

Microbit Robotics Beginner Level 1

Lesson 3

Build a Table Lamp & Button Programming

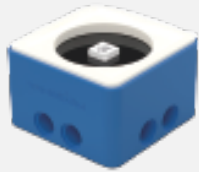
Presented by Advanced Superlogic Team

Review previous lesson



This world of module programmable robot kit includes 1 professional sensor expansion board, 2 building block servos, 10 electronic sensor modules and 300+ building block parts

Electronic Modules



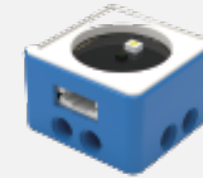
RGB Light Module



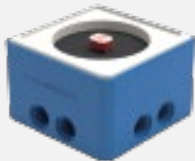
Button Module



Rocker Module



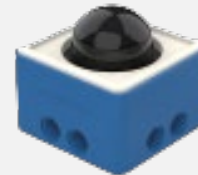
Color Recognition Module



Photosensitive Module



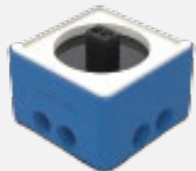
Temperature
Humidity Module



Human body
Infrared Module



Ultrasonic Module



Infrared Module

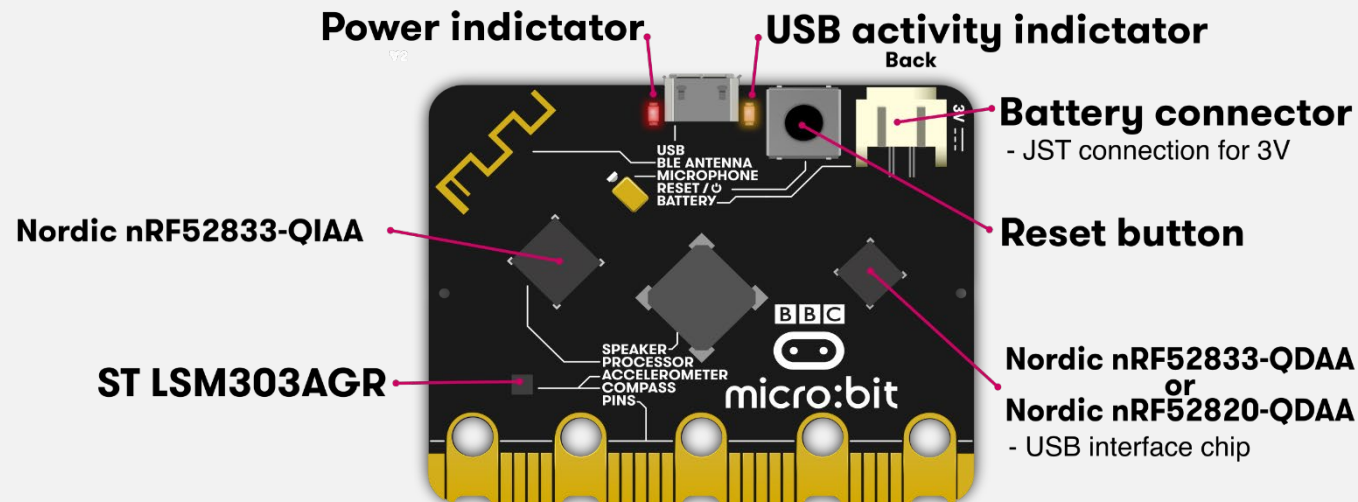
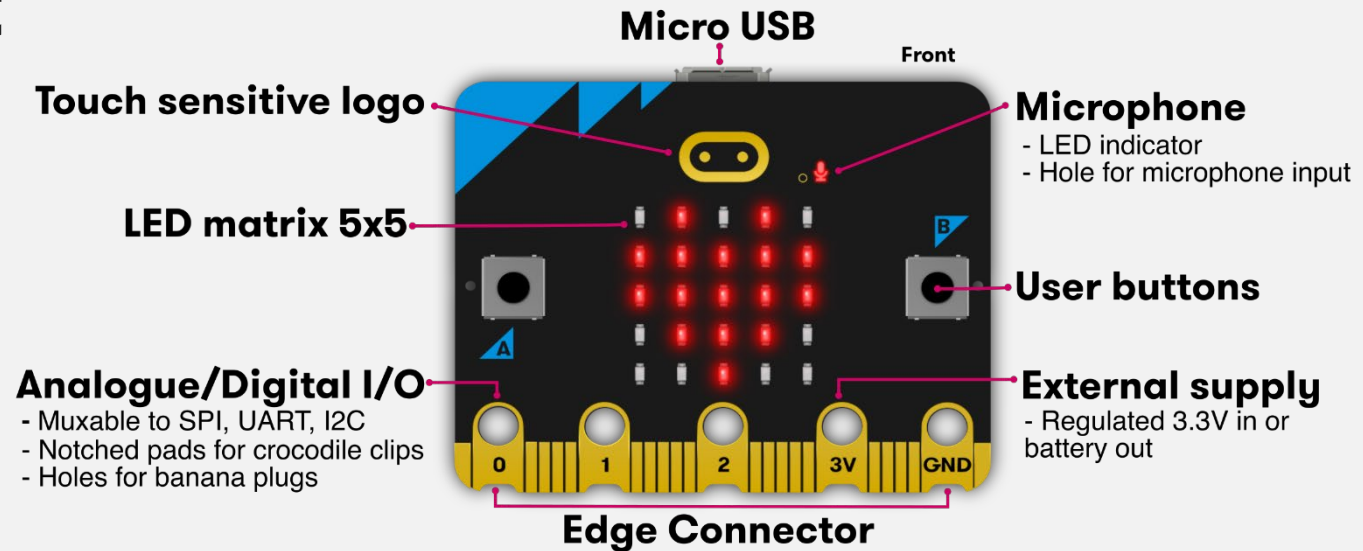


Digital Tube Module

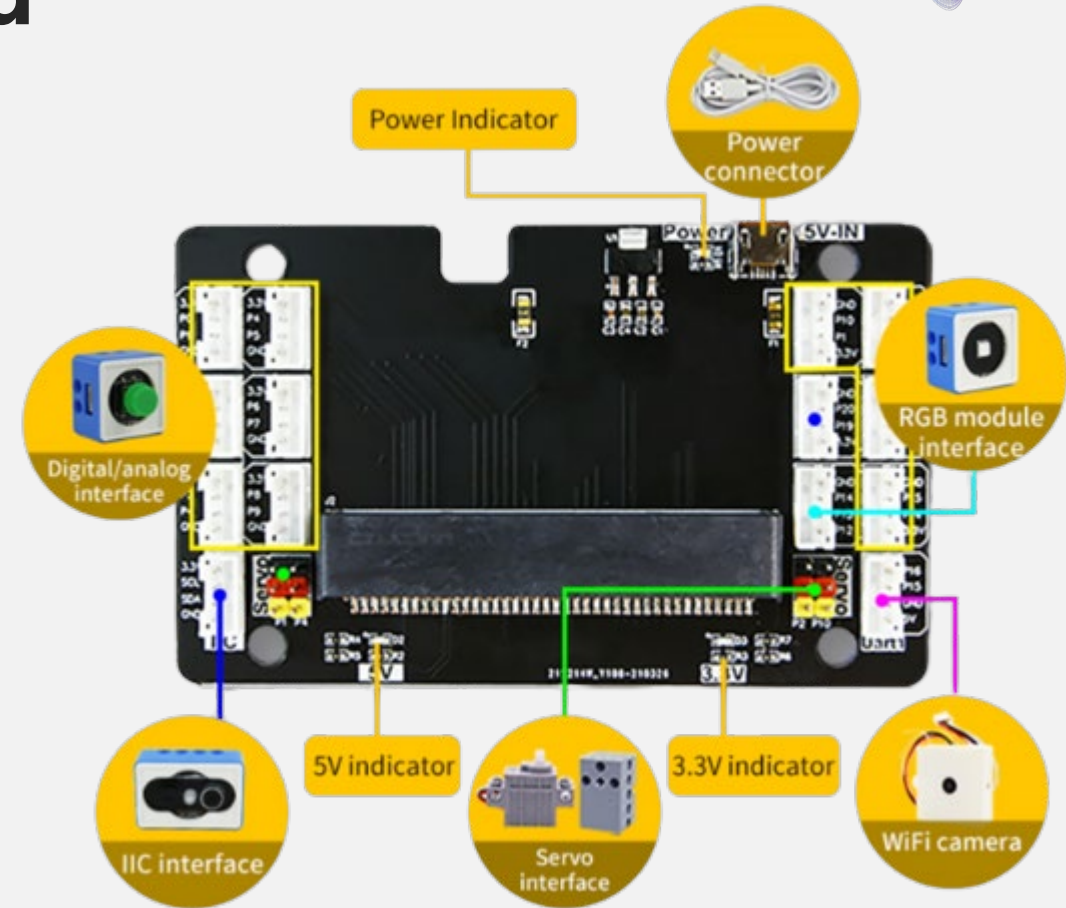
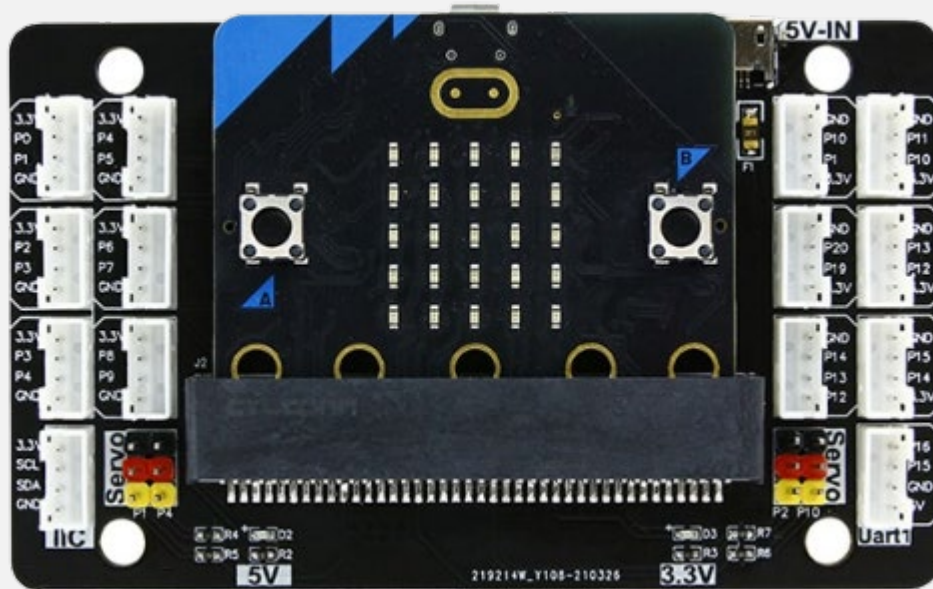


Servo

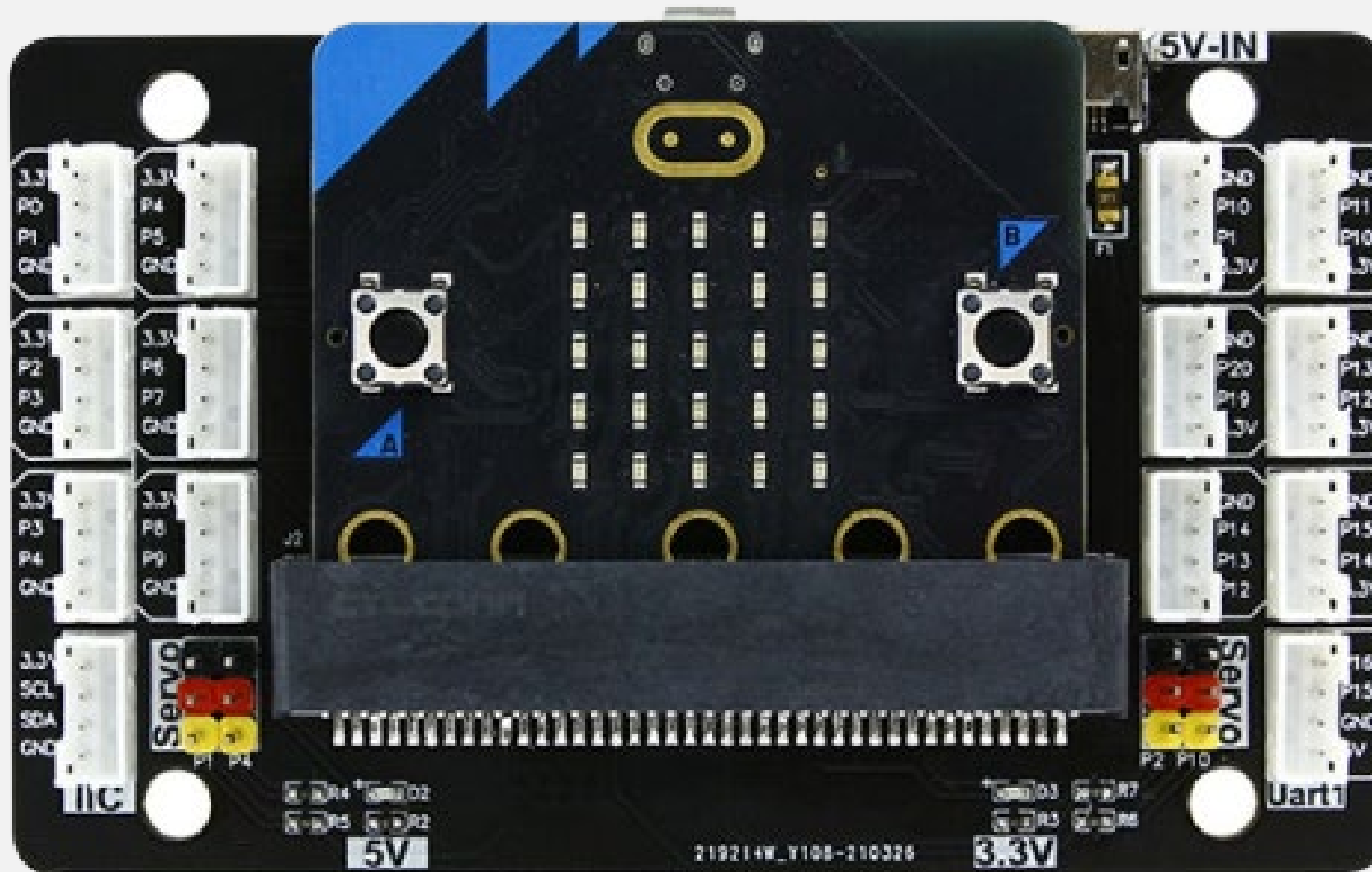
Micro:bit



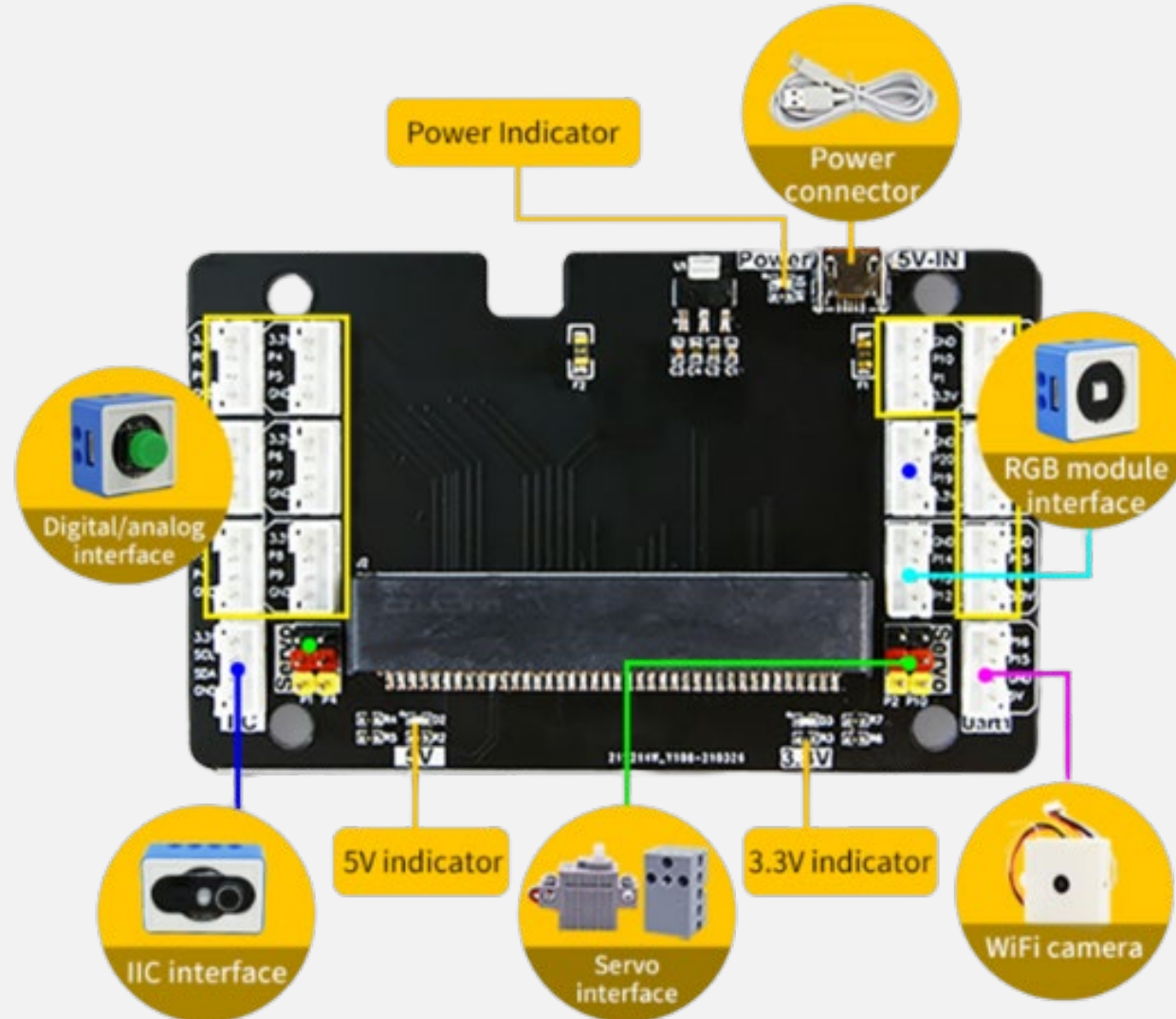
Micro:bit Expansion Board



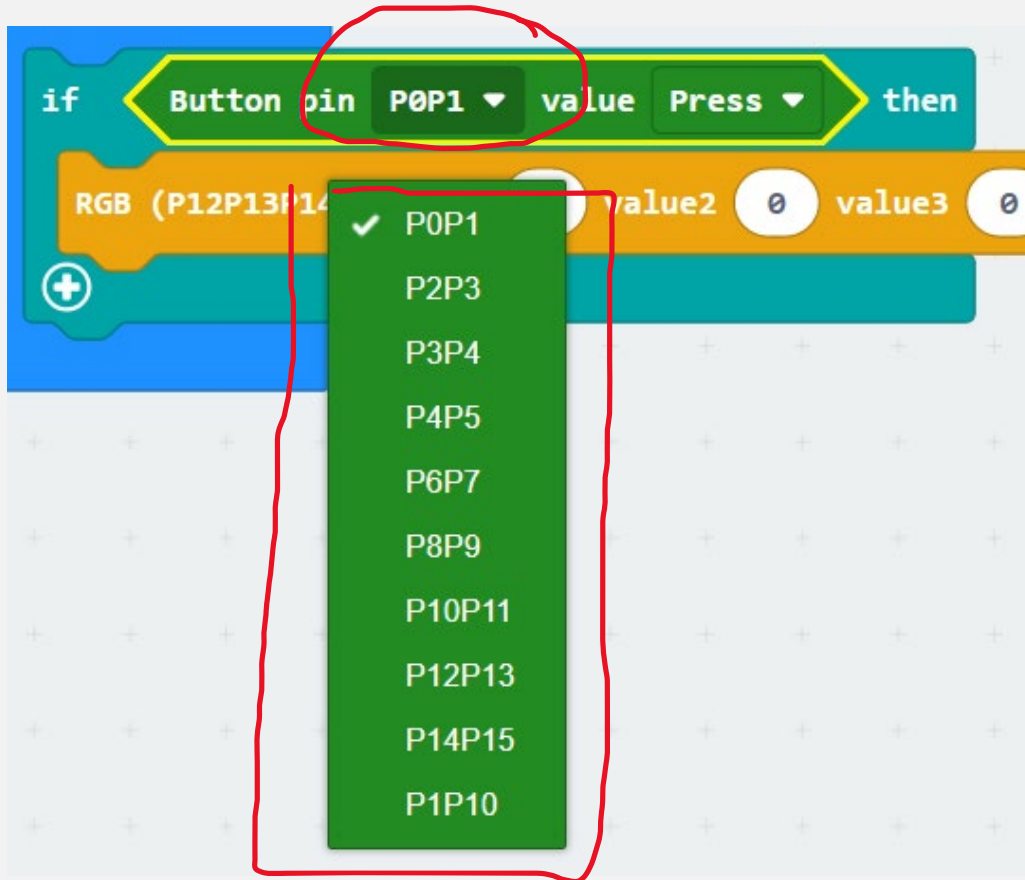
Micro:bit Expansion Board



Micro:bit Expansion Board

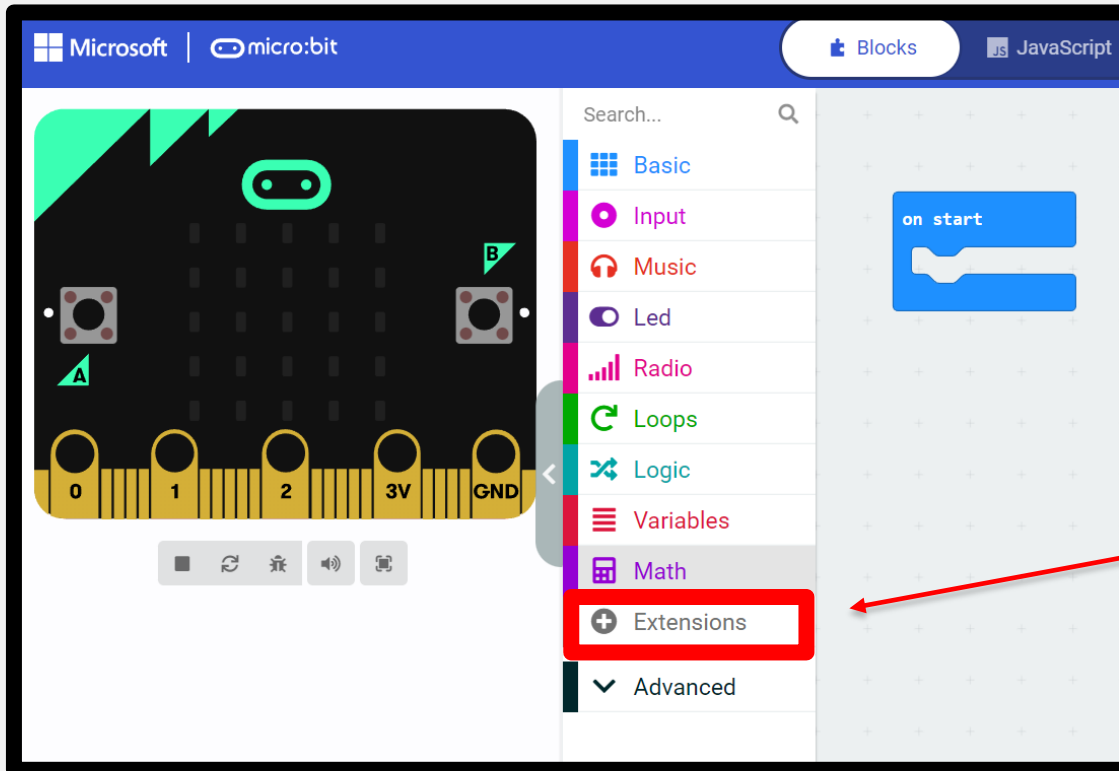


Micro:bit Expansion Board



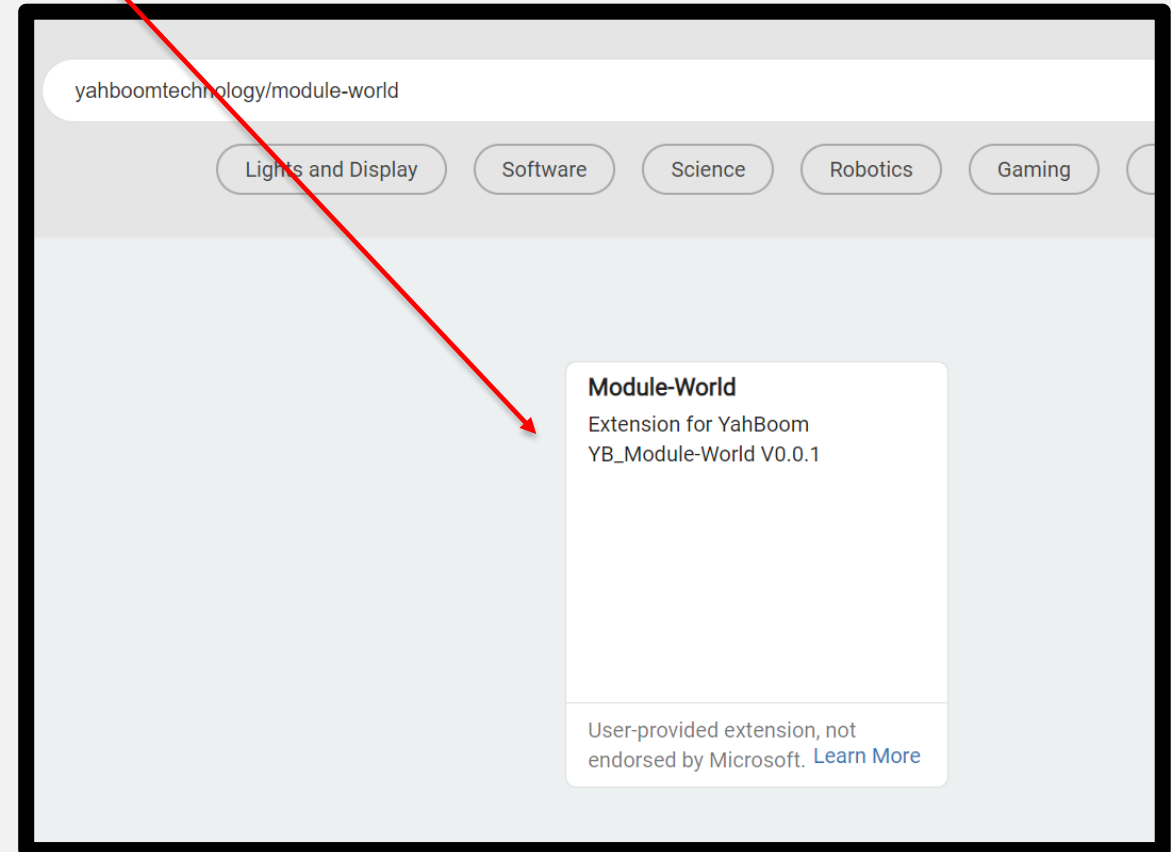
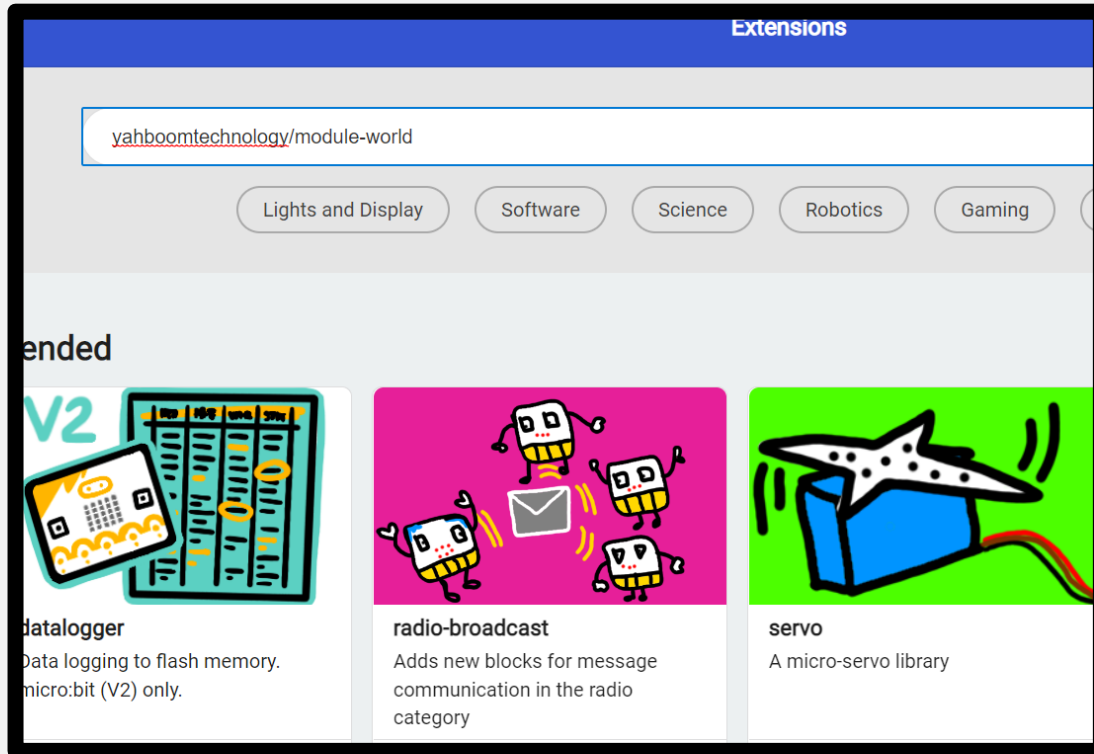
If you want to know which pin is suitable for which sensor, you can go to your code and check from drop down list, if the pin can be selected from the drop-down list, you can plug the sensor into that port.

Firstly, to program the Micro:bit with the expansion board, we need to **add** extension

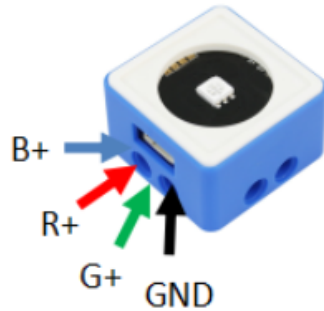


Click “Extensions”

Search and **click** the extension appeared

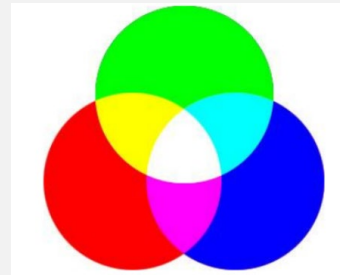


RGB Module



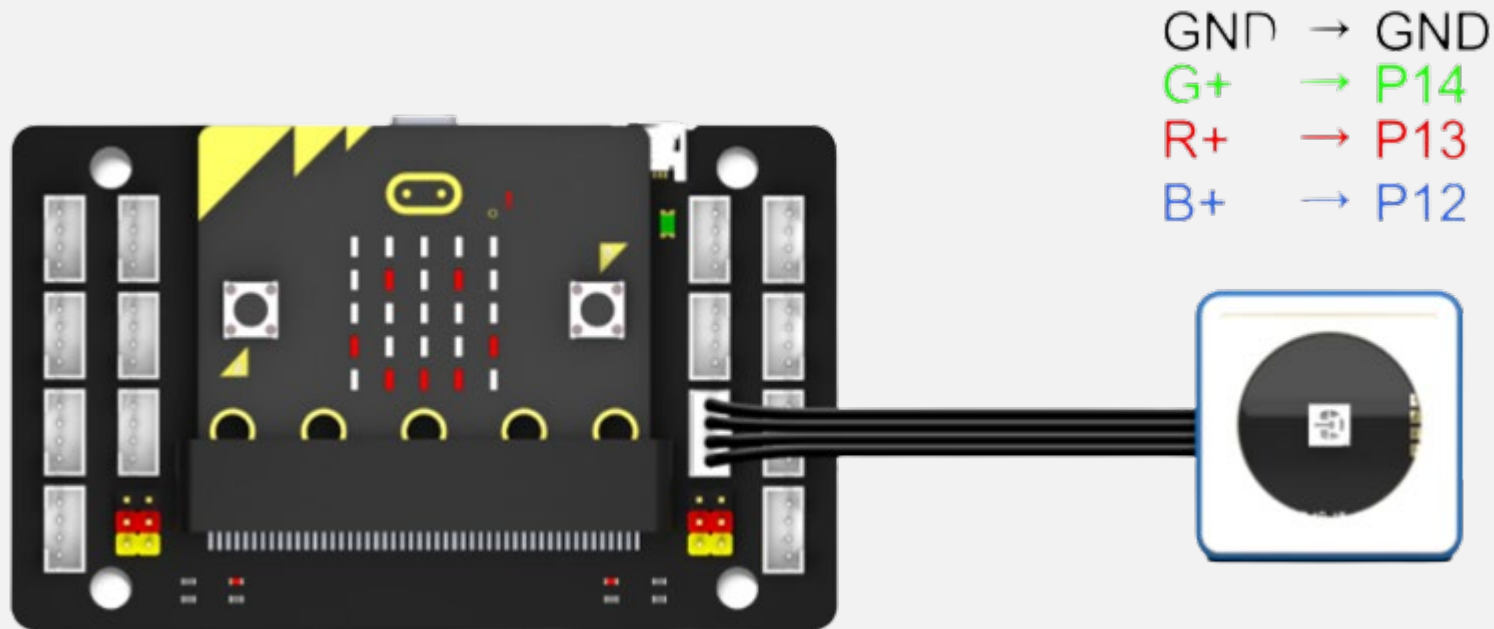
RGB: Three primary colors	GND: connect <u>gnd</u>
R+: Control the brightness of red	Working Voltage: 3.3V/5V
B+: Control the brightness of blue	Rated power: 0.2W
G+: Control the brightness of green	Size of module: 29.4mm*28.8mm

The brightness of each of the three **red**, **green**, and **blue** lights is adjustable



You can also call up **different colors** based on the RGB values assigned to different brightness.

Light up RGB



1. **Connect** RGB to expansion board

2. Combine blocks

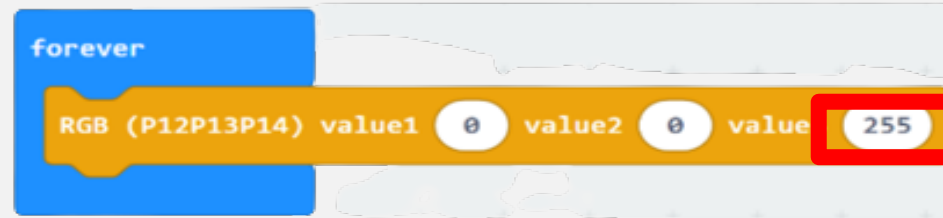
The image illustrates the process of combining blocks in the Advanced Superlogic software. On the left, the 'ModuleWorld_PWM' block is selected from the sidebar. In the main workspace, two yellow blocks are shown: 'RGB (P12P13P14) value1 0 value2 0 value3 0' and 'RGB (P12P13P14) value OFF'. A red arrow points from the workspace to a 'forever' loop block, which now contains the first yellow block with 'value1' set to 255.

3. Changing the corresponding value will display different colour

Green Light:



Blue Light:



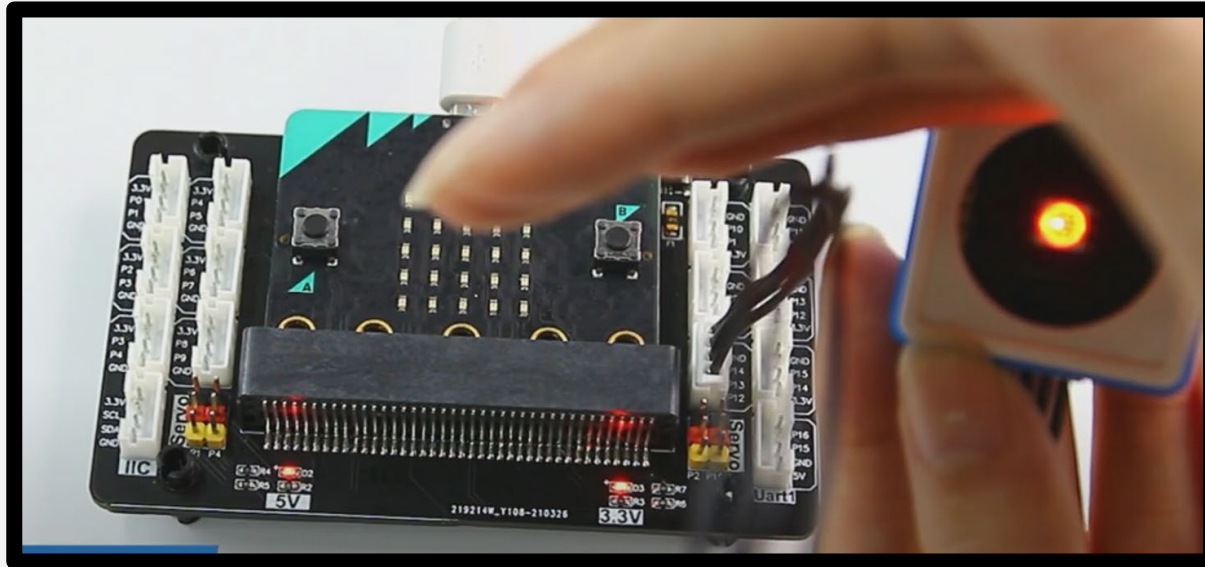
White Light:



Close RGB Light:

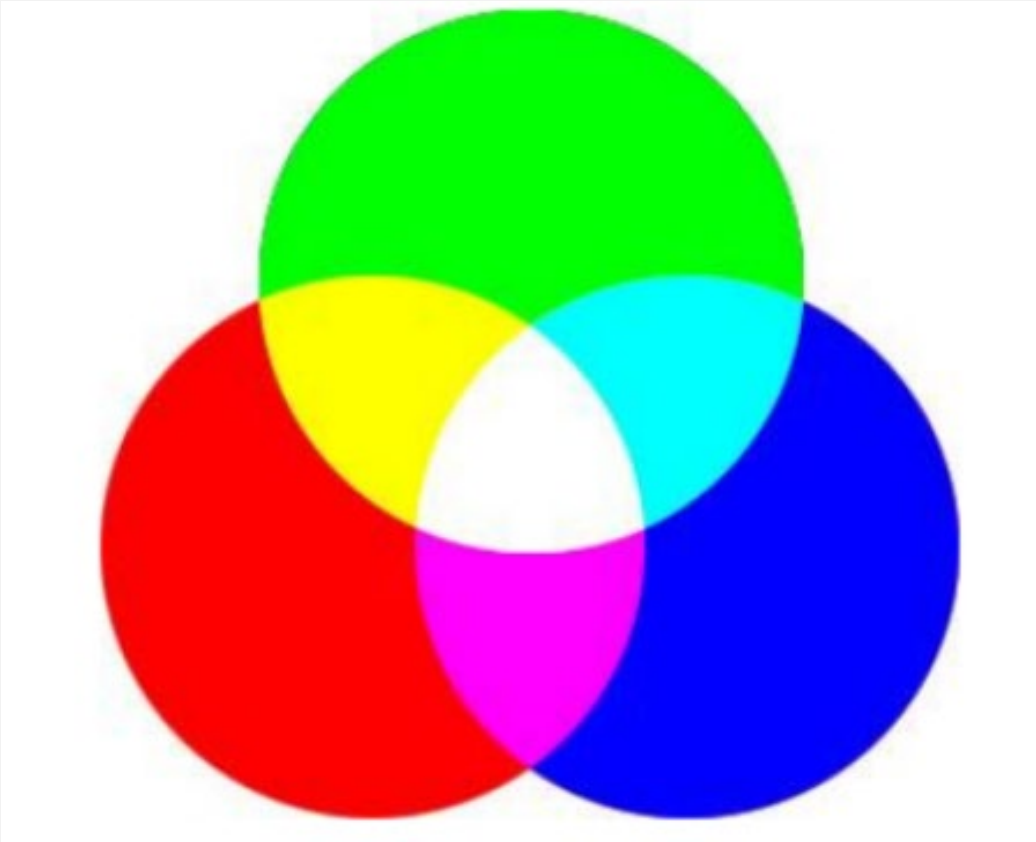


4. Light appeared



After the program is downloaded successfully, RGB light become red.

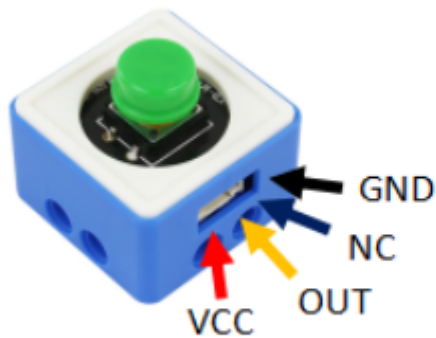
Challenge 1: Different Color



Can you program the light to display different colors like below:

1. Yellow
2. Cyan
3. Magenta

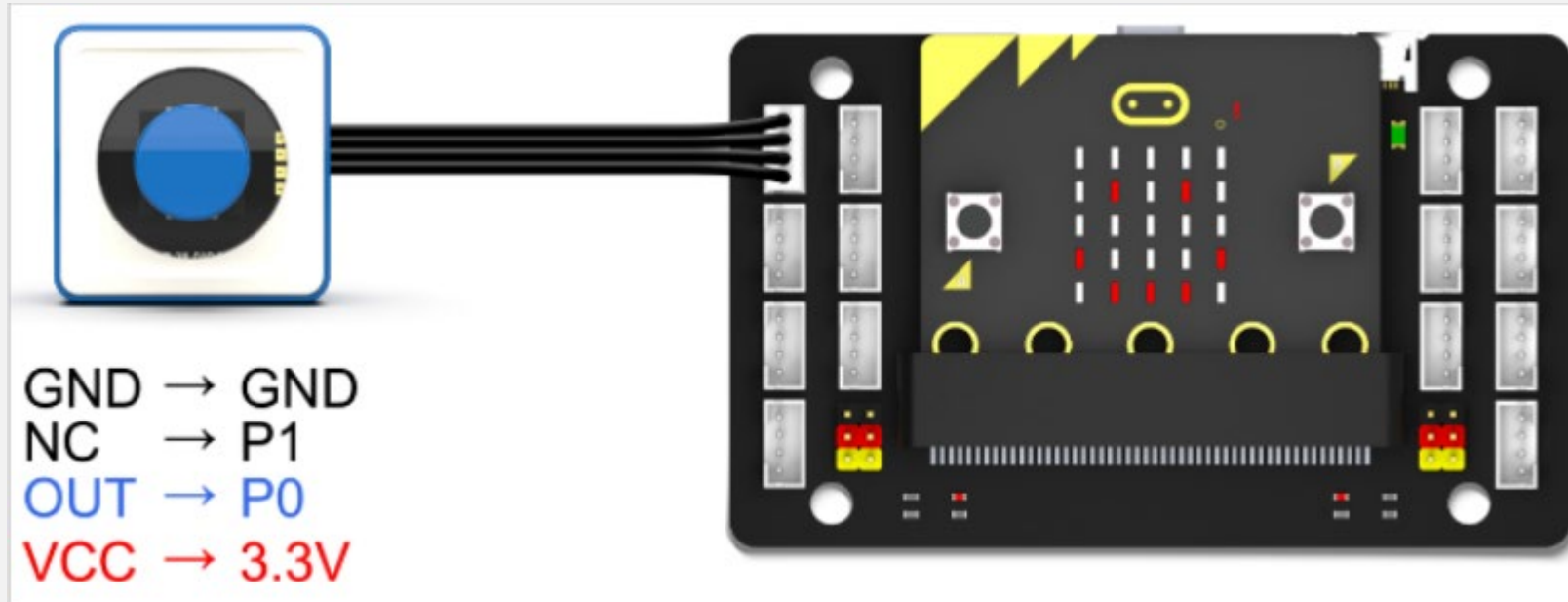
Button Module



NC: no need connect	VCC: connect 3.3V or 5V
GND: connect GND	OUT: press the key to output low level, release the output high level
Working Voltage: 3V/5V	Size of module:29.4mm*28.8mm

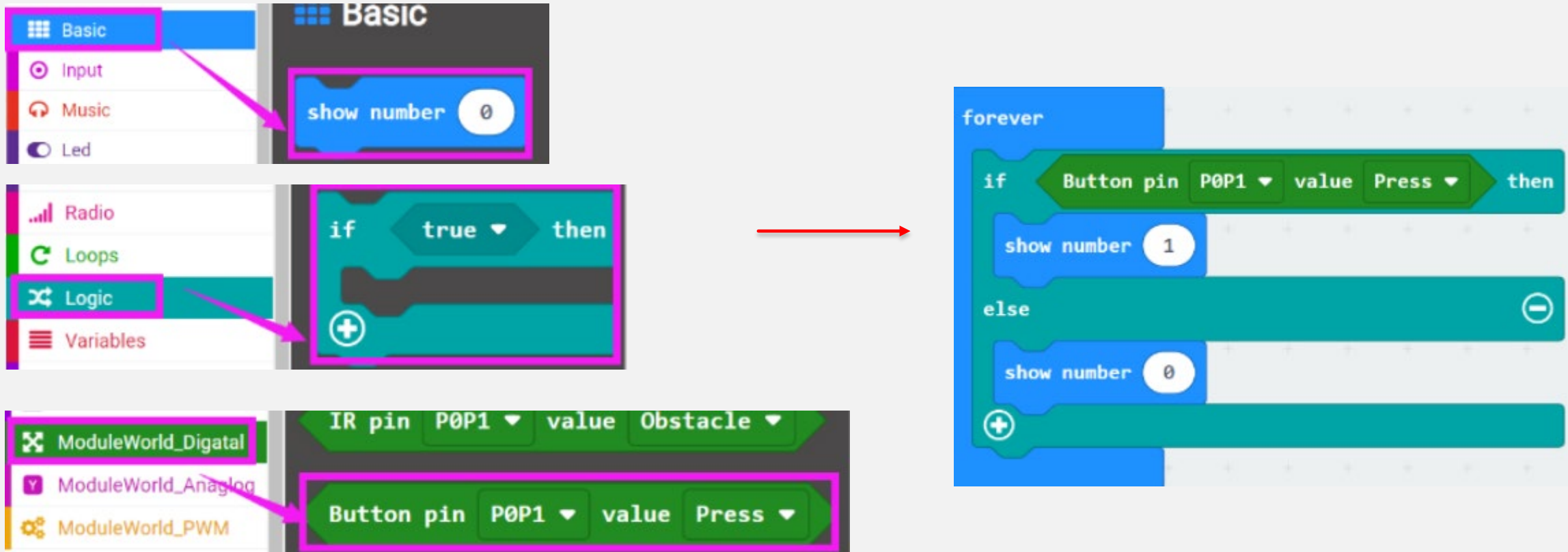
This button module is a **self-resetting** button

Button Detection



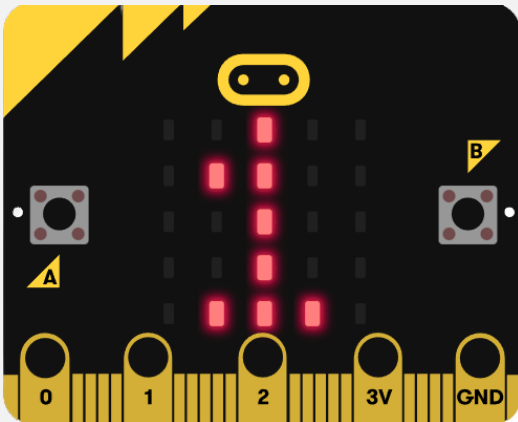
1. **Connect** Button to expansion board

2. Combine Blocks

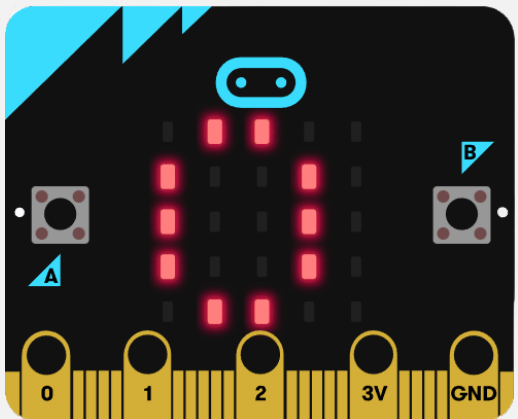


3. Number displayed

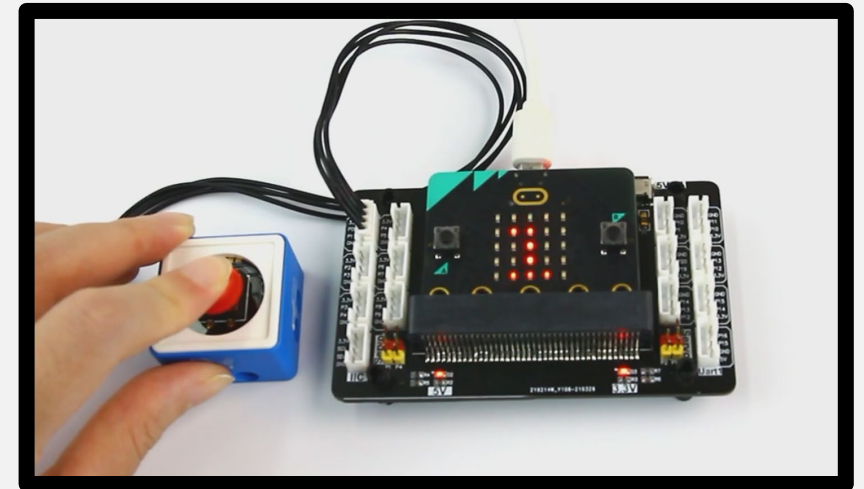
After the program is downloaded successfully,



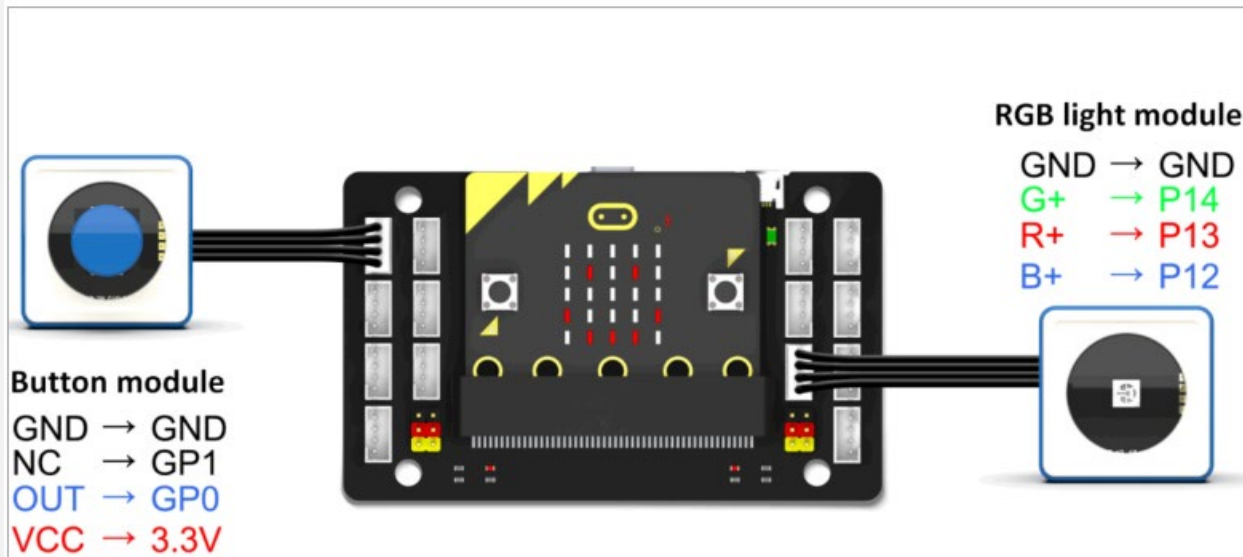
When we press button, Micro:bit dot matrix will **display 1**.



Otherwise, Micro:bit dot matrix will **display 0**.



Challenge 2: Button control light

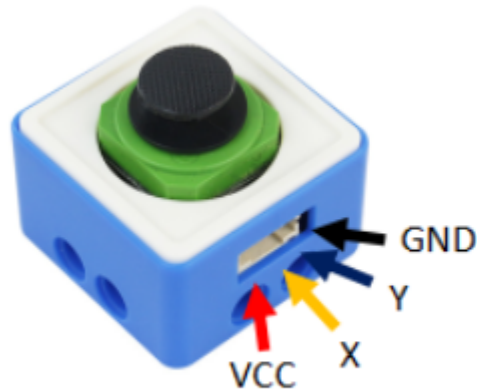


Connect your RGB light module to the expansion board to P14, P13, P12.

Try to program:

When the button is pressed, the RGB light module will light up.

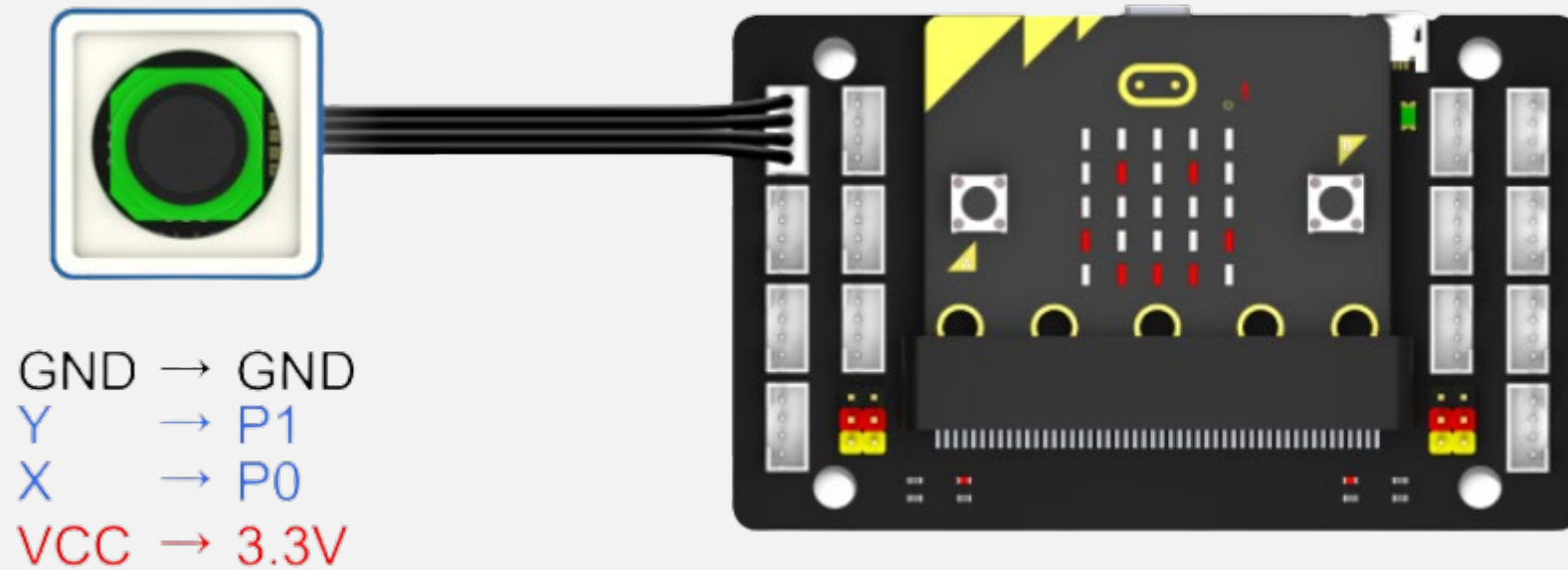
Rocker Module



GND:connect GND	VCC: connect 3.3V or 5V
X: Output coordinate analog value in X axis direction	Y: Output coordinate analog value in Y axis direction
Working Voltage: 3.3V/5V	Size of module: 29.4mm*28.8mm

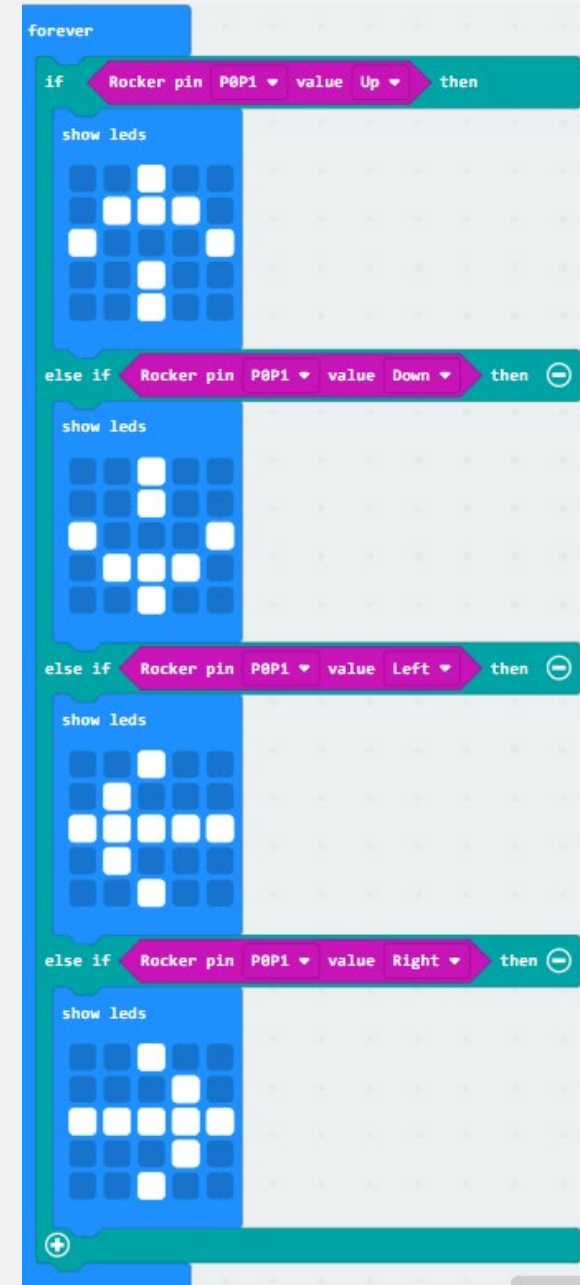
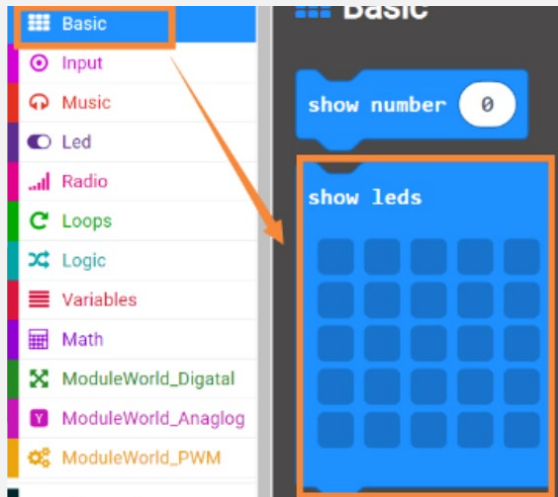
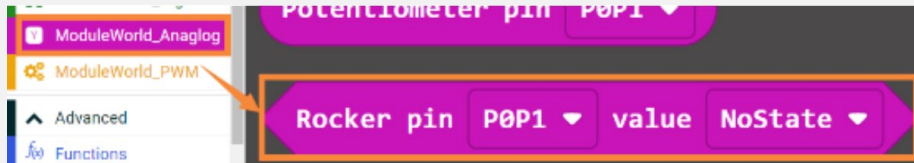
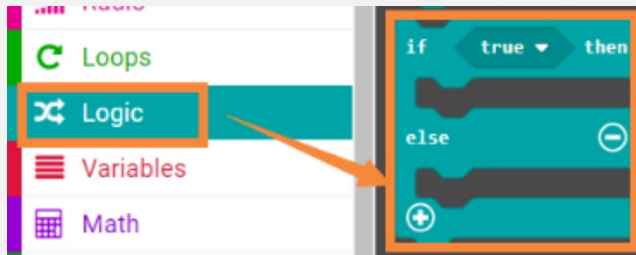
Rocker module can be regarded as a potentiometer with two channels, which can output the **X-axis and **Y-axis** analog values.**

Control rocker



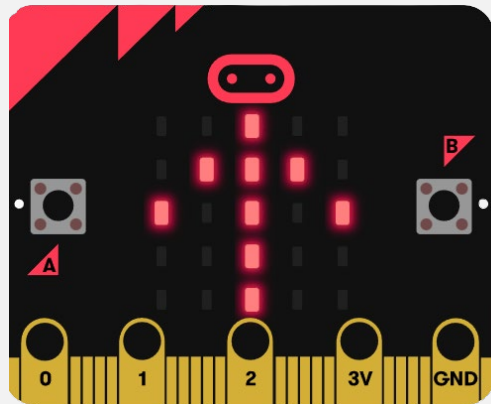
1. **Connect** Rocker to expansion board

2. Combine Blocks

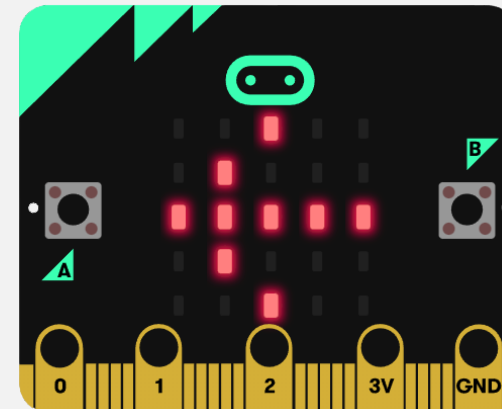


3. LED displayed

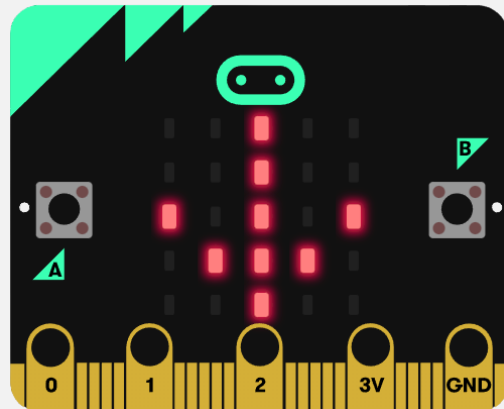
After the program is downloaded successfully,



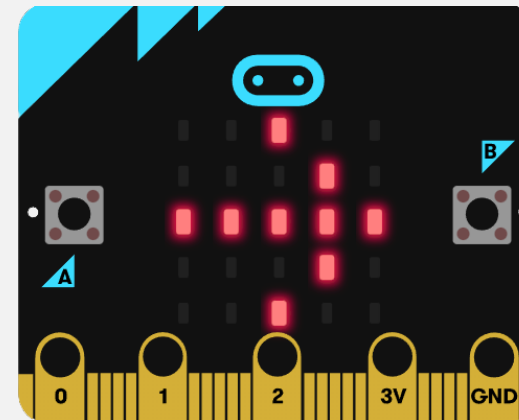
Joystick when
pushed up



Joystick when
pushed to the
left

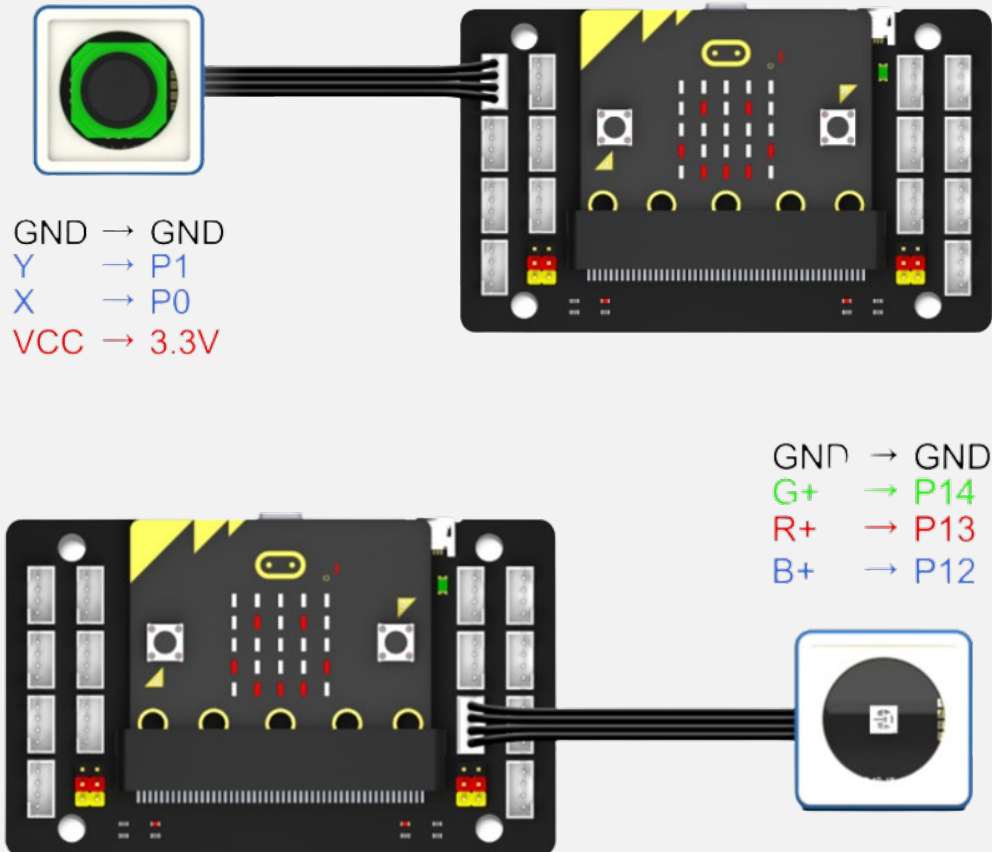


Joystick when
pushed down



Joystick when
pushed to the
right

Challenge 3: Control different colour with Rocker



Challenge:

Connect your RGB light module to the expansion board.

Program as follows:

- 1. Joystick Left → Red**
- 2. Joystick Right → Green**
- 3. Joystick Up → Blue**
- 4. Joystick Down → White**

Do a quick self-check of your last week lesson...

- 1. How many modules do we have in our Microbit WOM box?**
- 2. Which of the modules are outputs and which are inputs?**
- 3. Can we connect RGB light sensor to P1 and P0 port?**
- 4. Can I connect multiple modules on expansion board at the same time?**
- 5. “The button module is a self-resetting button”, what does this statement mean?**

Today's Topic

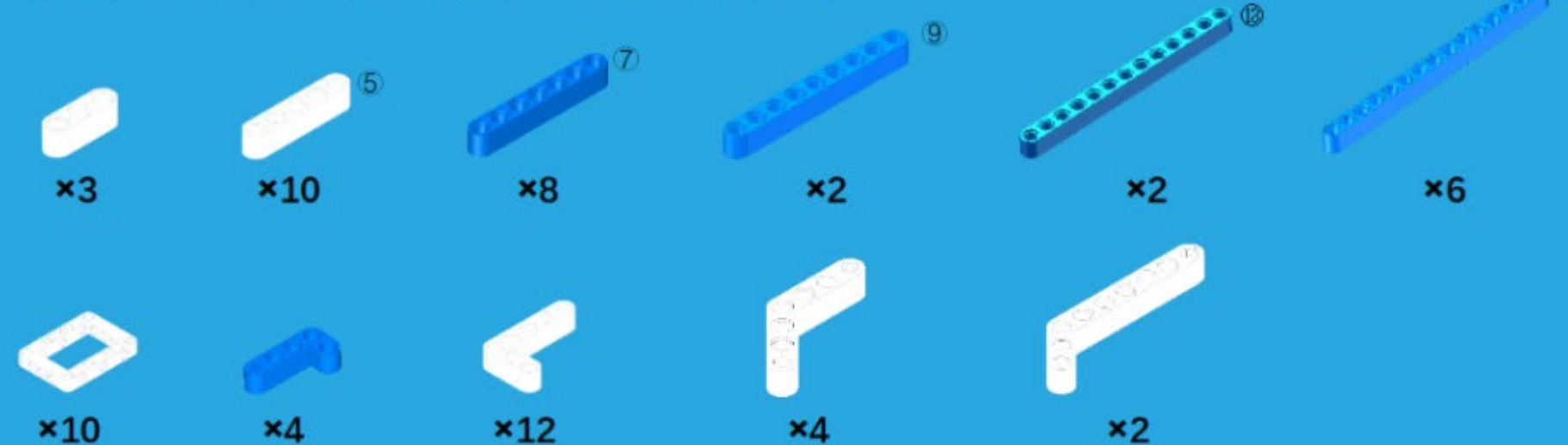
- 1. Build a table lamp with World of Modules**
- 2. Button and RGB module connection method**
- 3. Button Programming**
- 4. RGB Light Programming**

Learning Outcome

- 1. Able to build table lamp with instruction manual**
- 2. Understand how Button and RGB programming work**
- 3. Able to program the lamp switching on/off with button module**

Building Block Lists

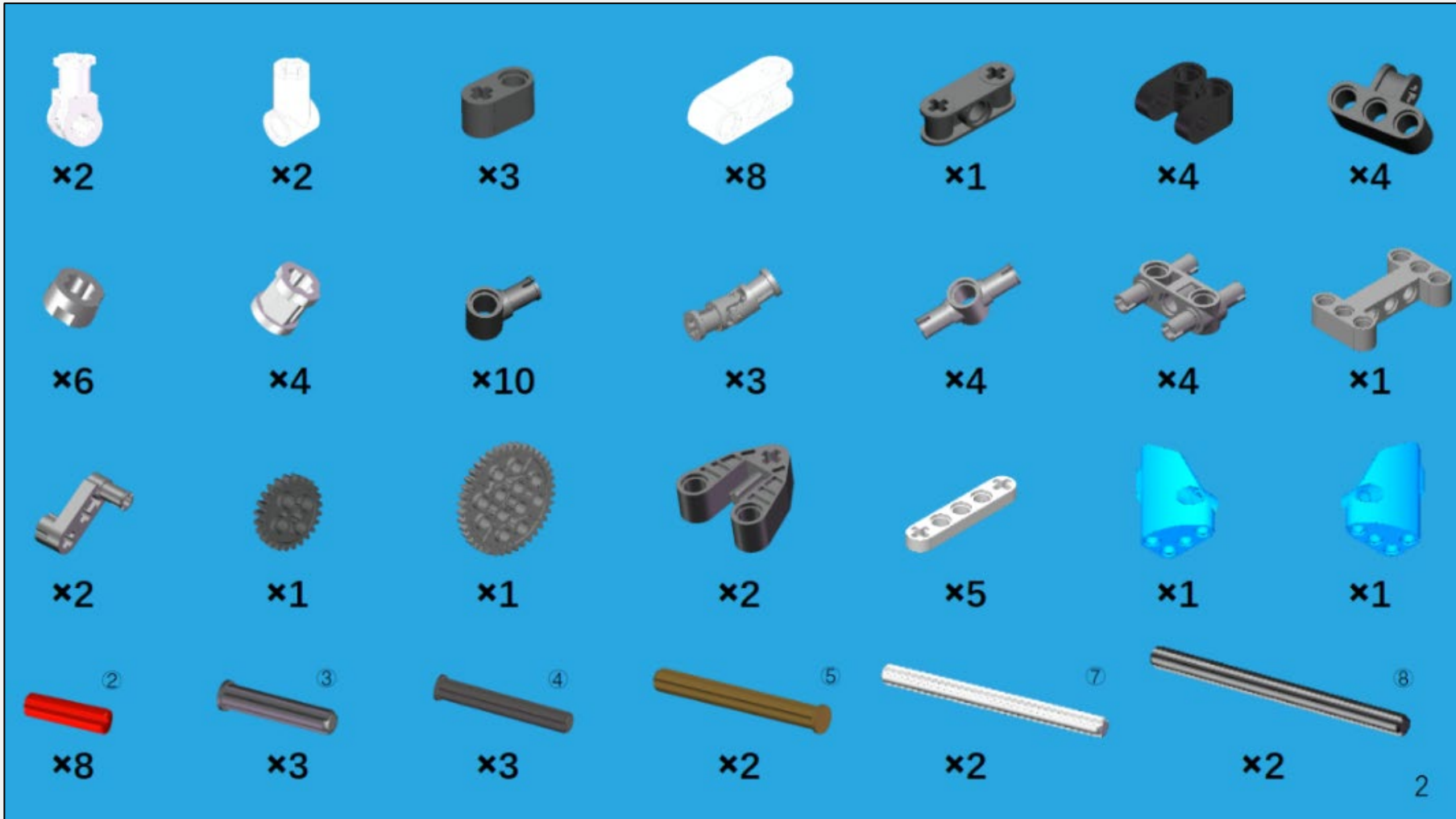
魔块世界micro:bit学习套件积木A包 (Block package A)



魔块世界micro:bit学习套件积木B包 (Block package B)

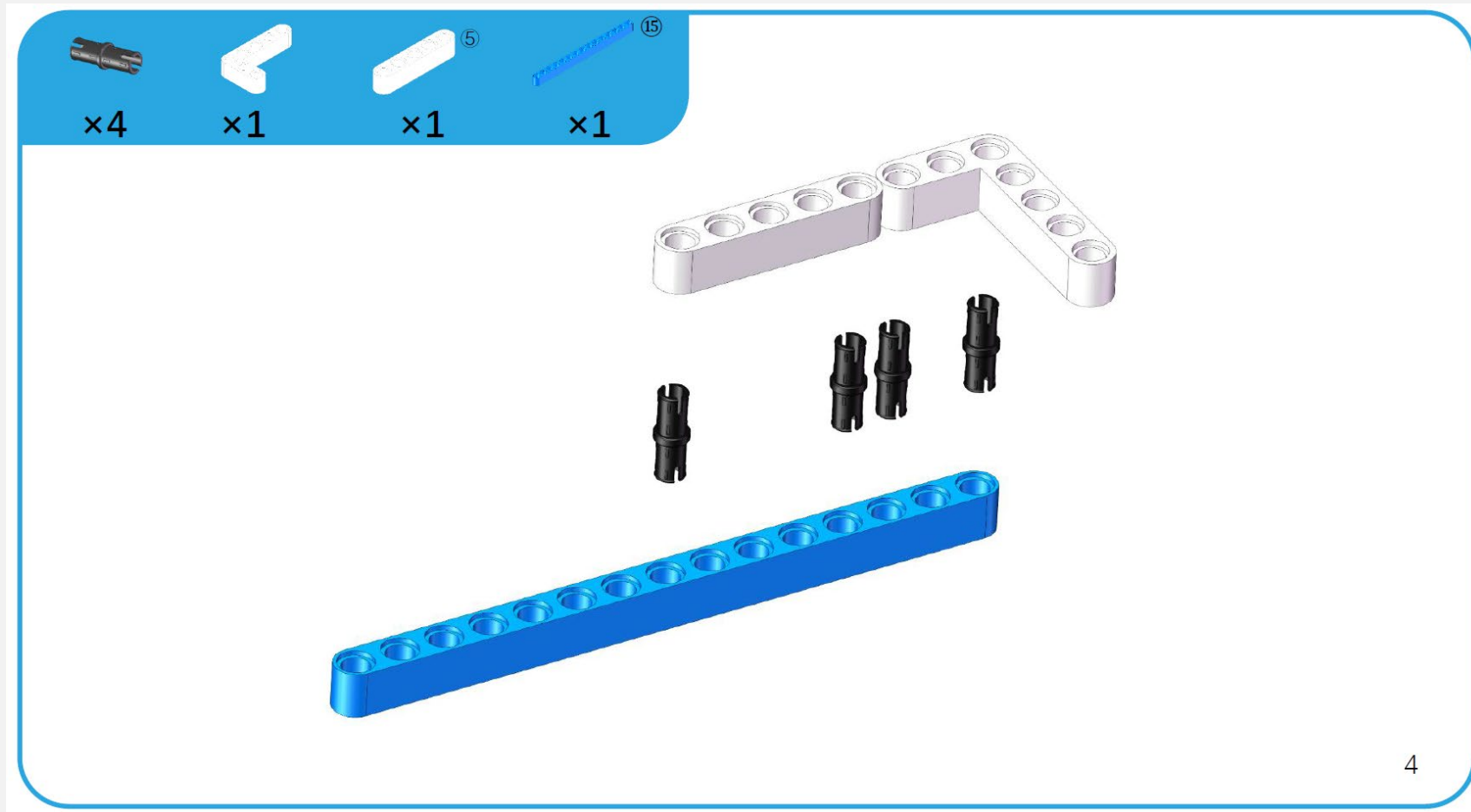


Building Block Lists

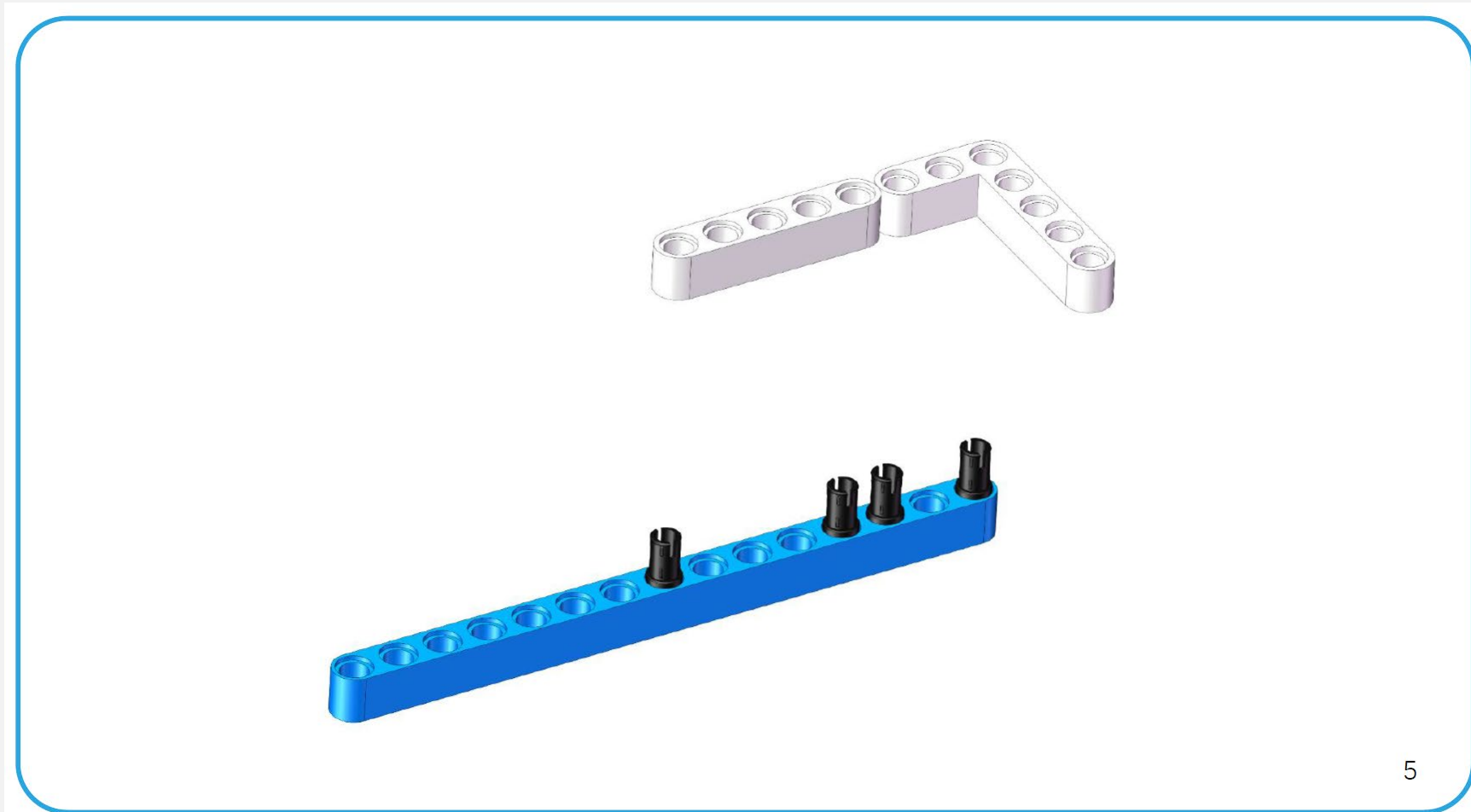


Let's Build a table lamp!

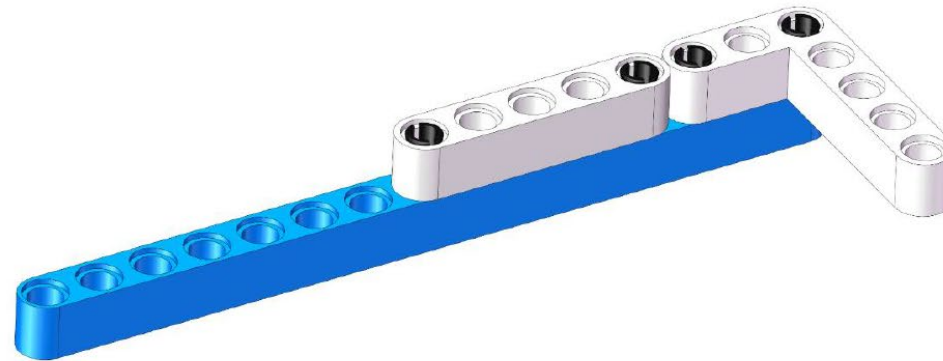
Step 1



Step 2

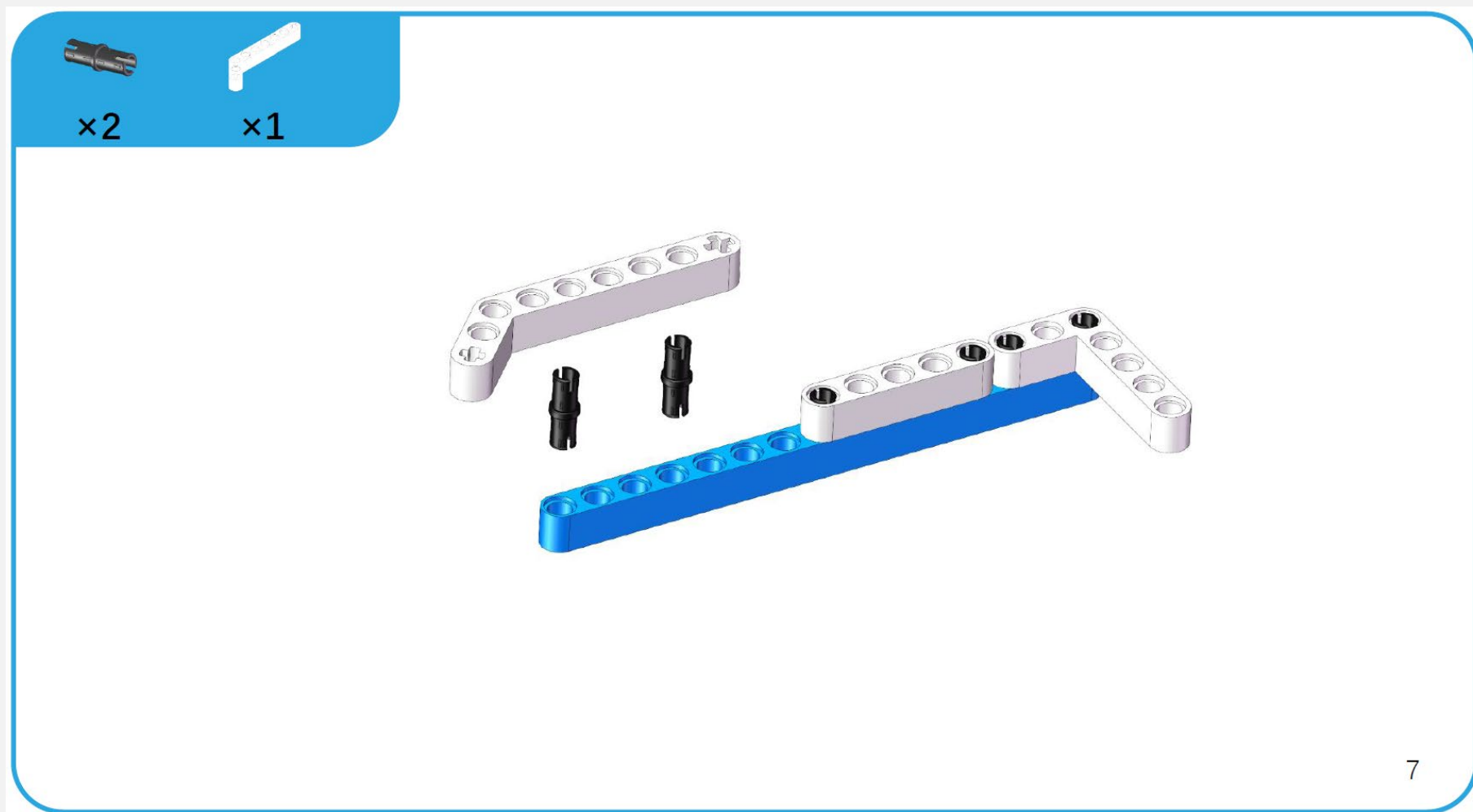


Step 3



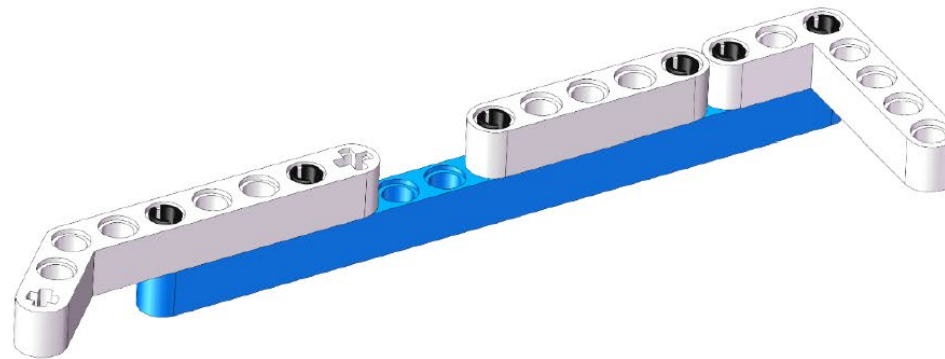
6

Step 4



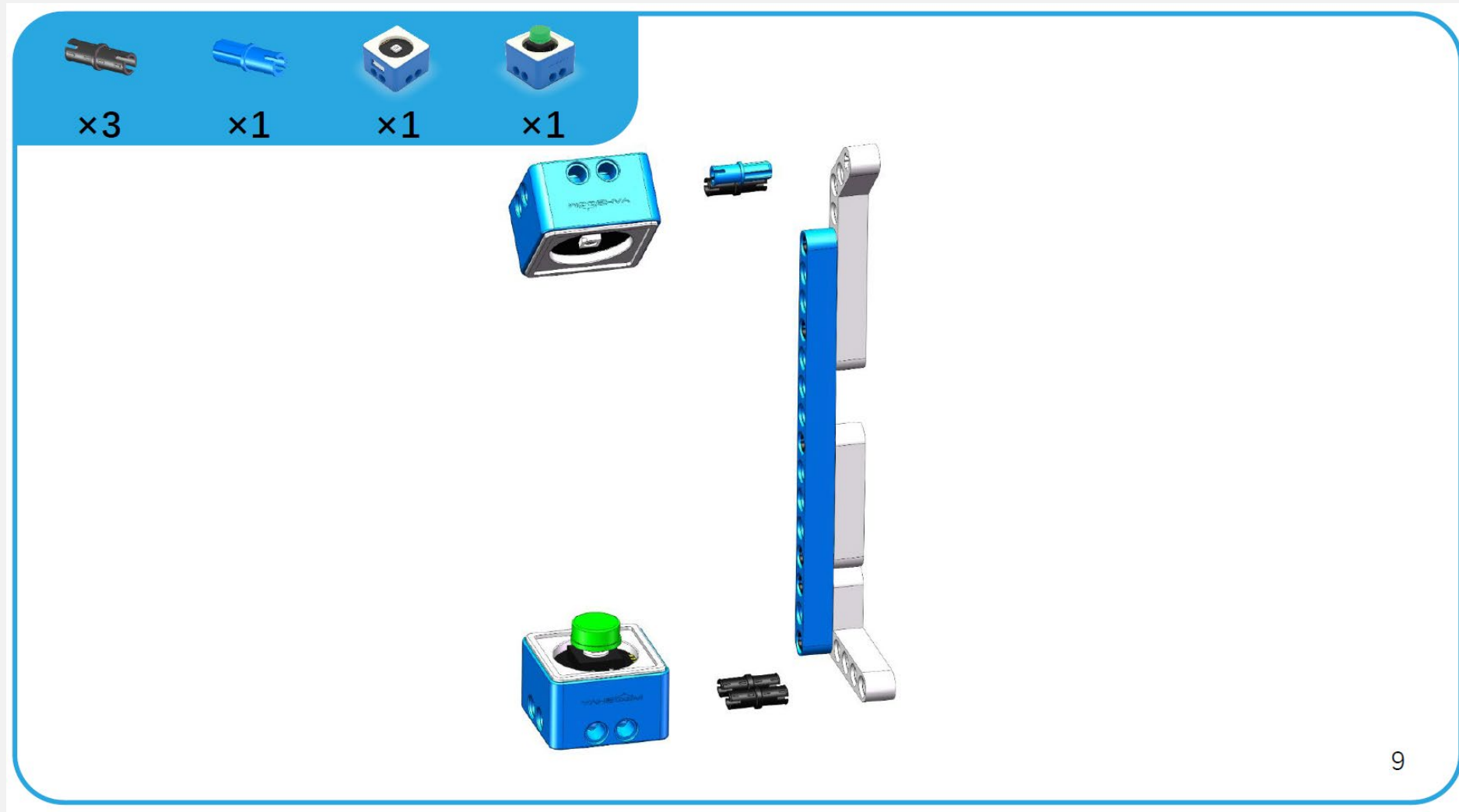
7

Step 5

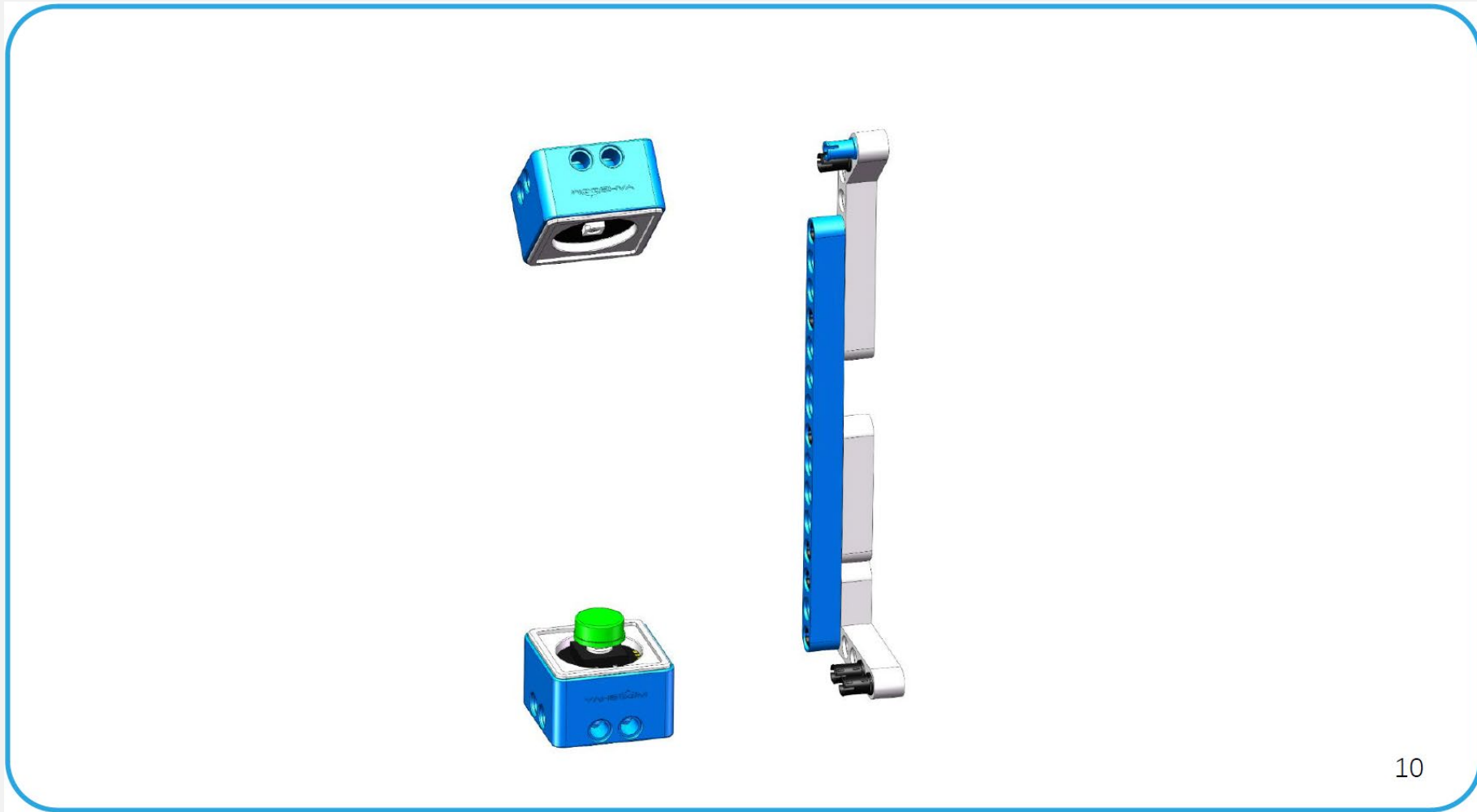


8

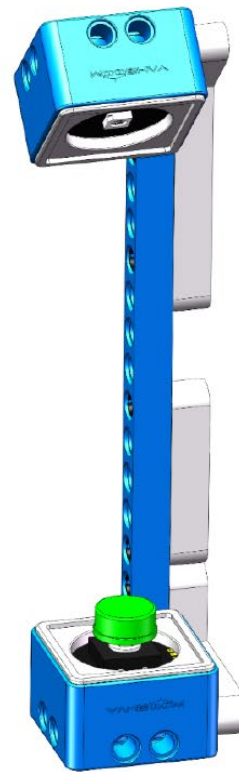
Step 6



Step 7

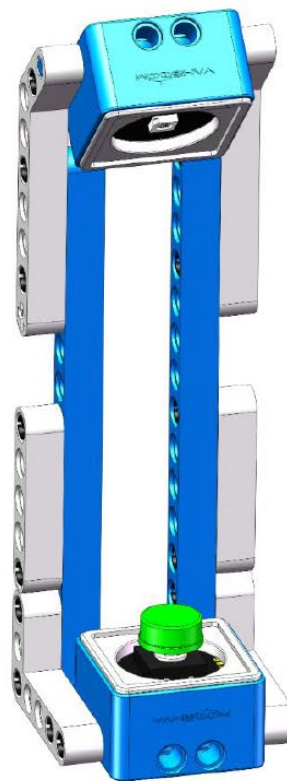


Step 8



11

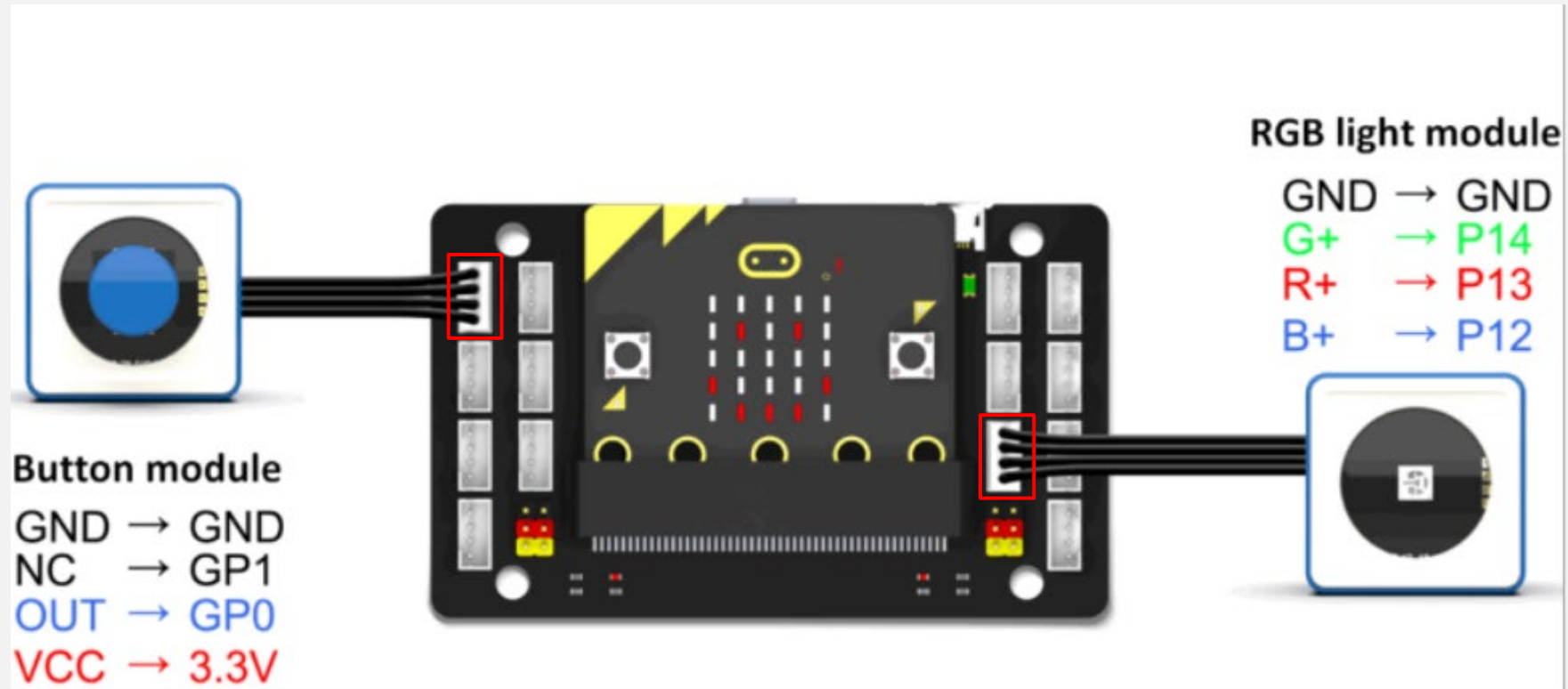
Step 9



12

Wire Connection

Connect the modules



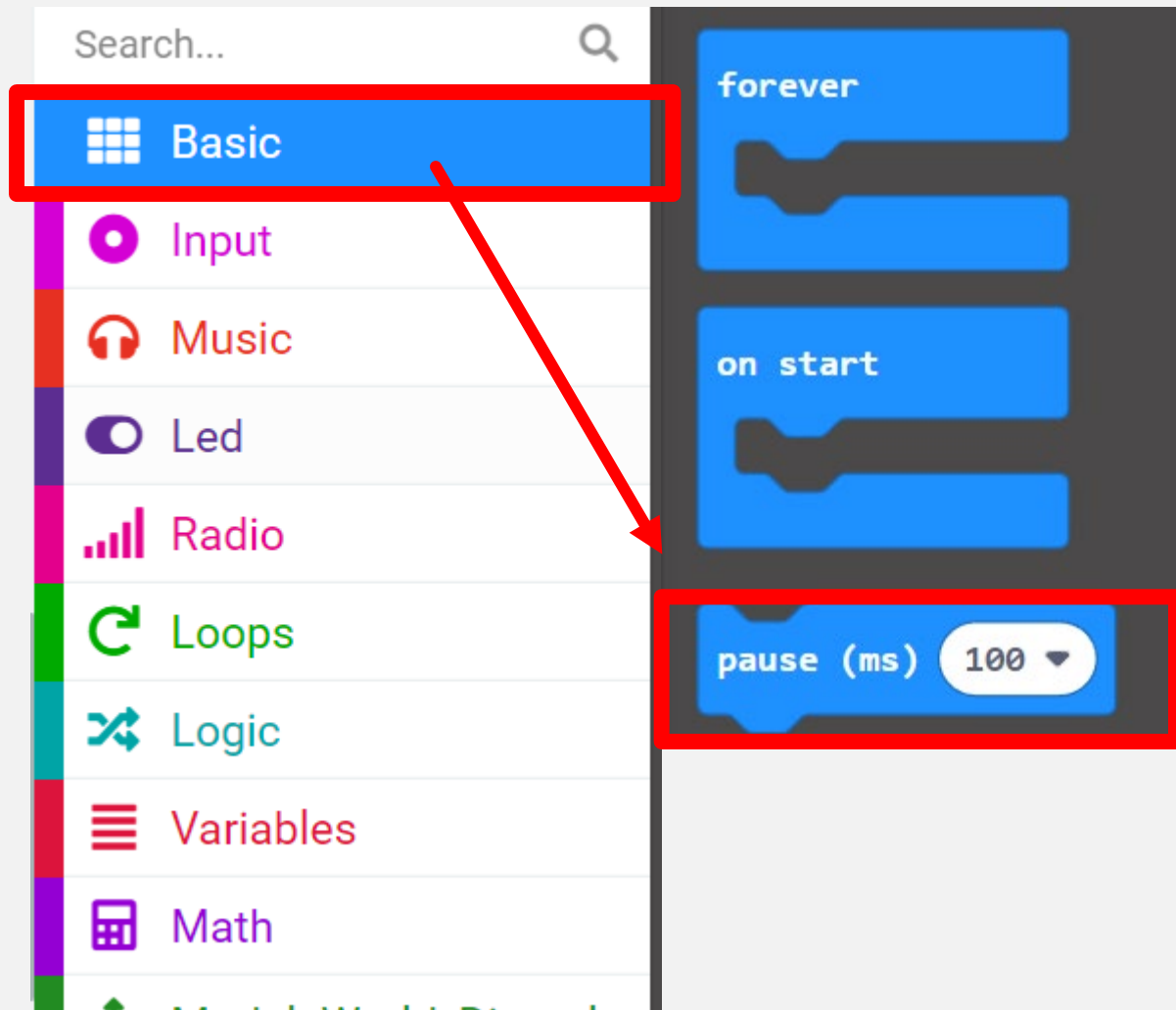
Let's **connect** the module like this.

MakeCode Programming

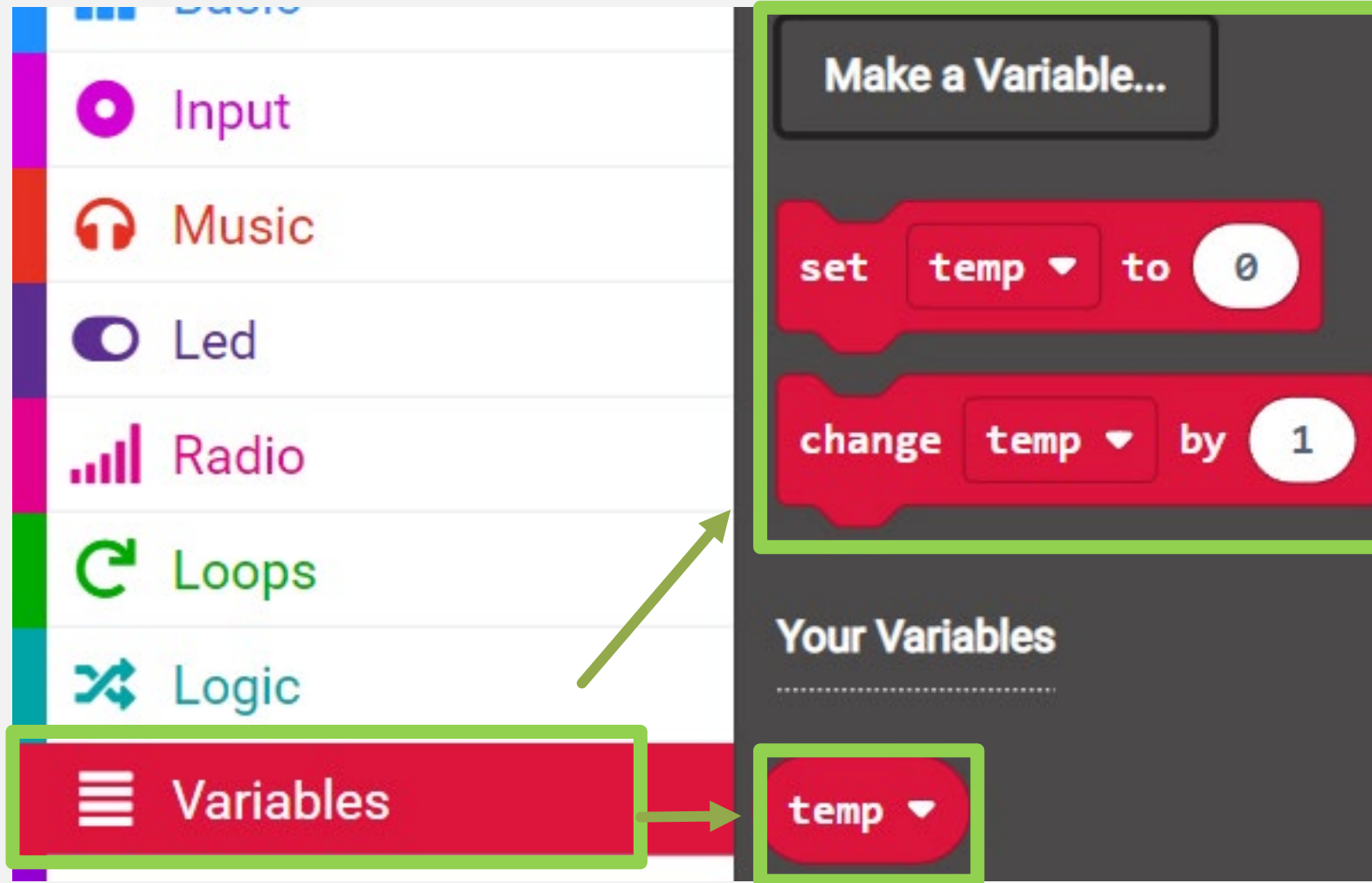
<https://github.com/YahboomTechnology/Module-World>.

Or search **YahboomTechnology/Module-World** in the extension block

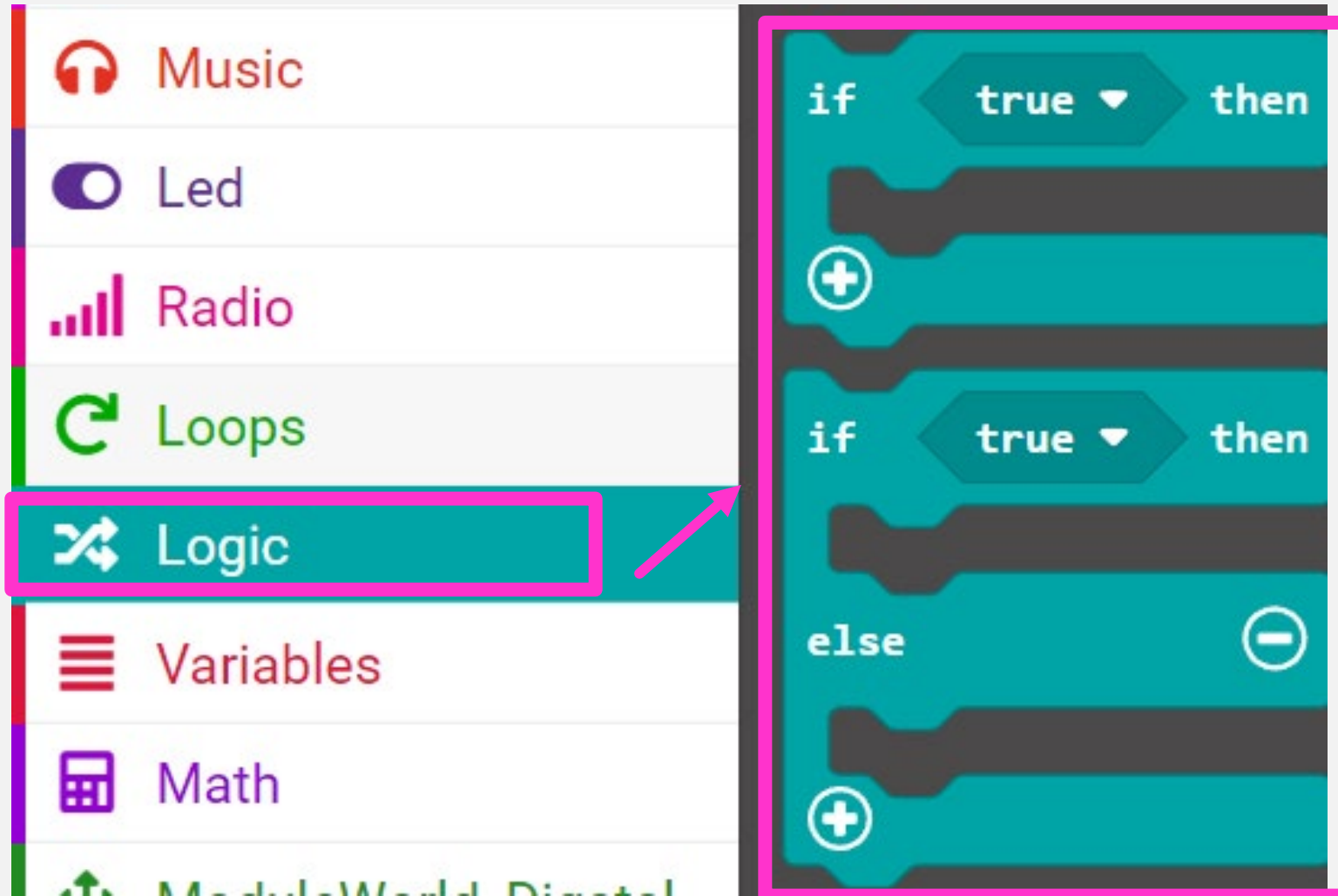
Coding - Basic



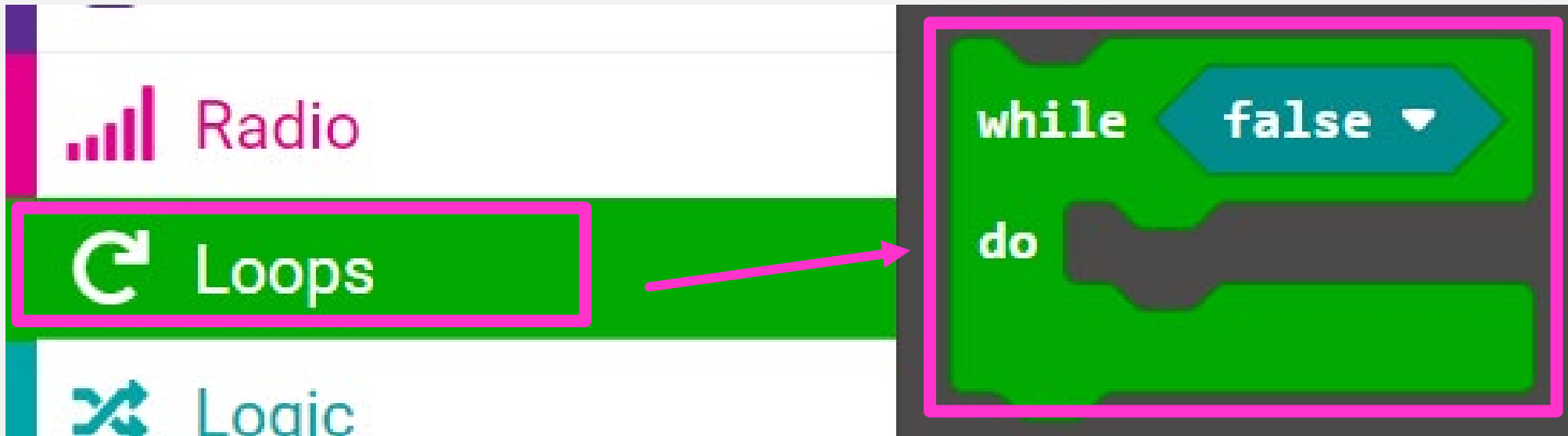
Coding - Variables



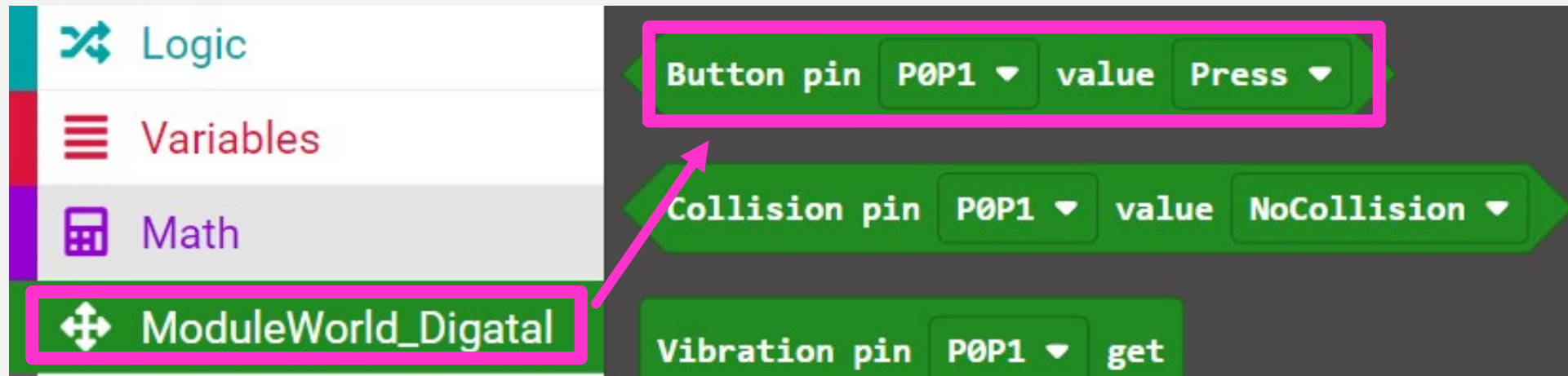
Coding - Logic



Coding - Loops



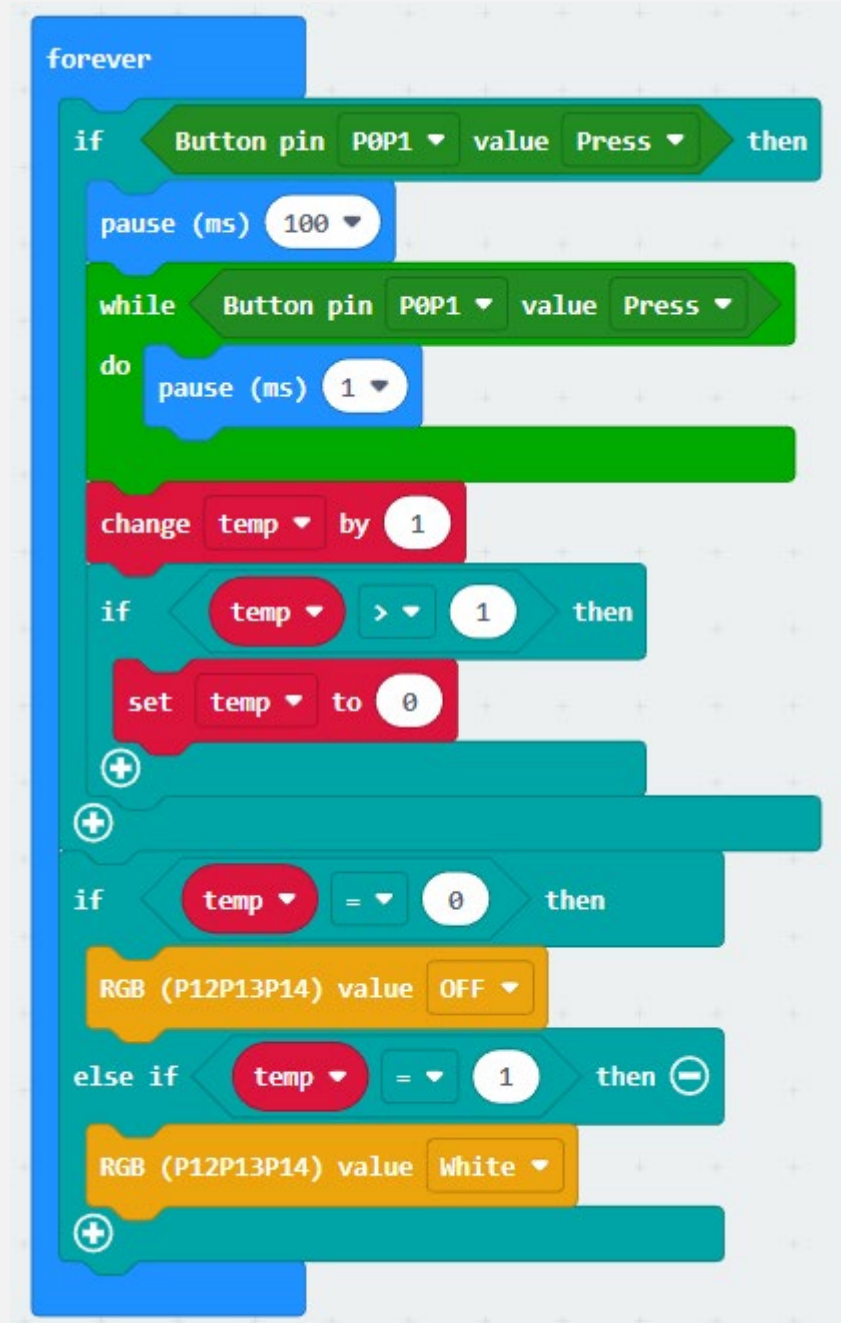
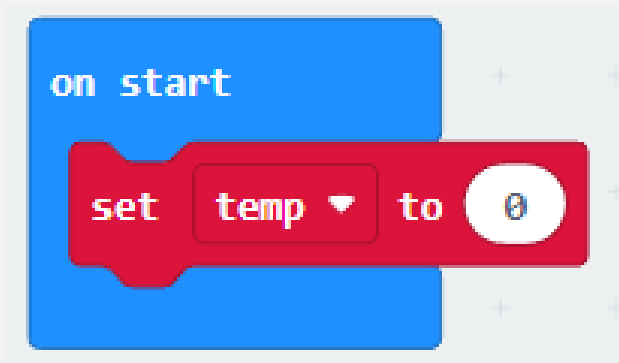
Coding – ModuleWorld_Digital



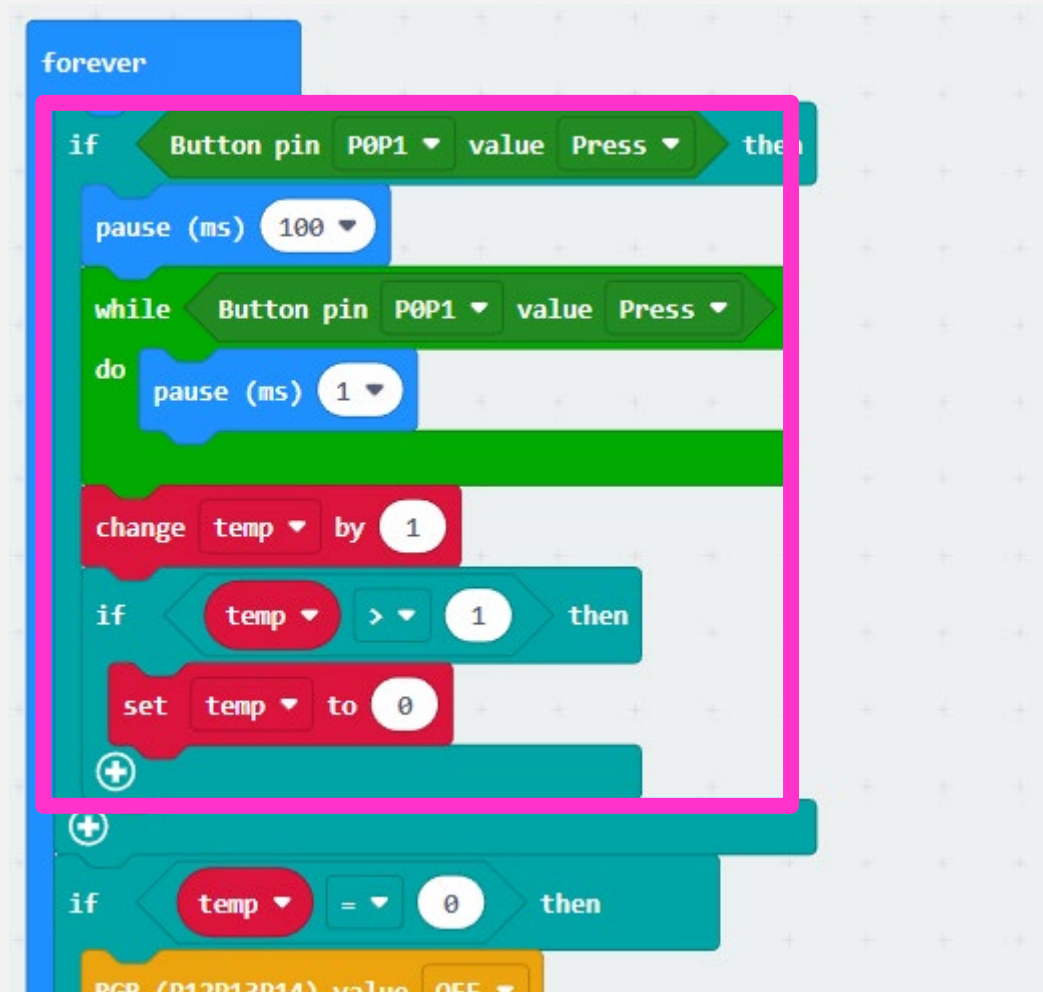
Coding – ModuleWorld_PWM



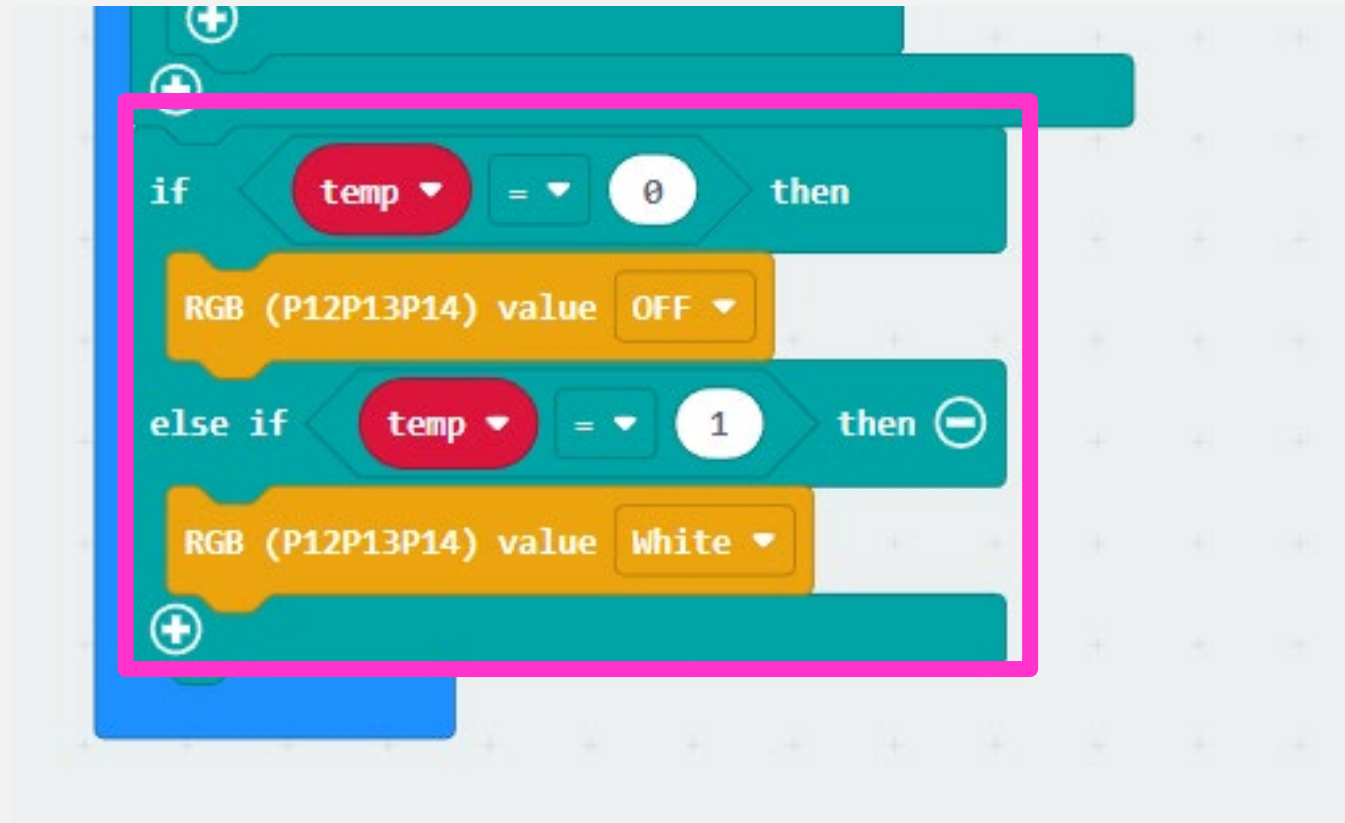
Combine Blocks



Button Programming

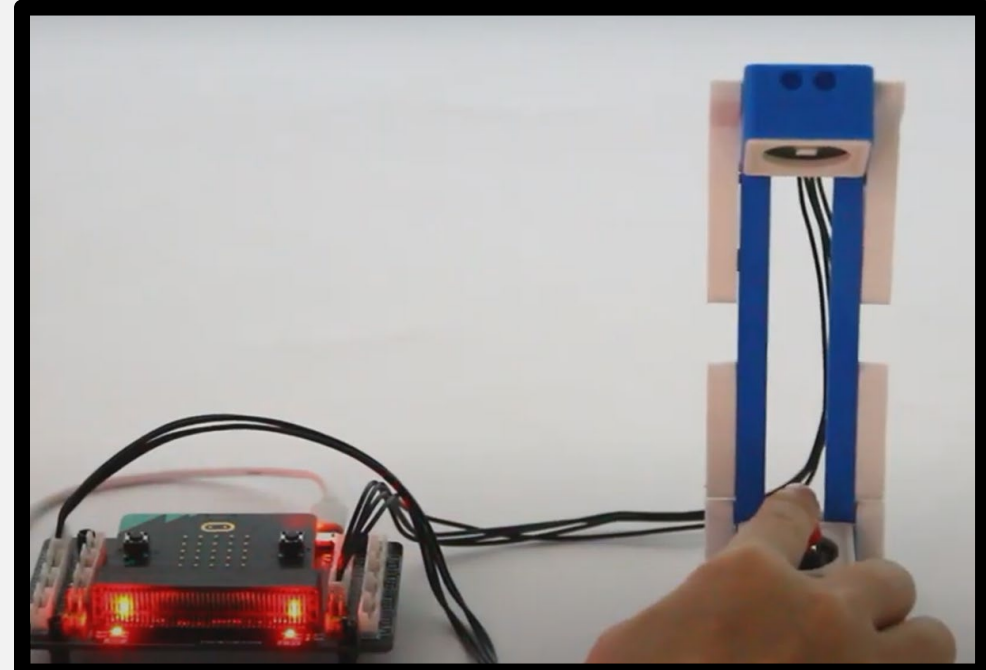
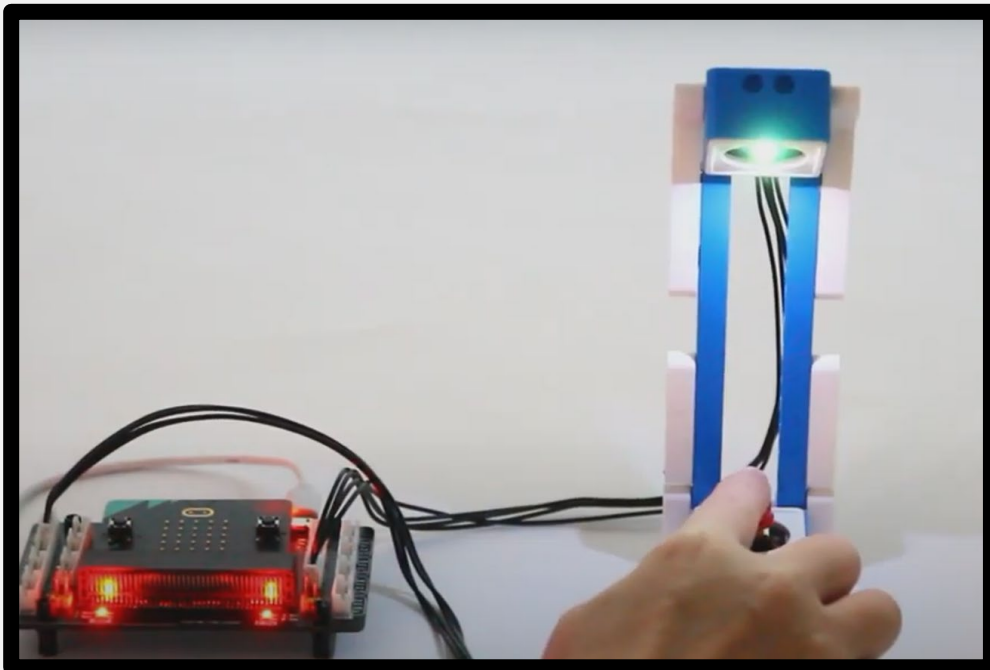


RGB Programming



Phenomenon

After the program is downloaded successfully.
When we **press** button module at the first time,
RGB light will become **white**;
when we **press** button module at the second time,
RGB light will **off**.



CHALLENGE

for : Lesson 3

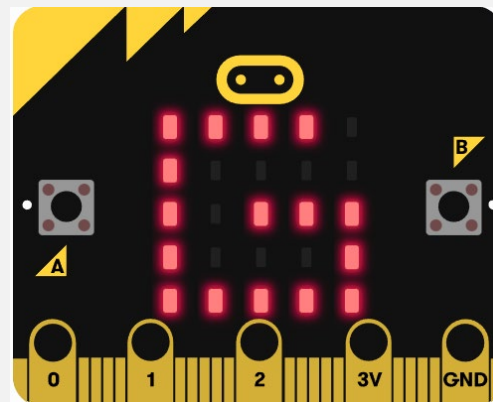
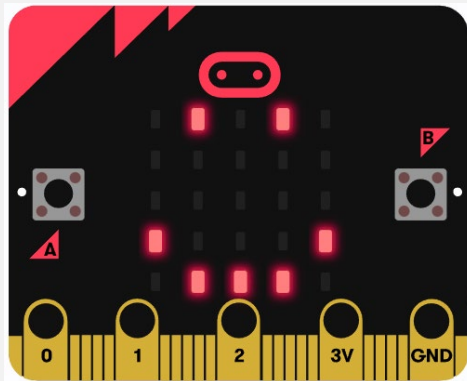
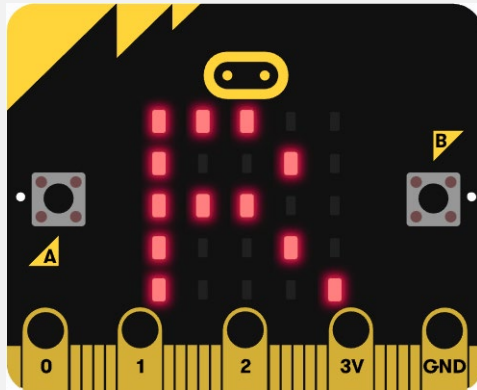
L3 - Challenge

Make the table lamp behaves like below:

After the program is downloaded successfully.
 When we **press** button module at the first time,
 RGB light will become **white**;
 when we **press** button module at the second time,
 RGB light will become **red**;
 when we **press** button module at the third time,
 RGB light will become **blue**;
 when we **press** button module at the fourth time,
 RGB light will become **green**;
 when we **press** button module at the fifth time,
 RGB light will off;

Condition: If we don't release the button, the light will **always keep changing (blink with 100 milliseconds)**

L3 – Mission



Make the lamp **changes** to every color and **off** after the 7th color

Every time when the light changes color, **show** what color it is on LED (Example - Red : “R”).

When **Button** pressed, smiley face appeared on LED before the color changes.

Summary

1. MakeCode is used to **program** Micro:bit.
2. There are **10** Modules with different functions.

1. RGB Light	6. Temperature and Humidity
2. Button	7. Ultrasonic
3. Rocker	8. Digital Tube
4. Photosensitive	9. Human Body Infrared
5. Infrared	10. Color Recognition
3. Modules and Servo need to **connect** correctly to their assigned pins

Do a quick self-check of your learning outcome...

- 1. How many modules do we have in our Microbit WOM box?**
- 2. Which of the modules are outputs and which are inputs?**
- 3. Can we connect RGB light sensor to P1 and P0 port?**
- 4. Can I connect multiple modules on expansion board at the same time?**
- 5. “The button module is a self-resetting button”, what does this statement mean?**



Any
Questions?

Thank you :)