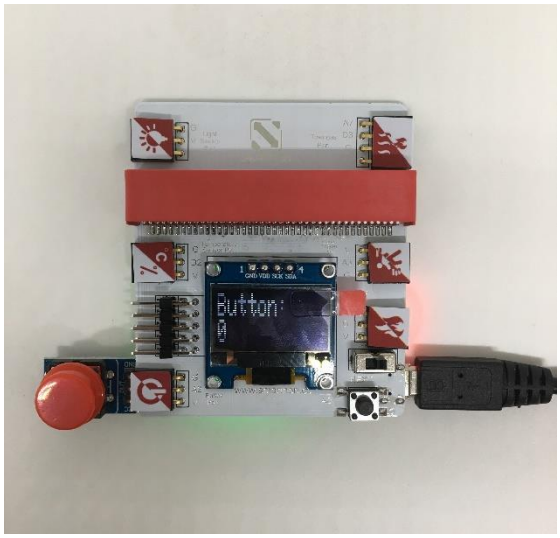
1. Switch on the power button first (orange colour)
2. Pressed the button in the right bottom corner of the Multiple Sensors for smart house (blue colour)

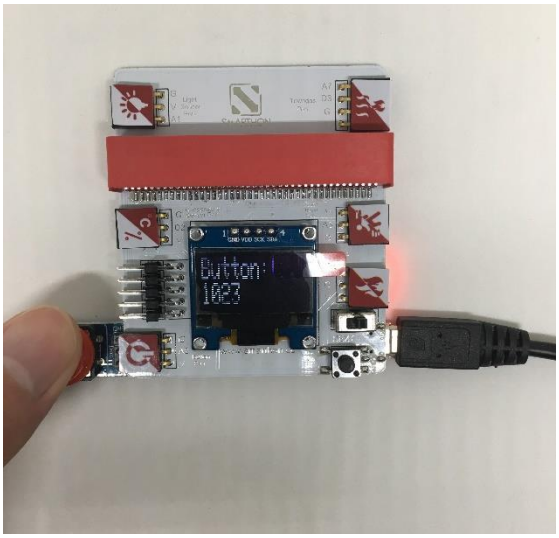
It shows the instant value of the digital light sensor, temperature, humidity, button, motion, flame as well as town gas sensor.



Button, Light Sensor and Town gas sensor are shown as examples:

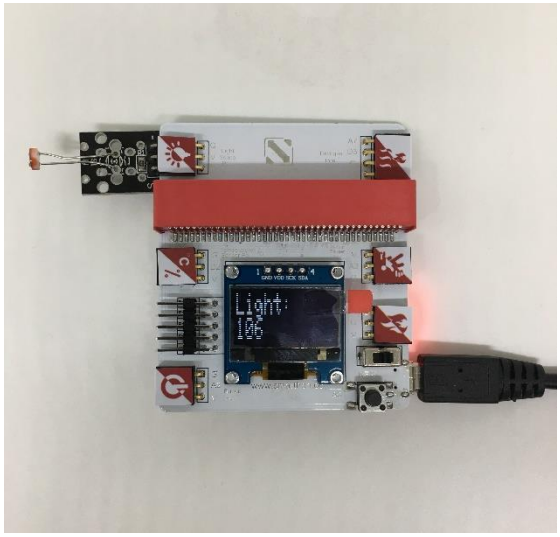
1. Button

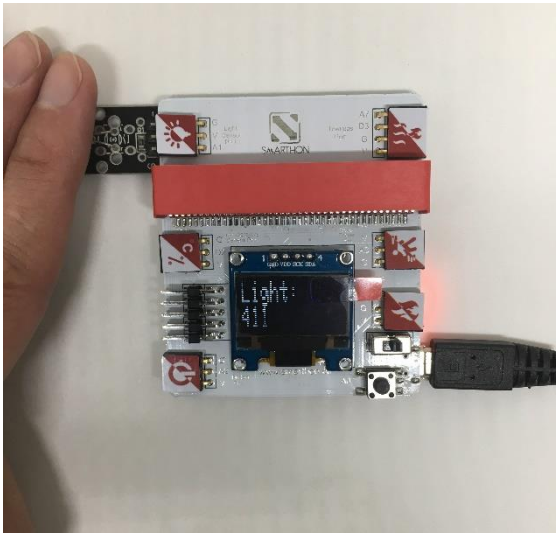



When you plug in the button, the screen shows 0 or 1 (small number); while when you pressed the button, the screen shows around 1020 - 1023 (large number). It indicates that a large number will be shown when you pressed the button.

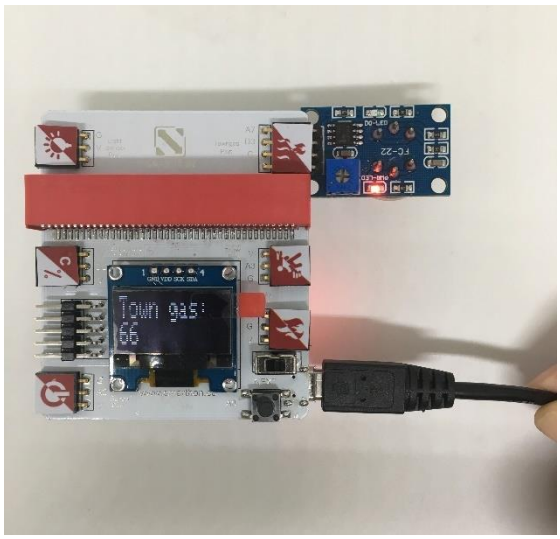
2. Light Sensor

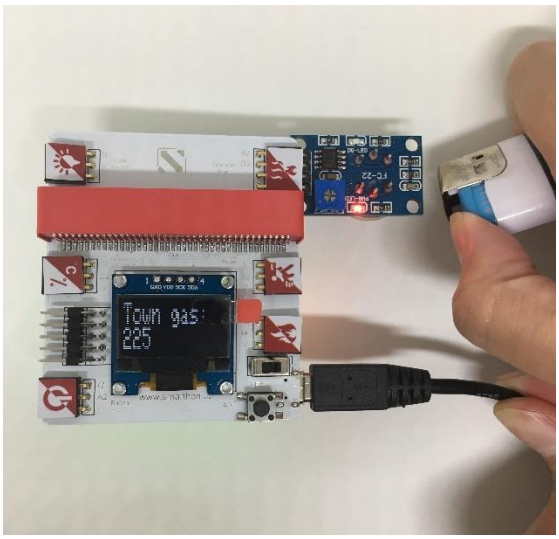



When there is a light turning on, the light sensor value is around 280-300; otherwise when you use a finger to cover the light sensor, it has increased into around 450-470. It reveals that the ambient lighting are getting brighter, the number of the light sensor value shown on the screen is getting smaller and vice versa.

3. Town gas Sensor




In the normal condition, the town gas sensor value is around 30-50; while there is a town gas leakage, the number has increased from 200 – 850 subject to the concentration of different leakage velocities.

* Please conduct a gas test in a well-ventilated area.

**Reading the other three sensors:**

Temperature & Humidity: _____

Motion sensor:_____

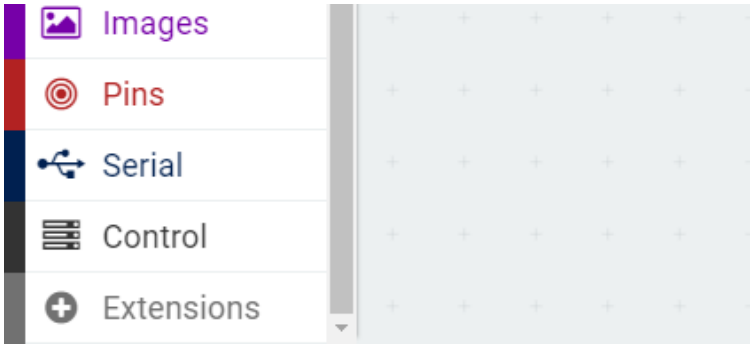
Flame sensor:_____

# Getting started: How to program Smarthon Plant Kit on micro:bit

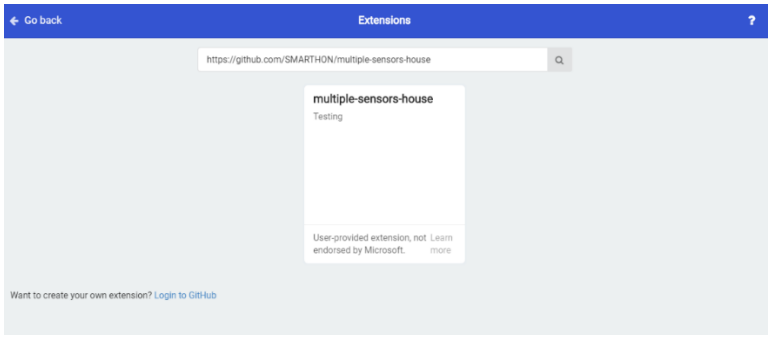
To Program Smarthon modules with micro:bit, you need to add the Smarthon Plant Kit packages to the BBC micro:bit makecode platform and initialize it first.

**Steps:**

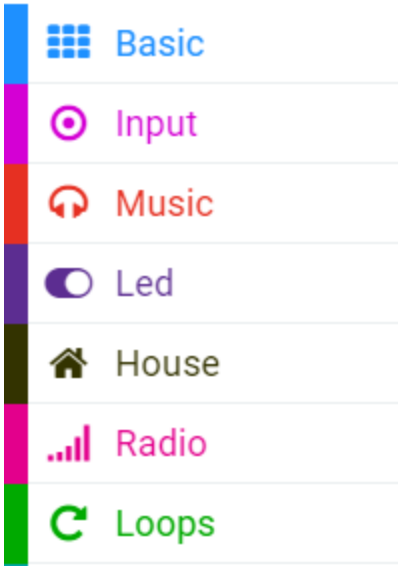
1. Find the “Extensions” block at the bottom



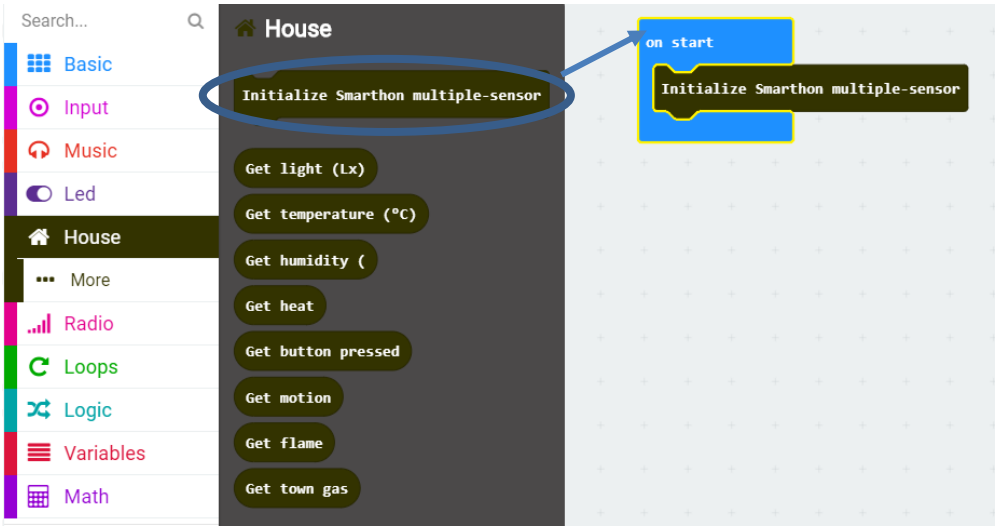

2. Search “https://github.com/SMARTHON/multiple-sensors-house”



3. Clicked “multiple sensors” and you can see “House” package has been successfully added under “Led”.




4. Initialize Smarthon Smart House Kit to add all the functions



# Project 1: Read Sensors on micro:bit 25 LED lights

Level: ★ ☆ ☆ ☆ ☆

Part List:

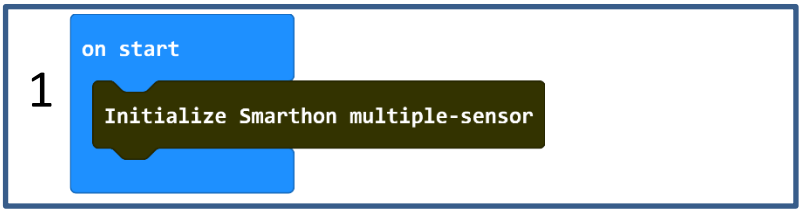
1. Temperature/Humidity Sensor X1
2. Multiple Sensors for smart house X1
3. Multiple Actuators for smart house X1
4. Connecting Wire X1
5. micro:bit X1
6. USB Cable X1

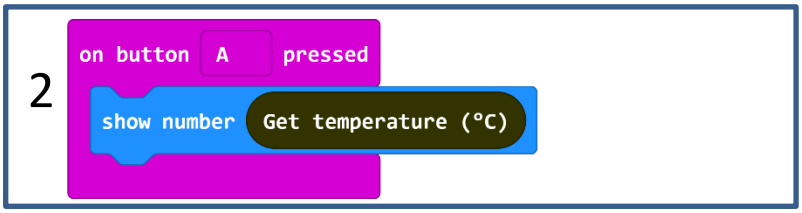
## Description:

You can learn how to get the value of the sensor and show on micro:bit LED. Temperature/Humidity sensor will be illustrated in this demo.

## Steps:

1. Basic (Add block ***on start***) > House (Add block ***Initialize Smarthon multiple-sensor***)
2. Input (Add block ***on button A is pressed***) > Basic (Add block ***show number***) > House (Add block ***Get temperature (°C)***)
3. Input (Add block ***on button A is pressed***, change **"A"** into **"B"** ) > Basic (Add block ***show number***) > House (Add block ***Get humidity***)

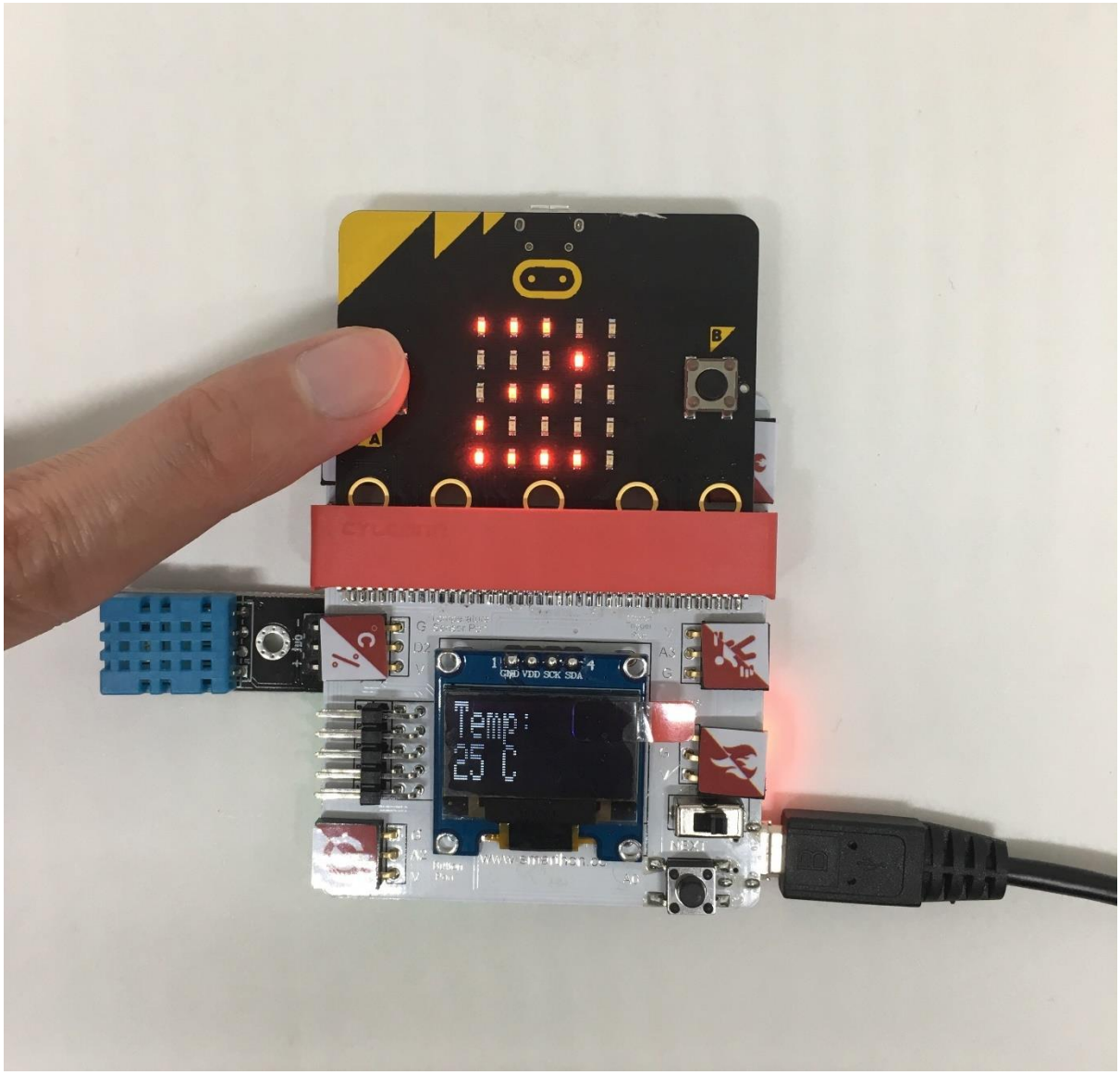




## Hardware:

4. Connect the **Temperature/Humidity sensor** to Temperature Sensor port of Multiple Sensors
5. **Download** the code and transfer to micro:bit
6. Plug the micro:bit into Multiple Sensors
7. Pressed micro:bit button A to see the temperature and button B to see the humidity




➢ Try to show the other sensors value on micro:bit LED.

# Project 2: Control Multiple Actuators Lv1

Level: ★ ☆ ☆ ☆ ☆

Part List:

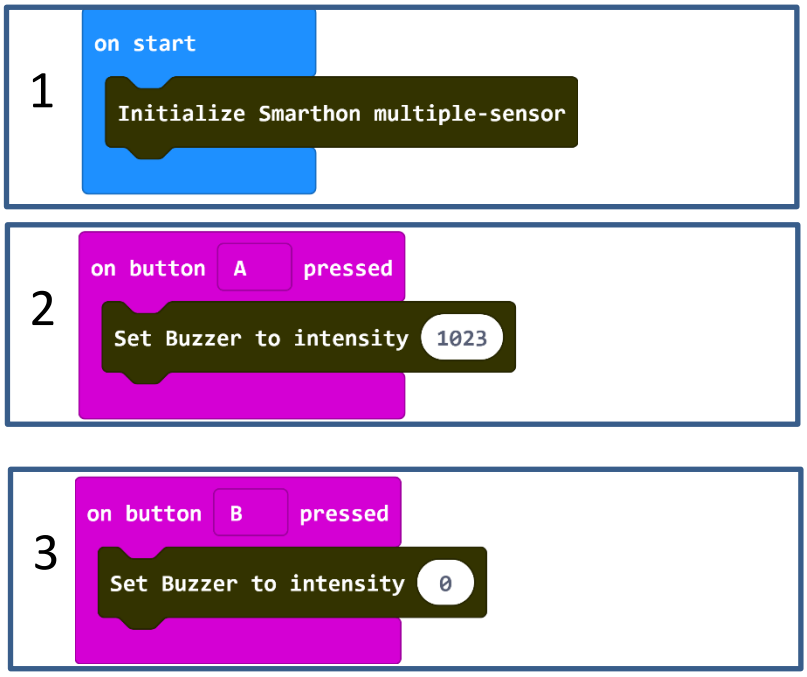
1. Mono-tone buzzer X1 (placed on Multiple Actuators for smart house)
2. Multiple Sensors for smart house X1
3. Multiple Actuators for smart house X1
4. Connecting Wire X1
5. micro:bit X1
6. USB Cable X1

## Description:

In project 2, you can learn how to use micro:bit button A & B to control mono-tone buzzer as an example in this demo.

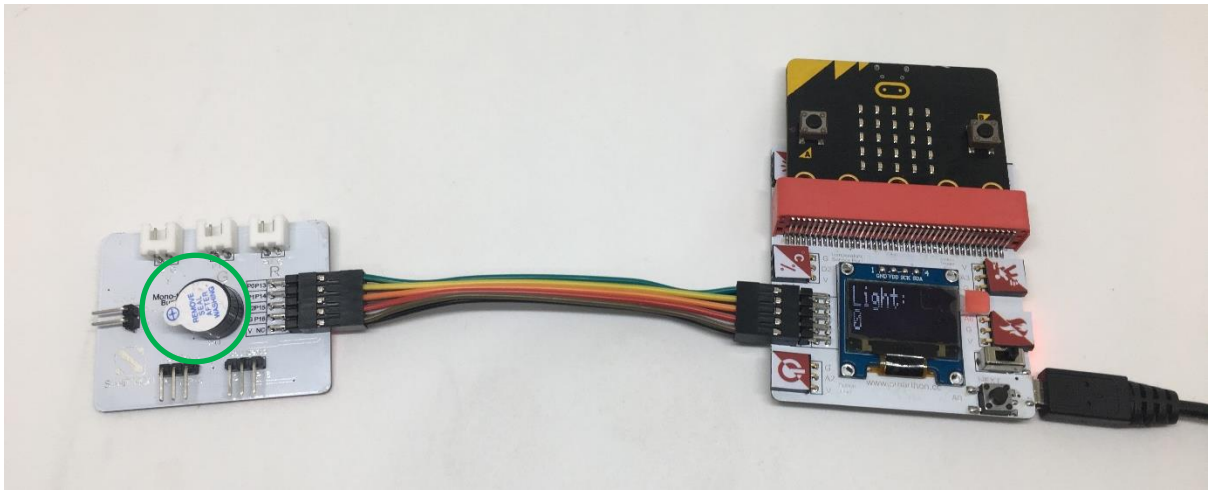
## Steps:

1. Basic (Add block ***on start***) > House (Add block ***Initialize Smarthon multiple-sensor***)
2. Input (Add block ***on button A is pressed***) > House-More (Add block ***Set Buzzer to intensity 0***, change ***"0" to "1023"***)
3. Input (Add block ***on button A is pressed***, change **"A"** into **"B"**) > House (Add block ***Set Buzzer to intensity "0"***)



**Hardware:**

4. **Download** the code and transfer to micro:bit.
5. Plug the micro:bit into Multiple Sensors.
6. Connect Multiple Sensors and Multiple Actuators by connecting wire.
7. Pressed micro:bit button A to turn to the buzzer and button B to turn off the buzzer.




- Try to use on shake to turn on and off buzzer.

# Project 3: Control Multiple Actuators Lv2

Level: ★ ★ ★ ☆ ☆

Part List:

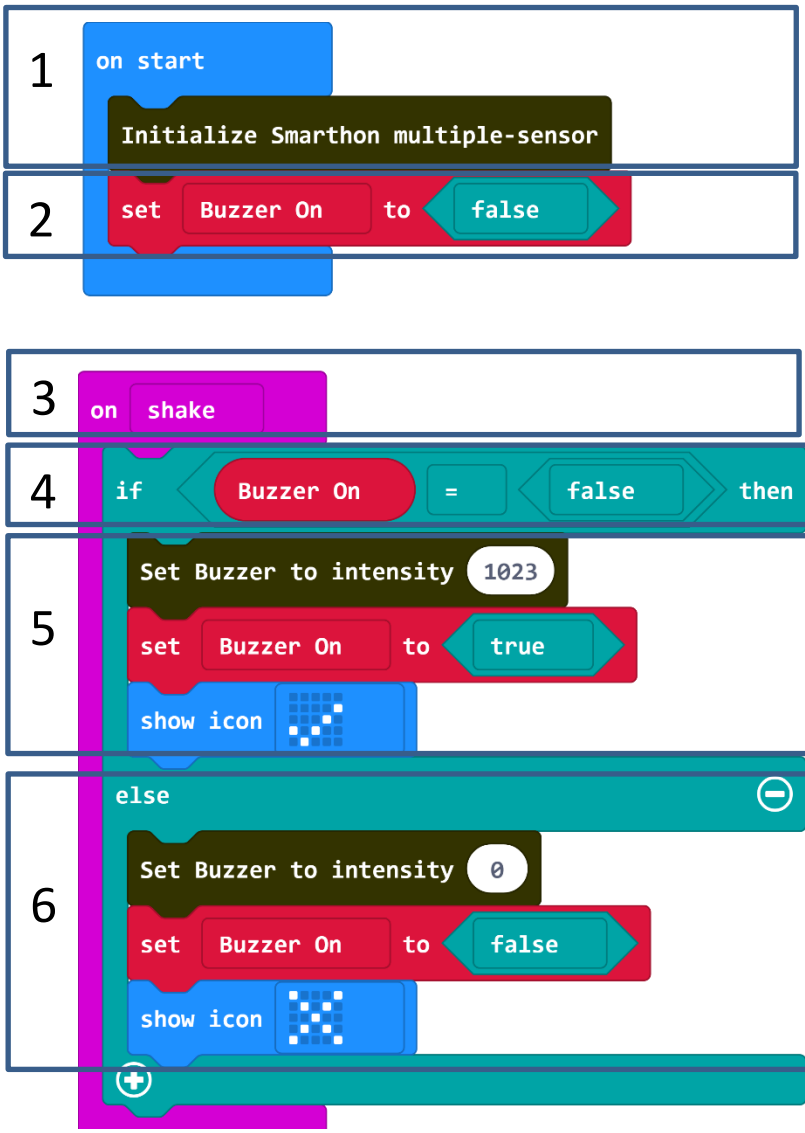
1. Mono-tone buzzer X1 (placed on Multiple Actuators for smart house)
2. Multiple Sensors for smart house X1
3. Multiple Actuators for smart house X1
4. Connecting Wire X1
5. micro:bit X1
6. USB Cable X1

## Description:

In project 3, this is level two to control multiple actuators and you can learn how to use micro:bit on shake to control mono-tone buzzer on and off together.

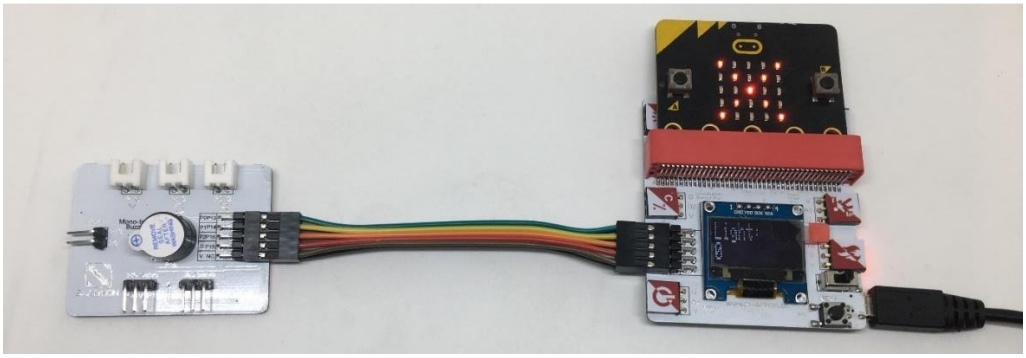
## Steps:

1. Basic (Add block ***on start***) > House (Add block ***Initialize Smarthon multiple-sensor***)
2. Variables (Make a Variable ***"Buzzer On")*** > Variables (Add block ***set item to 0***, change ***"item"*** to ***"Buzzer On"***; ***"0"*** to Logic ***"false"***)
3. Input (Add block ***on shake***)
4. Logic (Add block ***if...then...else***) > For ***if***: Logic (Add block ***0 = 0***, change ***"0"*** to Variables ***"Buzzer On"***; ***"0"*** to Logic ***"false"***)
5. For ***then***: House-More (Add block ***Set Buzzer to intensity 0***, change ***"0" to "1023"***) > Variables (Add block ***set item to 0***, change ***"item"*** to ***"Buzzer On"***; ***"0"*** to Logic ***"true"***) > Basic (Add block ***show icon***, change ***"heart"*** to ***"yes"***)
6. For ***else***: House-More (Add block ***Set Buzzer to intensity 0***) > Variables (Add block ***set item to 0***, change ***"item"*** to ***"Buzzer On"***; ***"0"*** to Logic ***"false"***) > Basic (Add block ***show icon***, change ***"heart"*** to ***"no"***)




## Hardware:

7. **Download** the code and transfer to micro:bit
8. Plug the micro:bit into Multiple Sensors
9. Connect Multiple Sensors and Multiple Actuators by connecting wire
10. Shook the micro:bit to turn on/off the buzzer



➢ Try to use on shake to turn on/off other actuators.

# Project 4: Open the door

Level: ★ ★ ☆ ☆ ☆

Part List:

1. Button X1
2. 180° servo X1
3. Multiple Sensors for smart house X1
4. Multiple Actuators for smart house X1
5. Connecting Wire X1
6. micro:bit X1
7. USB Cable X1
8. Lolly Sticks X2

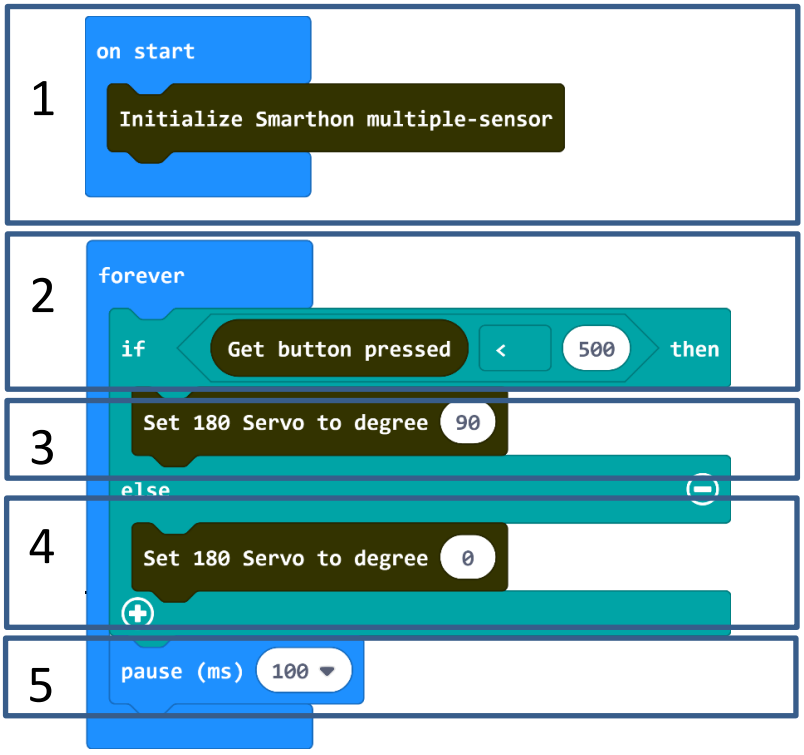
## Description:

In project 4, you can learn how to use the button to open the door.

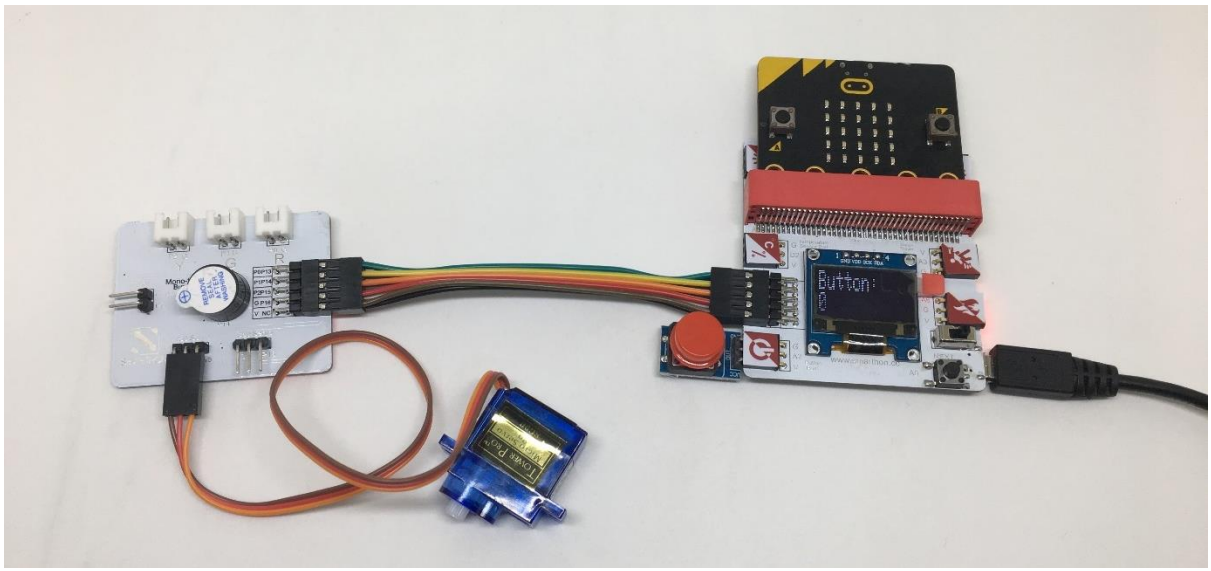
## Steps:

1. Basic (Add block ***on start***) > House (Add block ***Initialize Smarthon multiple-sensor***)
2. Basic (Add block ***forever***) > Logic (Add block ***if…then…else***) > For ***if***: Logic (Add block ***0 = 0***, change ***"0"*** to House ***"Get button pressed"***; ***"="*** to ***"<"***; ***"0"*** to ***"500"***)
3. For ***then***: House (Add block ***Set 180 Servo to degree 0***, change ***"0"*** to ***"90"***)
4. For ***else***: House (Add block ***Set 180 Servo to degree 0***)
5. Basic (Add block ***pause (ms) 100***)

*degrees of the servo have to be adjusted under the different condition



6. **Download** the code and transfer to micro:bit
7. Plug the micro:bit into Multiple Sensors
8. Connect Multiple Sensors and Multiple Actuators by connecting wire
9. Put the horn into 180° servo
10. Stick "+" with the lolly sticks and stick it up on the horn
11. Connect the module to 180° servo port of the Multiple Actuators and install it to the door
12. Pressed the button to open the door




- Try to use the other sensors, such as motion sensor to control the door.

# Project 5: Alarm System

Level: ★ ★ ☆ ☆ ☆

Part List:

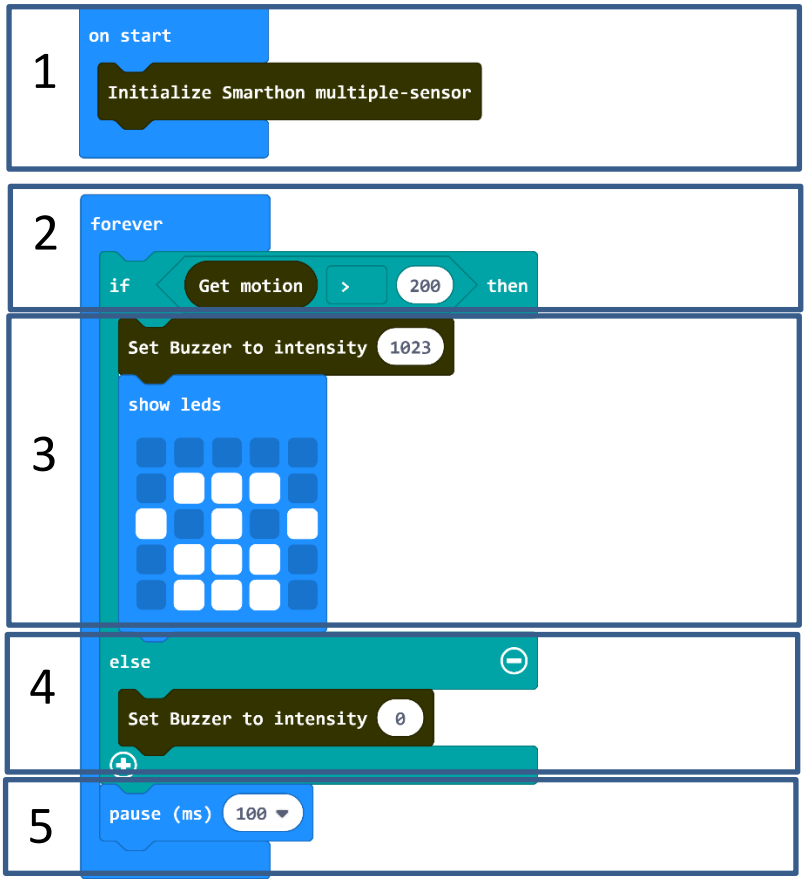
1. Motion sensor X1
2. Mono-tone buzzer X1 (placed on Multiple Actuators for smart house)
3. Multiple Sensors for smart house X1
4. Multiple Actuators for smart house X1
5. Connecting Wire X1
6. micro:bit X1
7. USB Cable X1

## Description:

In project 5, you can learn how to use motion sensor and buzzer to design an alarm system to maintain the house security.

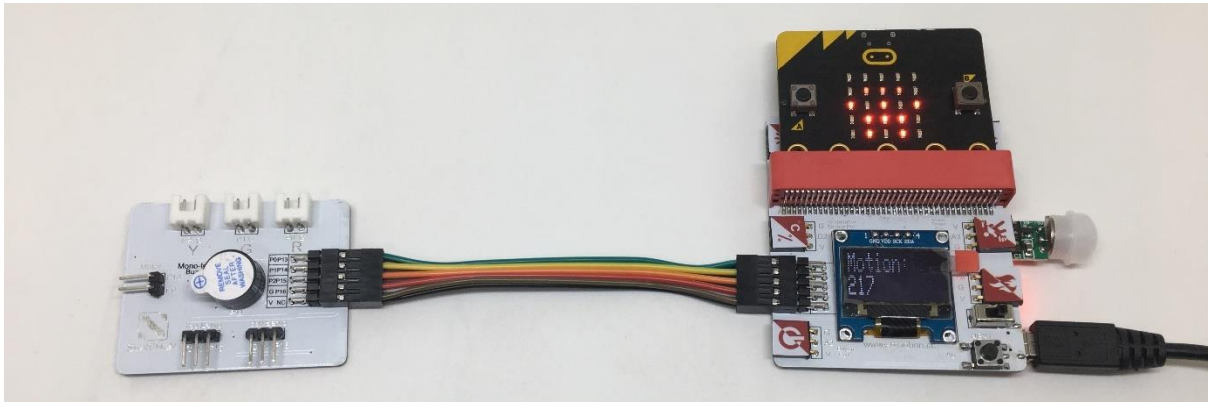
## Steps:

1. Basic (Add block ***on start***) > House (Add block ***Initialize Smarthon multiple-sensor***)
2. Basic (Add block ***forever***) > Logic (Add block ***if…then…else***) > For ***if***: Logic (Add block ***0 = 0***, change ***"0"*** to House ***"Get motion"***; ***"="*** to ***">"***; ***"0"*** to ***"200"***)
3. For ***then***: House-More (Add block ***Set Buzzer to intensity 0***, change ***"0"*** to ***"1023"***) > Basic (Add block ***show leds*** – create a telephone symbol)
4. For ***else***: House-More (Add block ***Set Buzzer to intensity 0***)
5. Basic (Add block ***pause (ms) 100***)




## Hardware:

6. Connect the **Motion sensor** to Motion Trigger port of Multiple Sensors
7. **Download** the code and transfer to micro:bit
8. Plug the micro:bit into Multiple Sensors
9. Connect Multiple Sensors and Multiple Actuators by connecting wire
10. Try shake your hand nearby the motion sensor to test



- Try to use other actuators, such as LED lights (green and red) to make an alarm system.

# Project 6: Light Automation

Level: ★ ★ ★ ☆ ☆

Part List:

1. Light sensor X1
2. Yellow LED X1
3. Multiple Sensors for smart house X1
4. Multiple Actuators for smart house X1
5. Connecting Wire X1
6. micro:bit X1
7. USB Cable X1

## Description:

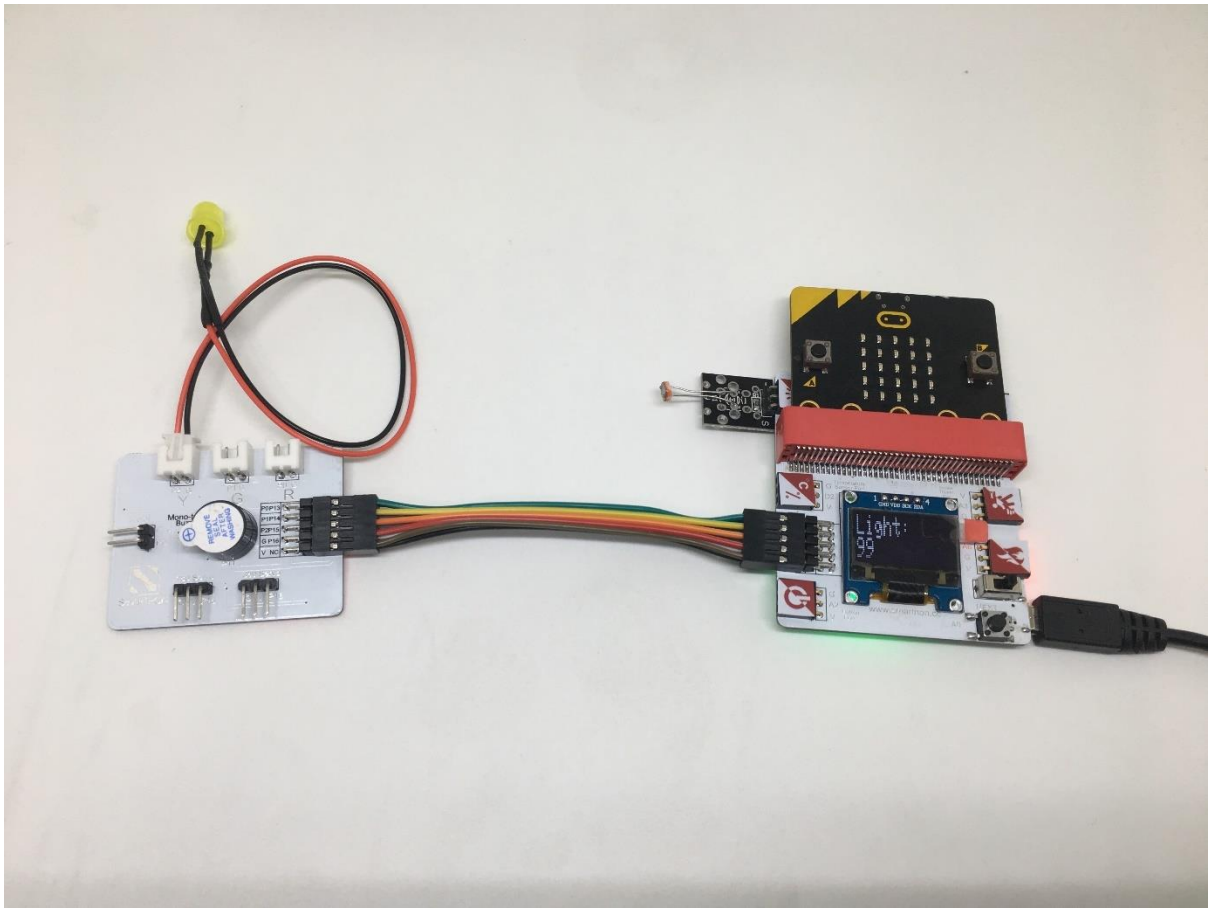
In project 6, you can learn how to build a light automation in the house subject to the sunshine.

## Step:

1. Basic (Add block ***on start***) > House (Add block ***Initialize Smarthon multiple-sensor***)
2. Basic (Add block ***forever***) > Logic (Add block ***if…then…else,*** add 1 more ***if…then…else***) > For 1st ***if***: Logic (Add block ***0 = 0***, change ***"0"*** to House ***"Get light"***; ***"="*** to ***"<"***; ***"0"*** to ***"50"***) > For ***then***: House-More (Add block ***Set Yellow LED to intensity 0***)
3. For ***else if***: Logic (Add block ***0 = 0***, change ***"0"*** to House ***"Get light"***; ***"="*** to ***">"***; ***"0"*** to ***"450"***) > For ***then***: House-More (Add block ***Set Yellow LED to intensity 0***, change ***"0"*** to ***"1023"***)
4. For ***else:*** House-More (Add block ***Set Yellow LED to intensity 0***, change ***"0"*** to ***"700"***)

**Hardware:**

5. Connect the **Light sensor** to Light Sensor port of Multiple Sensors
6. **Download** the code and transfer to micro:bit
7. Plug the micro:bit into Multiple Sensors
8. Connect Multiple Sensors and Multiple Actuators by connecting wire
9. Connect the Yellow LED to Y port of the Multiple Actuators
10. Use the finger to cover the light sensor to see if the LED light can be turn on / Shining a torch to the light sensor to see if the LED light can be turn off




- Try to conduct the experiment under the dark environment or sunshine and adjust the value of the sensors or LED light to fit the different projects.

# Project 7: Smart Motor Fan

Level: ★ ★ ★ ☆ ☆

Part List:

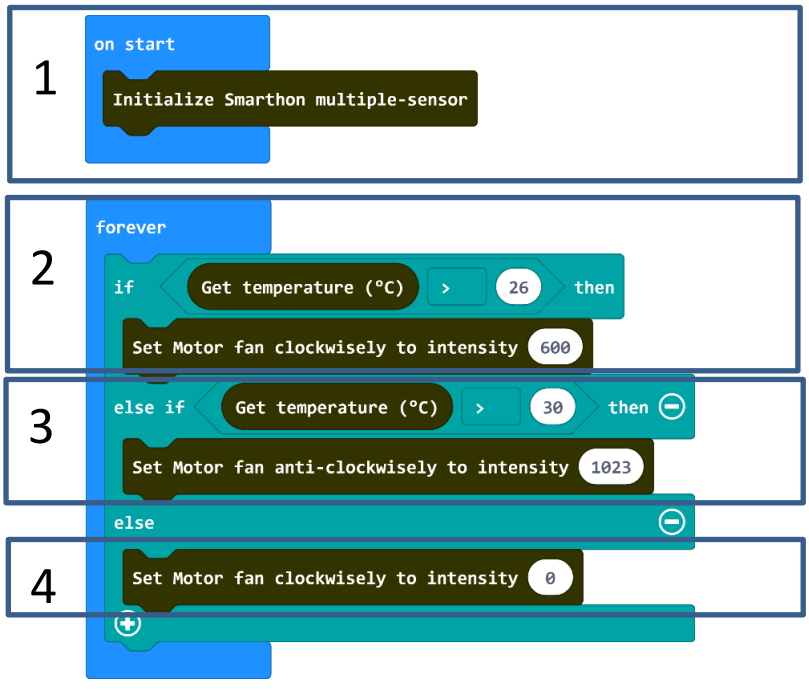
1. Temperature/Humidity sensor X1
2. Motor Fan X1
3. Multiple Sensors for smart house X1
4. Multiple Actuators for smart house X1
5. Connecting Wire X1
6. micro:bit X1
7. USB Cable X1

## Description:

In project 7, you can learn how to make an smart fan automation that allows you to design a smarter and more comfortable house.

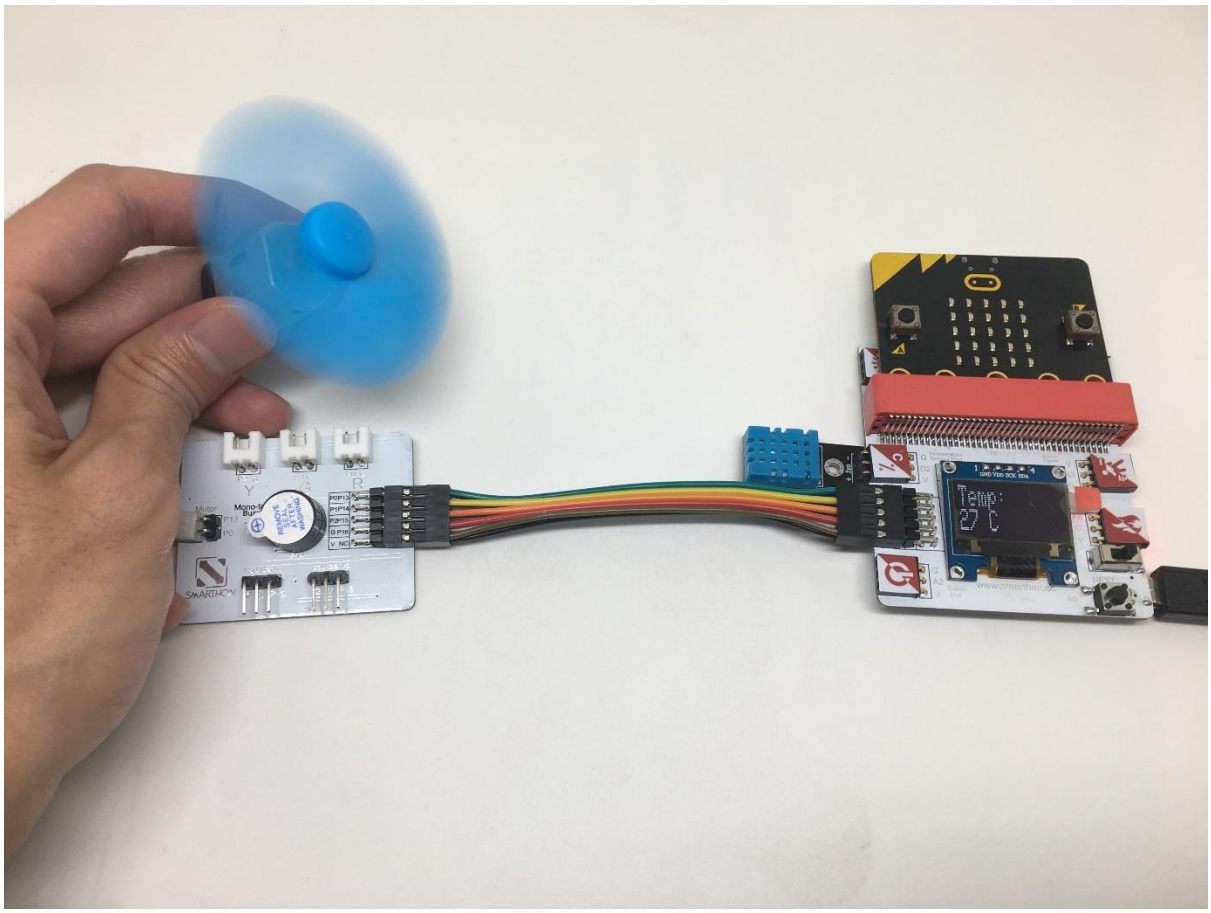
## Step:

1. Basic (Add block ***on start***) > House (Add block ***Initialize Smarthon multiple-sensor***)
2. Basic (Add block ***forever***) > Logic (Add block ***if…then…else,*** add 1 more ***if…then…else***) > For 1st ***if***: Logic (Add block ***0 = 0***, change ***"0"*** to House ***"Get temperature(°C)"***; ***"="*** to ***">"***; ***"0"*** to ***"26"***) > For ***then***: House-More (Add block ***Set Motor fan clockwisely to intensity 0***, change ***"0"*** to ***"600"***)
3. For ***else if***: Logic (Add block ***0 = 0***, change ***"0"*** to House ***"Get temperature(°C)"***; ***"="*** to ***">"***; ***"0"*** to ***"30"***) > For ***then***: House-More (Add block ***Set Motor fan anti-clockwisely to intensity 0***, change ***"0"*** to ***"1023"***)
4. For ***else:*** House-More (Add block ***Set Motor fan clockwisely to intensity 0***)



**Hardware:**

5. Connect the **Temperature/Humidity sensor** to Temperature Sensor port of Multiple Sensors
6. **Download** the code and transfer to micro:bit
7. Plug the micro:bit into Multiple Sensors
8. Connect Multiple Sensors and Multiple Actuators by connecting wire
9. Connect the Motor fan to Motor port of the Multiple Actuators
10. Conduct the test to see if the motor fan can be turn on > 26°C




- Can you think of other possible combination for turning on the motor fan? Try to do it.

# Project 8: Fire Alarm

Level: ★ ★ ☆ ☆ ☆

Part List:

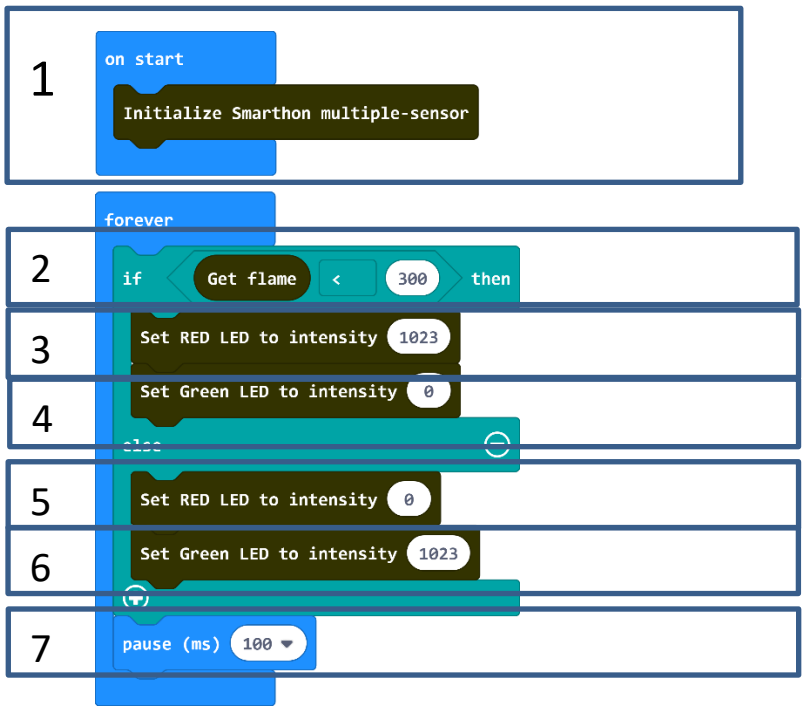
1. Flame sensor x 1
2. Red LED X1
3. Green LED X1
4. Multiple Sensors for smart house X1
5. Multiple Actuators for smart house X1
6. Connecting Wire X1
7. micro:bit X1
8. USB Cable X1

**Description:**

In project 8, you can learn how to use micro:bit to make Alert LED (Red/Green). If the flame is detected, the Red LED will be turned on, the Green LED will be turned off. If there is no flame, Green LED is turned on and Red LED will be turned off.

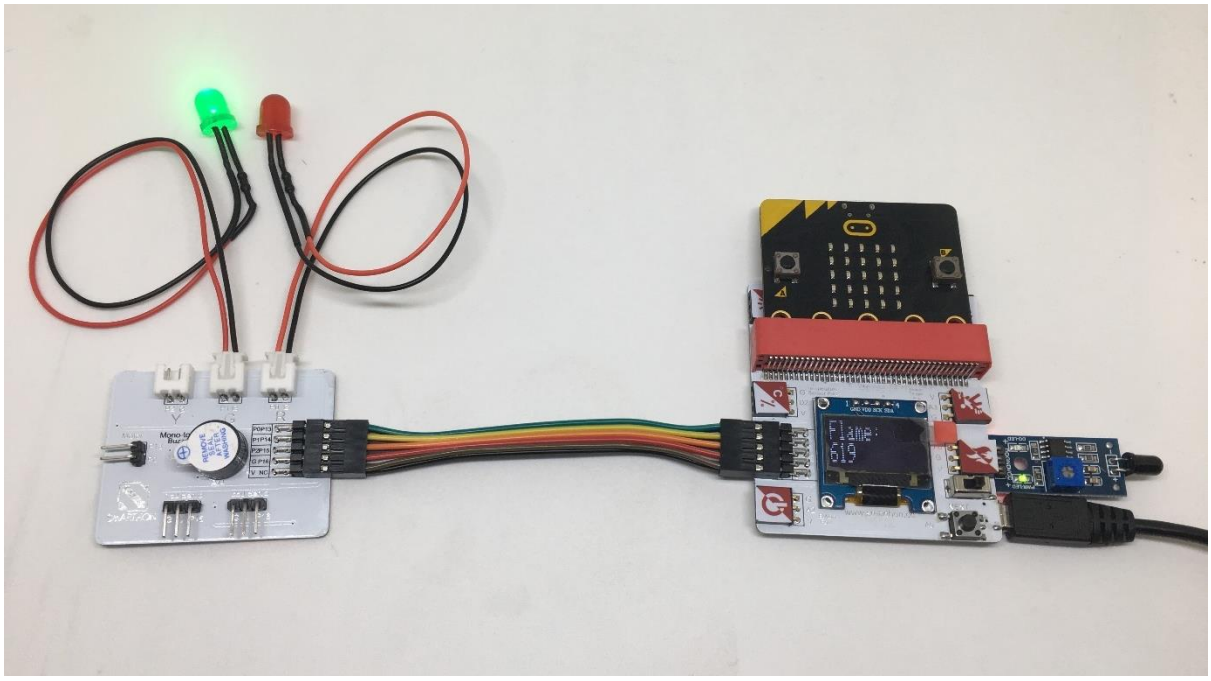
**Steps:**

1. Basic (Add block ***on start***) > House (Add block ***Initialize Smarthon multiple-sensor***)
2. Basic (Add block ***forever***) > Logic (Add block ***if…then…else***) > For ***if***: Logic (Add block ***0 = 0***, change ***"0"*** to House ***"Get flame"***; ***"="*** to ***"<"***; ***"0"*** to ***"300"***)
3. For ***then***: House (Add block ***Set RED LED to intensity 0, change 0 to 1023***)
4. For ***then***: House (Add block ***Set Green LED to intensity 0***)
5. For ***else***: House (Add block ***Set RED LED to intensity 0***)
6. For ***else***: House (Add block ***Set GREEN LED to intensity 0, change 0 to 1023***)
7. Basic (Add block ***pause (ms) 100***)




**Hardware:**

8. **Download** the code and transfer to micro:bit
9. Plug the micro:bit into Multiple Sensors
10. Connect Multiple Sensors and Multiple Actuators by connecting wire
11. Connect the RED LED and GREEN LED module to the corresponding port of the Multiple Actuators
12. You can test it by lighter



- Try to make some blinking of the RED LED and buzzer turned on if there is a fire.

# Project 9: Kitchen Safety

Level: ★ ★ ★ ☆ ☆

Part List:

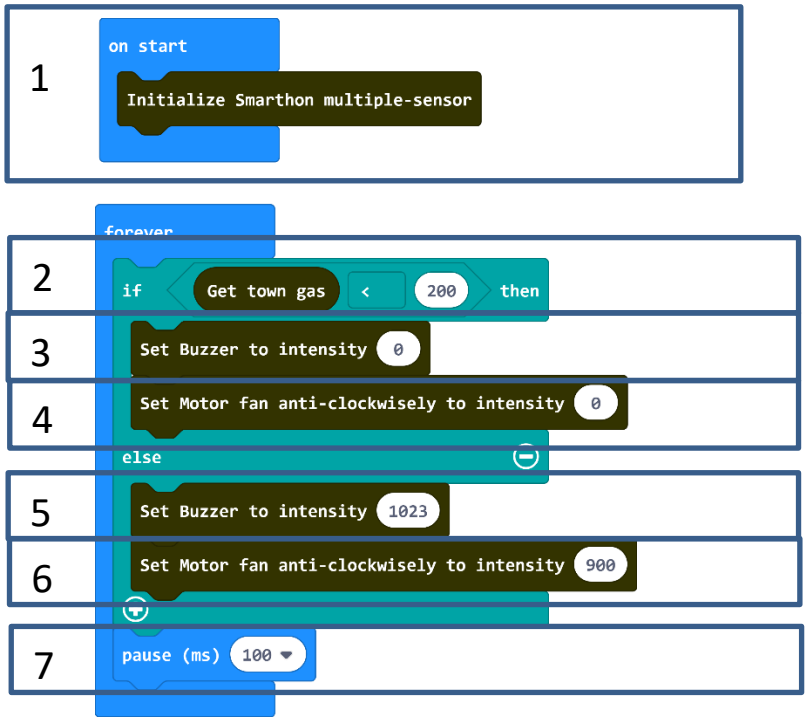
1. Town gas sensor x 1
2. Mono-tone buzzer X1 (placed on Multiple Actuators for smart house)
3. Motor fan x 1
4. Multiple Sensors for smart house X1
5. Multiple Actuators for smart house X1
6. Connecting Wire X1
7. micro:bit X1
8. USB Cable X1

**Description:**

In project 9, you can learn how to use micro:bit to make Kitchen safety system. If the town gas leakage happened, the buzzer and motor fan will be turned on.

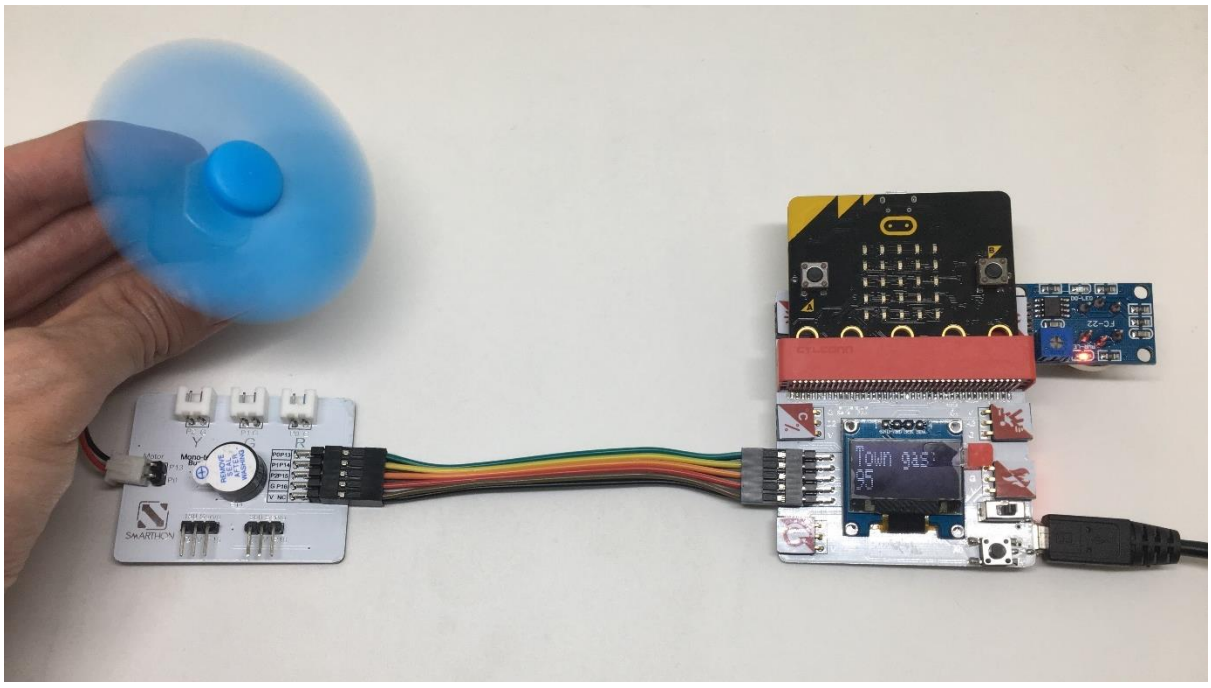
**Steps:**

1. Basic (Add block ***on start***) > House (Add block ***Initialize Smarthon multiple-sensor***)
2. Basic (Add block ***forever***) > Logic (Add block ***if…then…else***) > For ***if***: Logic (Add block ***0 = 0***, change ***"0"*** to House ***"Get town gas"***; ***"="*** to ***"<"***; ***"0"*** to ***"200"***)
3. For ***then***: House (Add block ***Set Buzzer to intensity 0***)
4. For ***then***: House (Add block ***Set Motor fan anti-clockwisely to intensity 0***)
5. For ***else***: House (Add block ***Set Buzzer to intensity 0, change 0 to 1023***)
6. For ***else***: House (Add block ***Set Motor fan anti-clockwisely to intensity 0, change 0 to 900***)
7. Basic (Add block ***pause (ms) 100***)




**Hardware:**

8. **Download** the code and transfer to micro:bit
9. Plug the micro:bit into Multiple Sensors
10. Connect Multiple Sensors and Multiple Actuators by connecting wire
11. Connect the Motor Fan module to motor port of the Multiple Actuators and install it in the kitchen
12. You can test it by lighter



- Try to adjust different speed of the motor fan.

# Project 10: Remote control on the curtain

Level: ★ ★ ★ ★ ★

Part List:

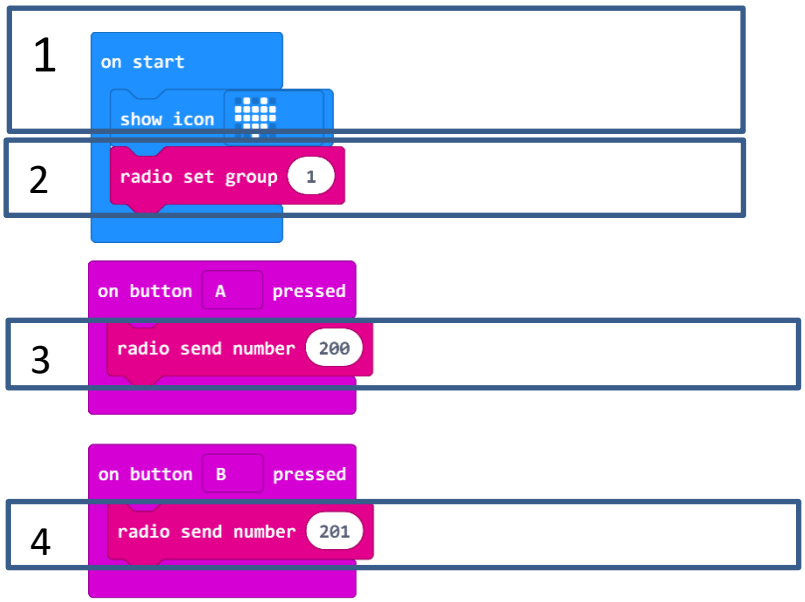
1. 360° servo X1
2. Multiple Sensors for smart house X1
3. Multiple Actuators for smart house X1
4. Connecting Wire X1
5. micro:bit X2
6. USB Cable X2

**Description:**

In project 10, you will need 2 microbit. One is sender (controller). Another is the receiver (curtain machine). You can learn how to use micro:bit to remote control SMARTHON main board with curtain (360 servo) up and down.

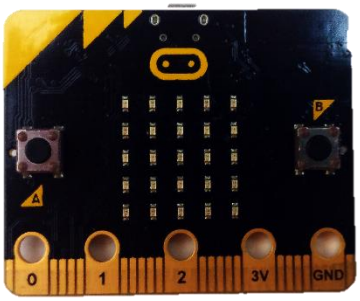
**Sender Steps:**

1. Basic (Add block ***on start***) > Basic (Add block ***show icon - heart***)
2. Basic (Add block ***on start***) > (Add block radio set group 0, ***change 0 to 1***)
3. Input (Add block ***on button A is pressed***) > Radio (Add block ***radio send number*** 0, ***change 0 to 200***)
4. Input (Add block ***on button A is pressed*** > change **"A"** into **"B"** ) > Radio (Add block ***radio send number*** 0, ***change 0 to 201***)



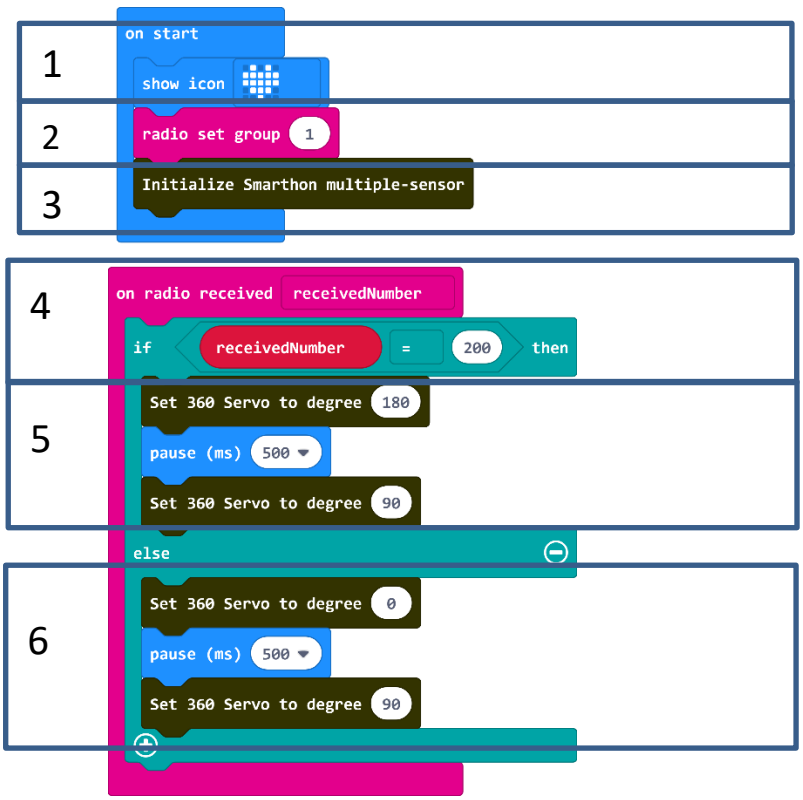
**Hardware:**

5. **Download** the code and transfer to micro:bit
6. Connect USB with micro:bit
7. Send the signal with button A/B pressed



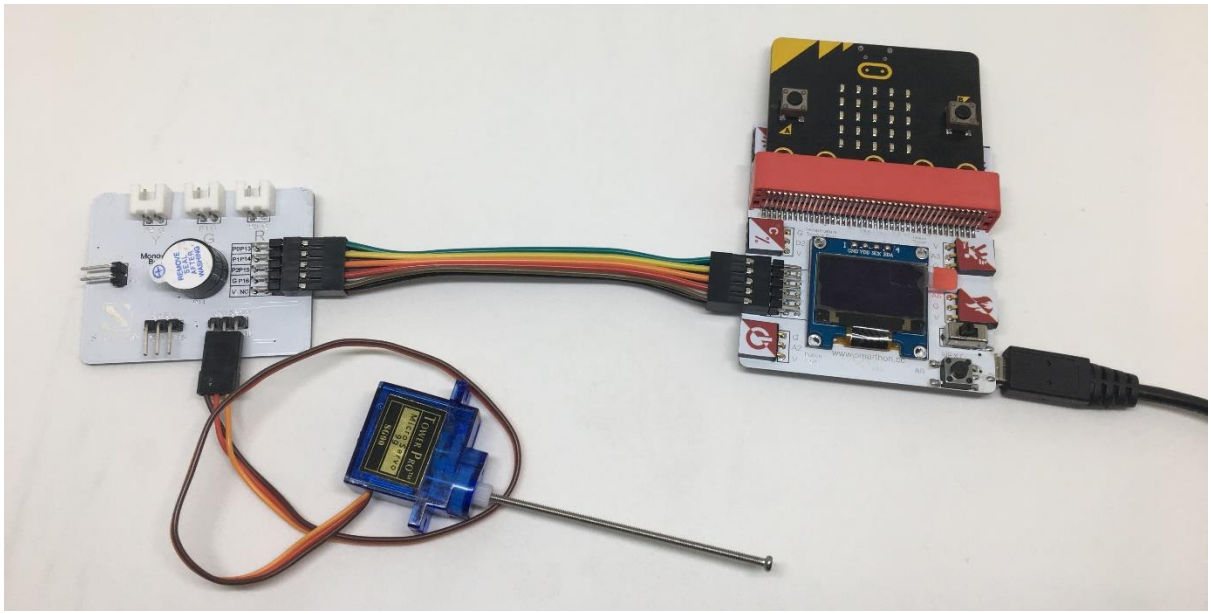

**Receiver Steps:**

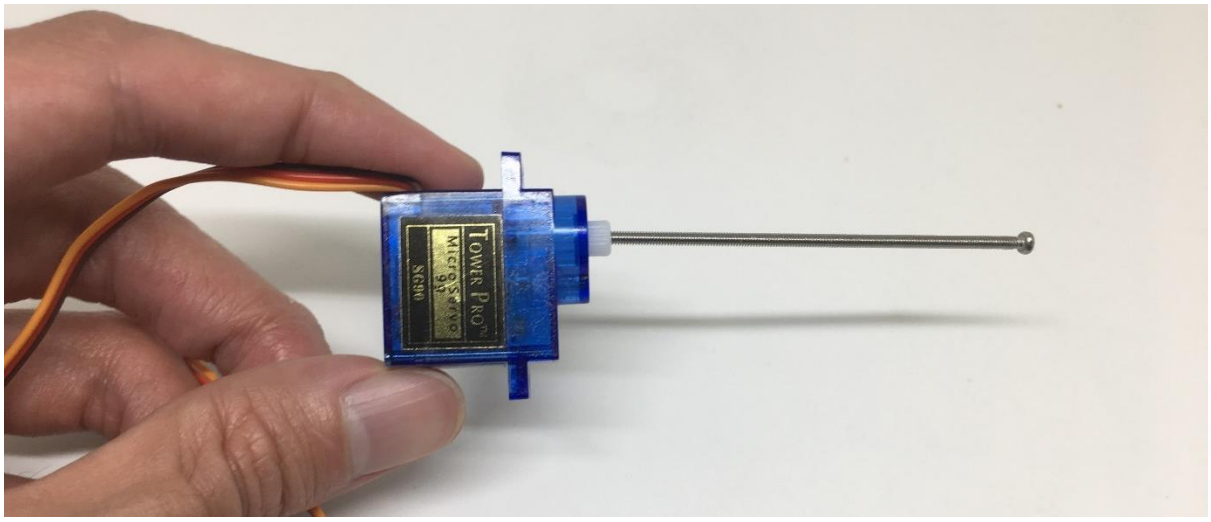
1. Basic (Add block ***on start***) > Basic (Add block ***show icon - heart***)
2. Basic (Add block ***on start***) > (Add block radio set group 0, ***change 0 to 1***)
3. Basic (Add block ***on start***) > House (Add block ***Initialize Smarthon multiple-sensor***)
4. Radio (Add block ***on radio received receivedNumber***) > Logic (Add block ***if…then…else***) > For ***if***: Logic (Add block ***0 = 0***, change ***"0"*** to Variables ***"receivedNumber"***; ***"0"*** to ***"200"***)
5. For ***then***: House (Add block ***Set 360 servo to degree 0, change 0 to 180***); Basic (Add block ***pause (ms) 100***, ***change "100" to "500"***); House (Add block ***Set 360 servo to degree 0, change 0 to 90***)
6. For ***else***: House (Add block ***Set 360 servo to degree 0***); Basic (Add block ***pause (ms) 100***, ***change "100" to "500"***); House (Add block ***Set 360 servo to degree 0, change 0 to 90***)Basic (Add block ***pause (ms) 100***)



**Hardware:**

7. **Download** the code and transfer to micro:bit
8. Plug the micro:bit into Multiple Sensors
9. Connect Multiple Sensors and Multiple Actuators by connecting wire
10. Connect 360° servo module to 360 servo port of the Multiple Actuators






- Let's put on the hardware into the house model.

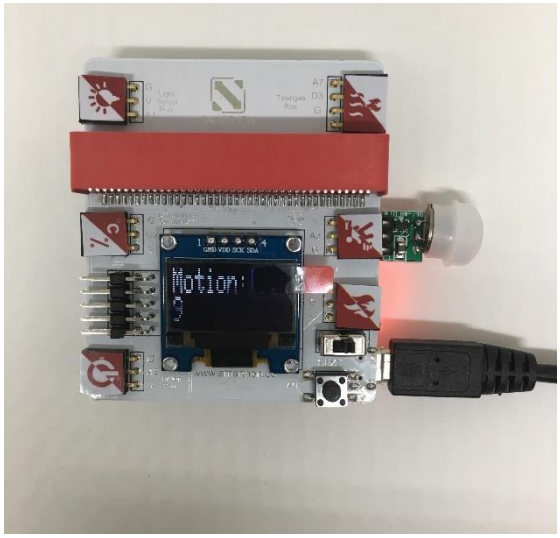
# Appendix I:

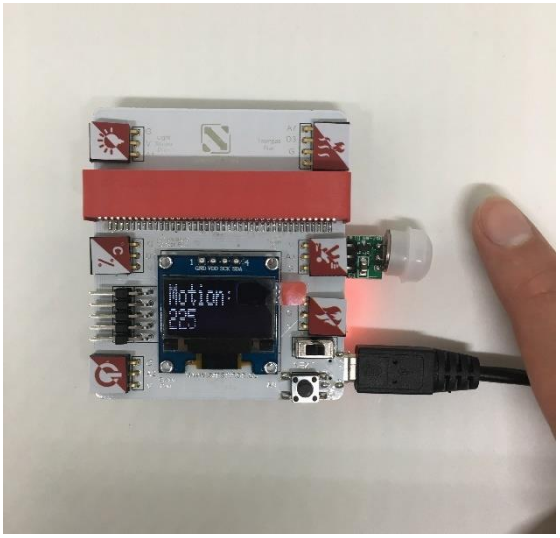
## Reading Sensors Answer:

Temperature & Humidity:

Please feel free to write down the value of the current condition.

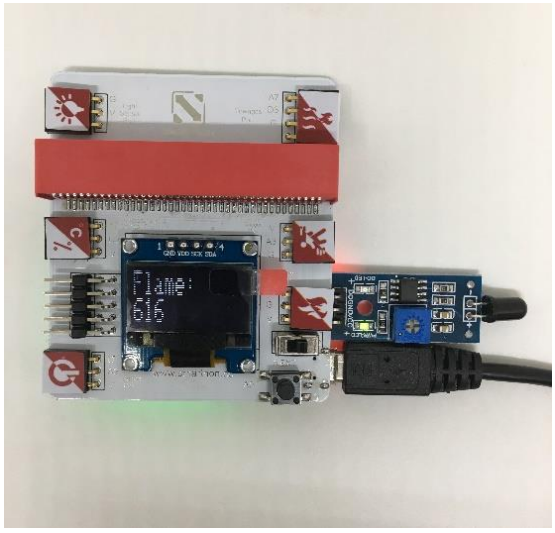
Motion Sensor:

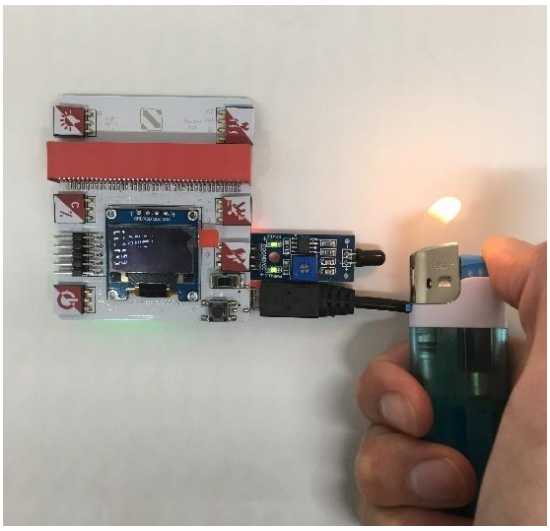



If this sensor detects any movements, the value of the motion sensor will increase from 0 to 200, as shown in the picture.

Flame Sensor:

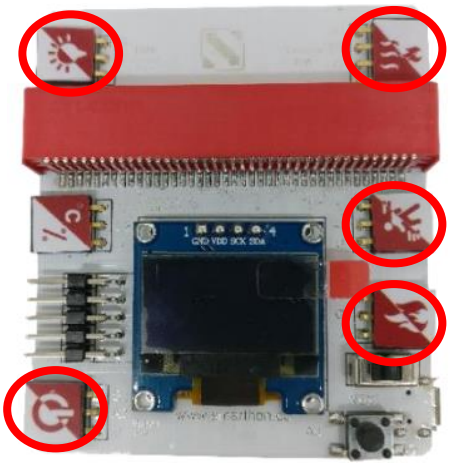


If there is a fire, the number of the flame sensor will decrease from 600 to 30.

# Maker: Control other actuators and sensors

1. Connect to more other sensors (Input)!



2. Connect to more other actuators (Output)!