

Microbit Robotics Beginner Level 1

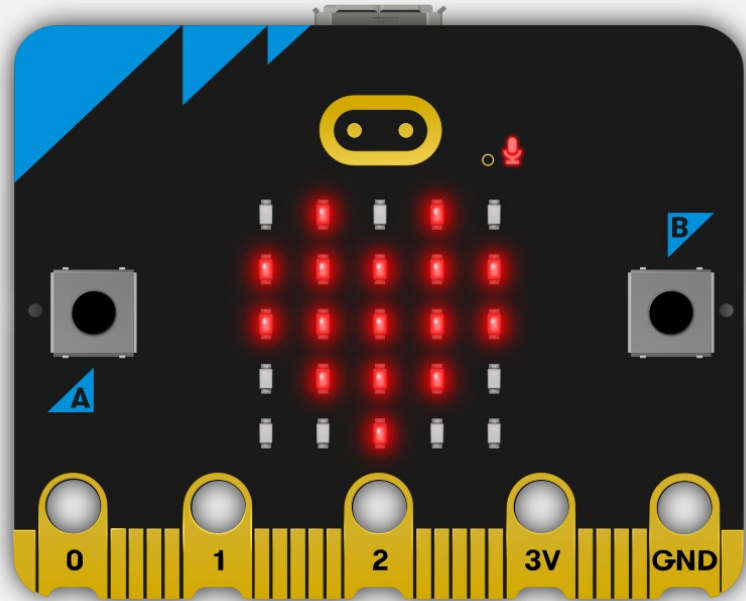
Lesson 3

Introduction to WOM and Microbit

Presented by Advanced Superlogic Team

Review previous lesson

Send message via Radio – from Microbit to Microbit



```

on button A pressed
  radio send number 0
  show icon [grid icon]

on start
  radio set group 1
  
```

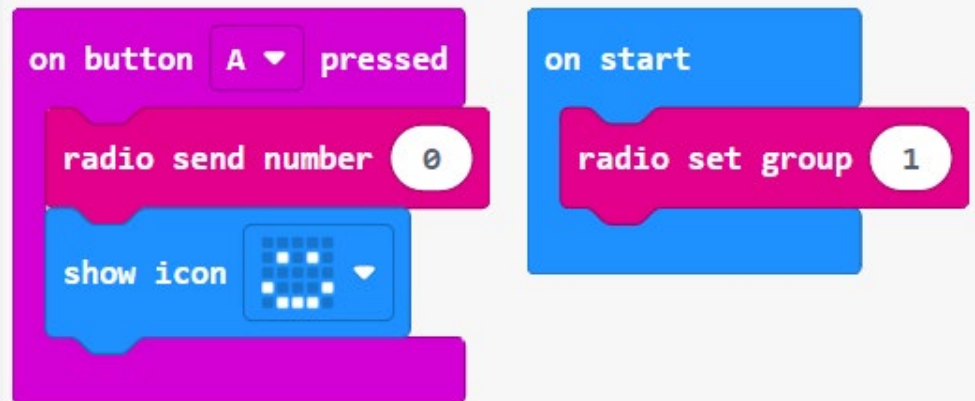
Radio – wave frequency can be sent and received from microbit, hence, we can use this function to communicate between microbit.

Mood Radio Project



This project uses the radio to share your mood with other micro:bits. When you press A, your friends will see a smiley face. When you press B, they will see a frowny face.

Mood Radio Project



Sending a smiley

The micro:bit can't understand mood but it is pretty good with numbers. In fact, it can send numbers between micro:bits using the radio antenna, just like a phone can send text messages.

Let's add blocks that send a number when button A is pressed. We assume that 0 is the "mood code" to send for smiley.

Mood Radio Project

```

on radio received receivedNumber
  if receivedNumber = 0 then
    show icon [smiley icon]
  
```

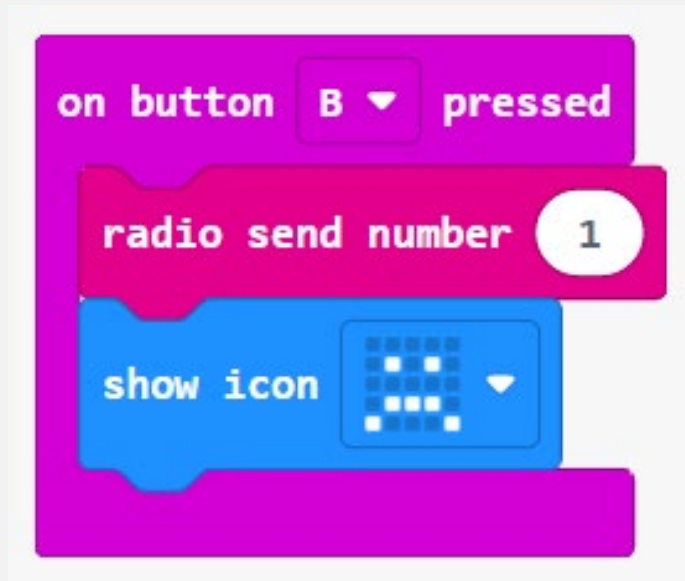
Receiving a smiley

We add a on received number block that will run code whenever a new “mood” message comes in.

The receivedNumber variable contains the numeric value that was sent.

Since we’ve decided that 0 is smiley, we add a conditional if then statement to show this icon.

Mood Radio Project – Sending Frowny



Sending a frowny

Adding another mood to our messaging app done in a similar way.

We decide that the “mood code” of 1 means frowny.

We can add a B button event that sends that code.

Mood Radio Project - Finalizing

```

on radio received receivedNumber
  if receivedNumber = 0 then
    show icon [frowny face]
  +
  if receivedNumber = 1 then
    show icon [frowny face]
  +

```

If the on received number block, we add another conditional if then statement to handle the frowny "mood code".

Full Code in your Microbit

```

on start
  radio set group 1

forever
  on radio received receivedNumber
    if receivedNumber = 0 then
      show icon [LEDs]
    +
    if receivedNumber = 1 then
      show icon [LEDs]
    +
  on button A pressed
    radio send number 0
    show icon [LEDs]
  on button B pressed
    radio send number 1
    show icon [LEDs]
  
```

This is the full coding scripts for your microbit sending message via radio project.

Radio group - channel from 0 to 255



If you are to send your message to your friend, you must make sure your friend is using the same radio group.

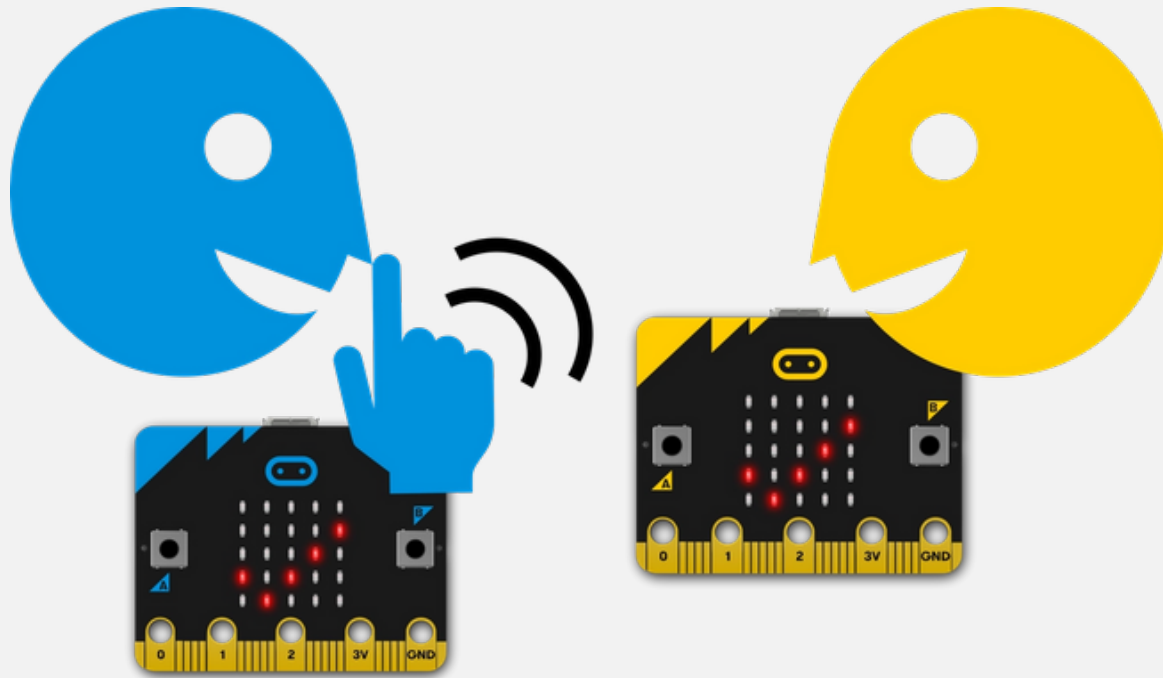
Microbit can cater for channel from 0 to 255, which is 256 channels for 2 microbit to communicate with each other.

Mood Radio Project – Download and try it



Yay you have completed your program, faster download and try it with your friend.

Activity – Send secret codes to your friend (15 min)



Pair up with your friend and make it to 2 in 1 group, then select a channel for both of you.

Try giving different events (at least 5 events) to send some secret code to your friend and don't let other people know what you're sending.

(activity time
- 15 minutes)

Introduction Microbit and WOM modules



Grouping (2 – 3 people in 1 Group)

Today's Topic

- 1. World of Module Programmable Robot Kit**
- 2. Introduction of Micro:bit**
- 3. Introduction to few WOM modules**
- 4. MakeCode Programming**
- 5. Basic Module's Programming block**

Learning Outcome

- 1. Understand Micro:bit and Module Sensor Kit**
- 2. Able to program using MakeCode**
- 3. Understand how Module's programming work**
- 4. Able to program basic Module's programming**

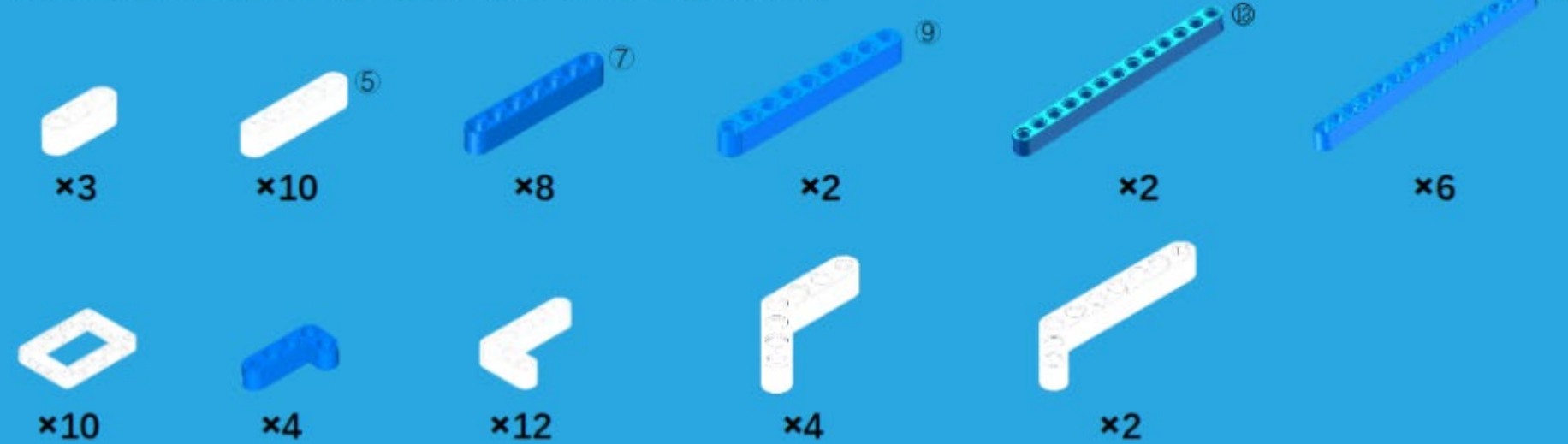
World of Module Programmable Robot Kit (WOM)



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

Building Block Lists

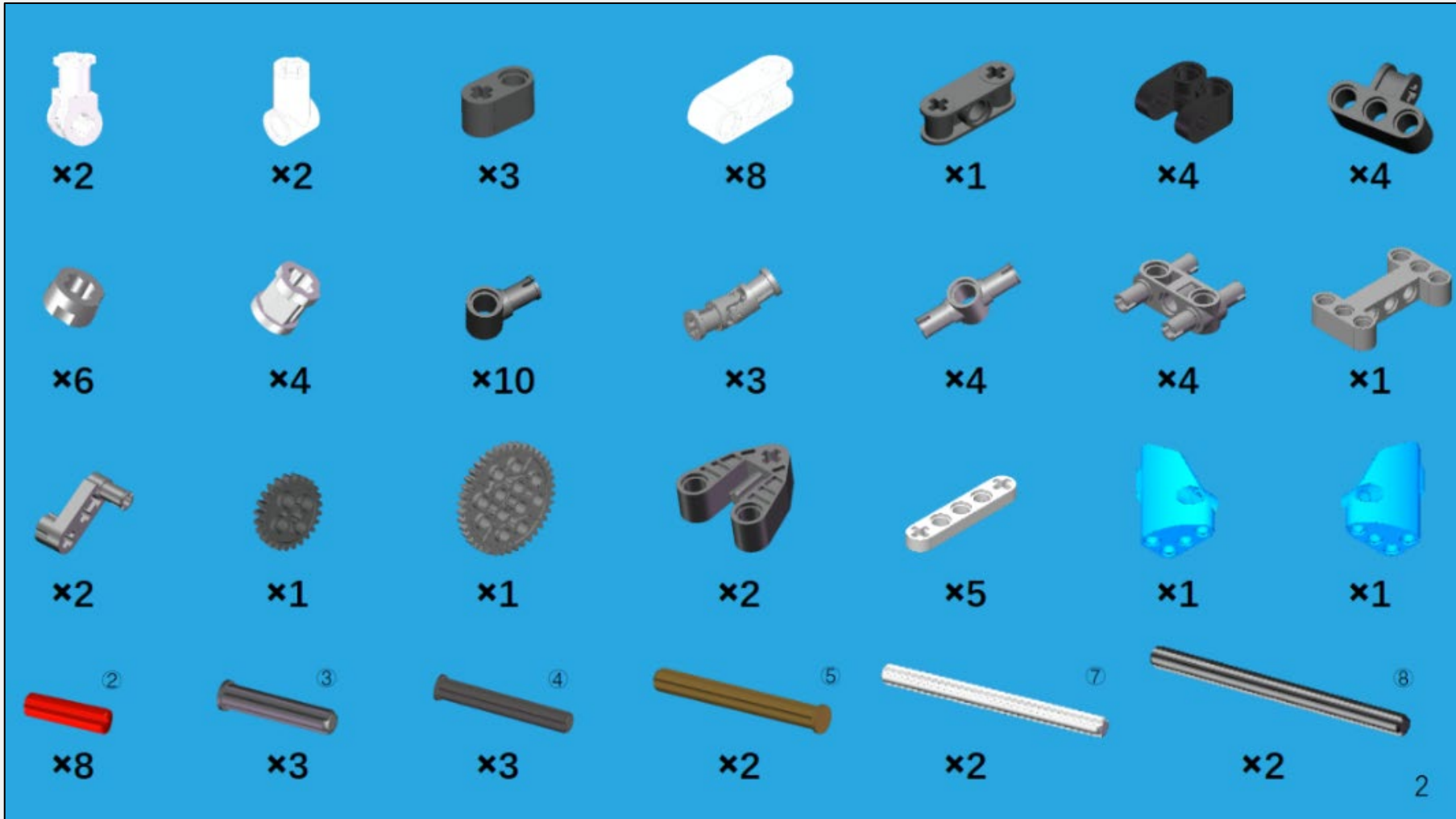
魔块世界micro:bit学习套件积木A包 (Block package A)



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

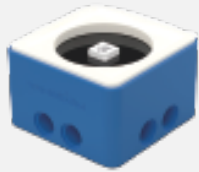


Building Block Lists



Electronic Modules

Electronic Modules



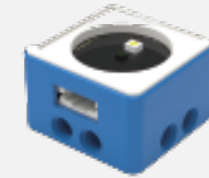
RGB Light Module



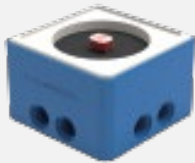
Button Module



Rocker Module



Color Recognition Module



Photosensitive Module



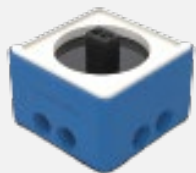
Temperature Humidity Module



Human body Infrared Module



Ultrasonic Module



Infrared Module



Digital Tube Module

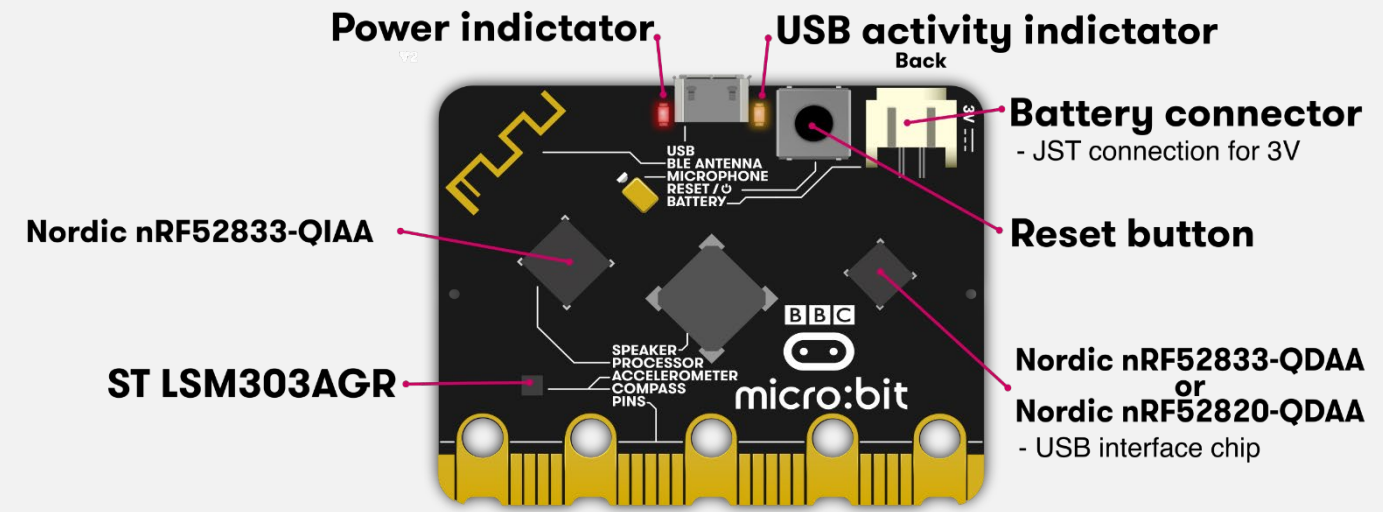
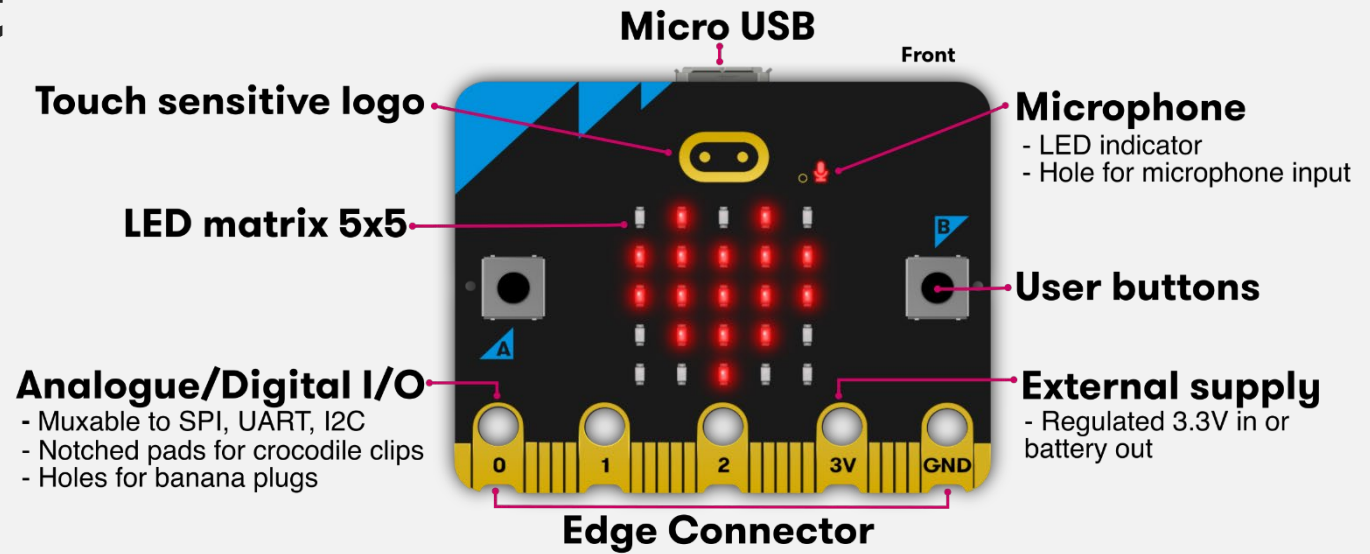


Servo

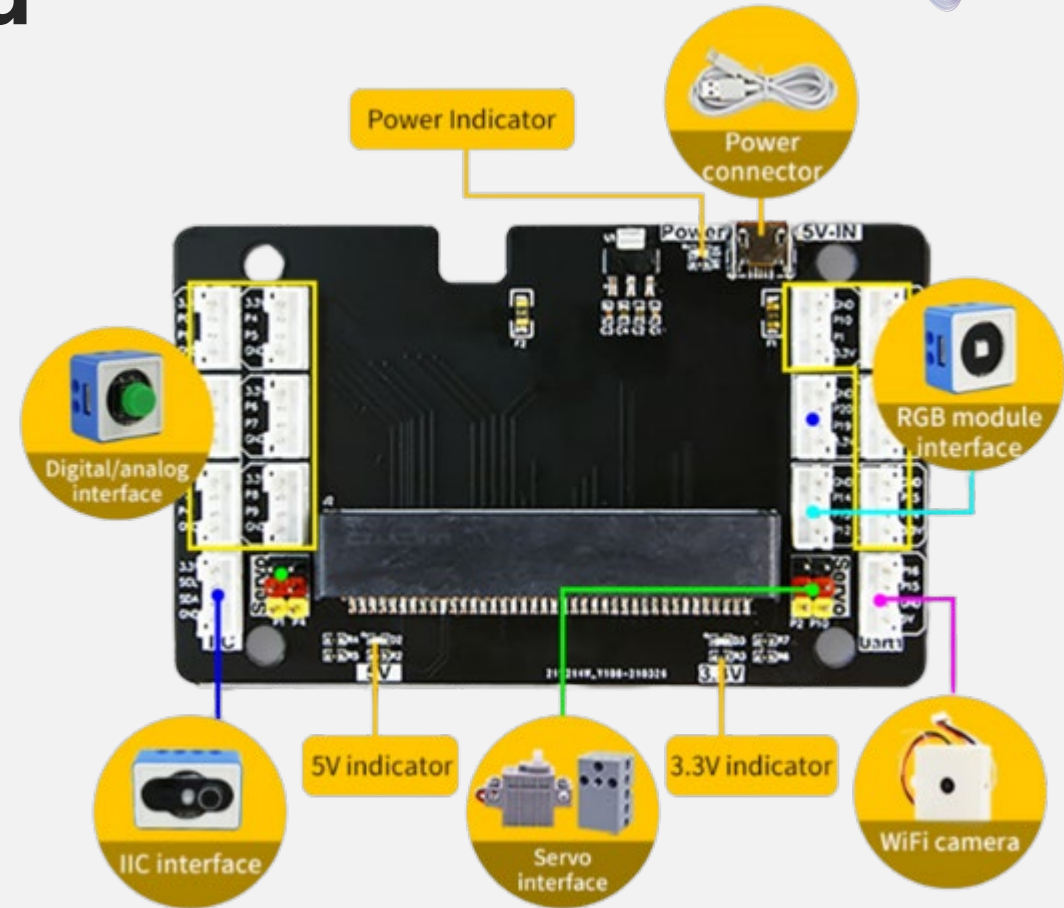
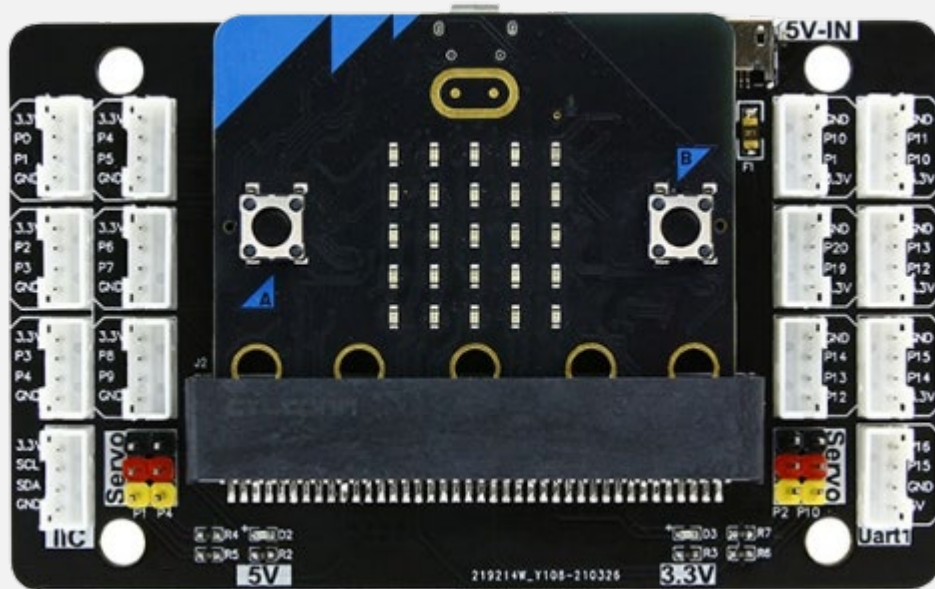


What is Micro:bit?

Micro:bit

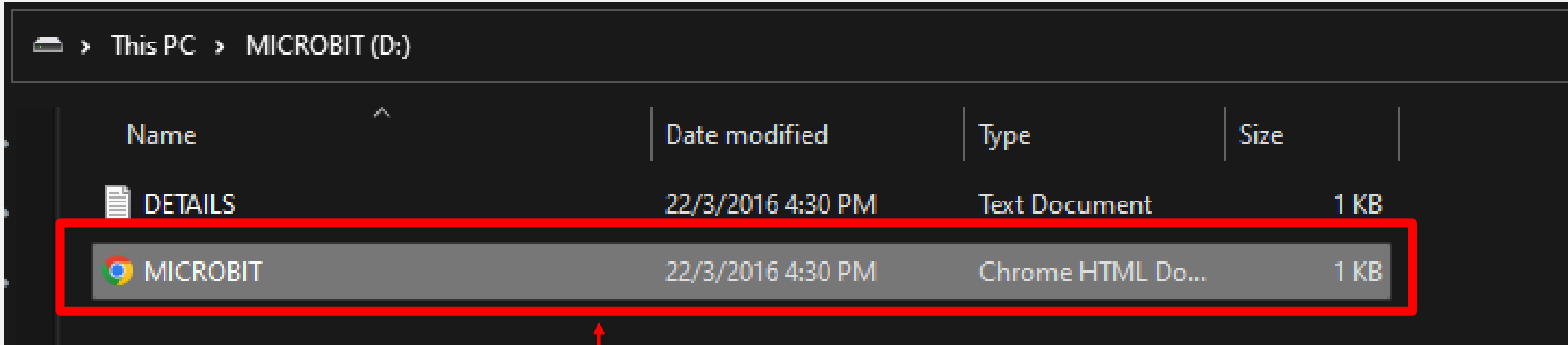


Micro:bit Expansion Board

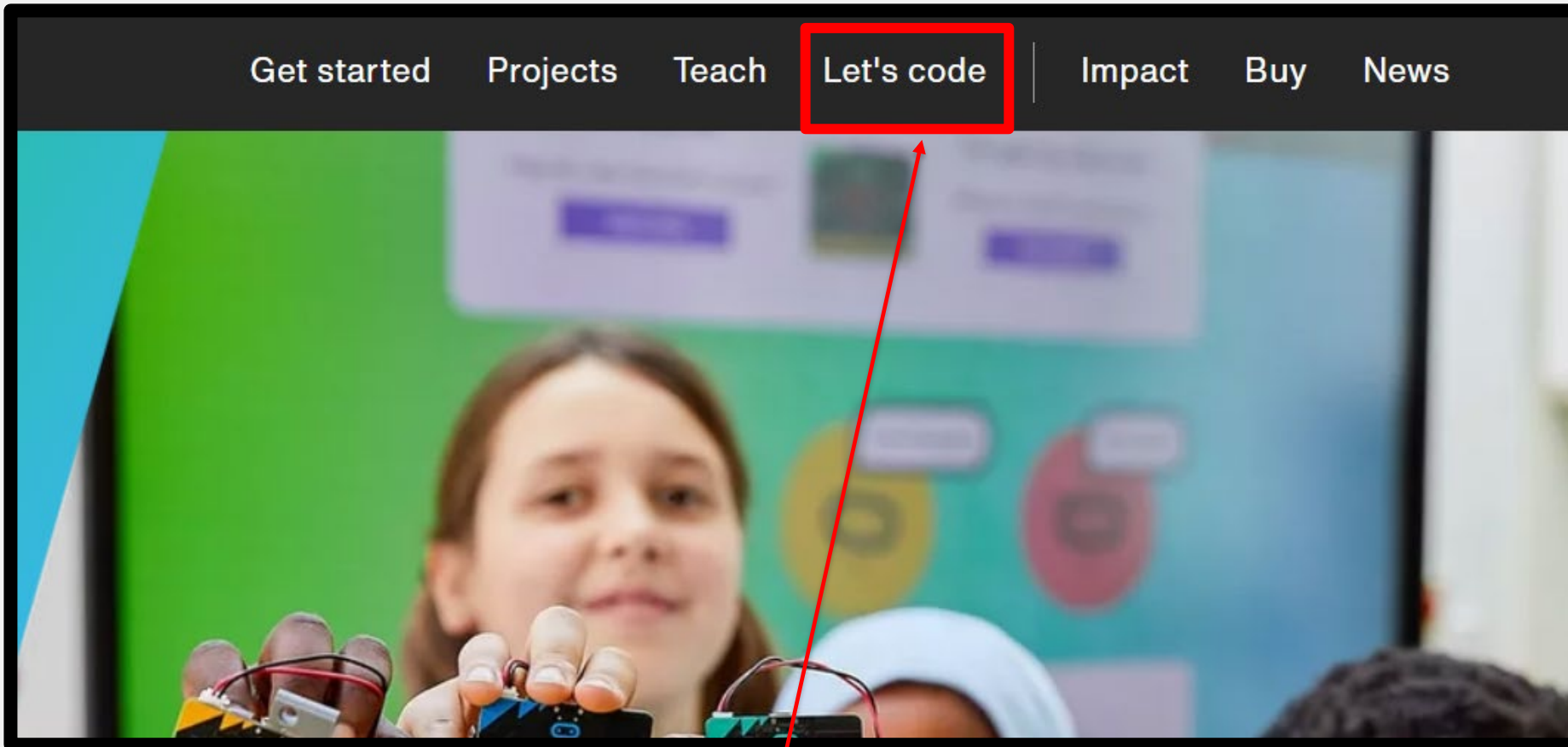


Let's program the *Micro:bit*

Connect the Micro:bit



Click the MICROBIT to enter the official website



Click “Let 's code”

micro:bit

Get started Projects Teach Let's code

Let's code

Quick links

New to coding or new to micro:bit

Text-based programming, widely used in education

Manage whole class micro:bit coding sessions

{ } **MakeCode editor**

Python editor

micro:bit classroom

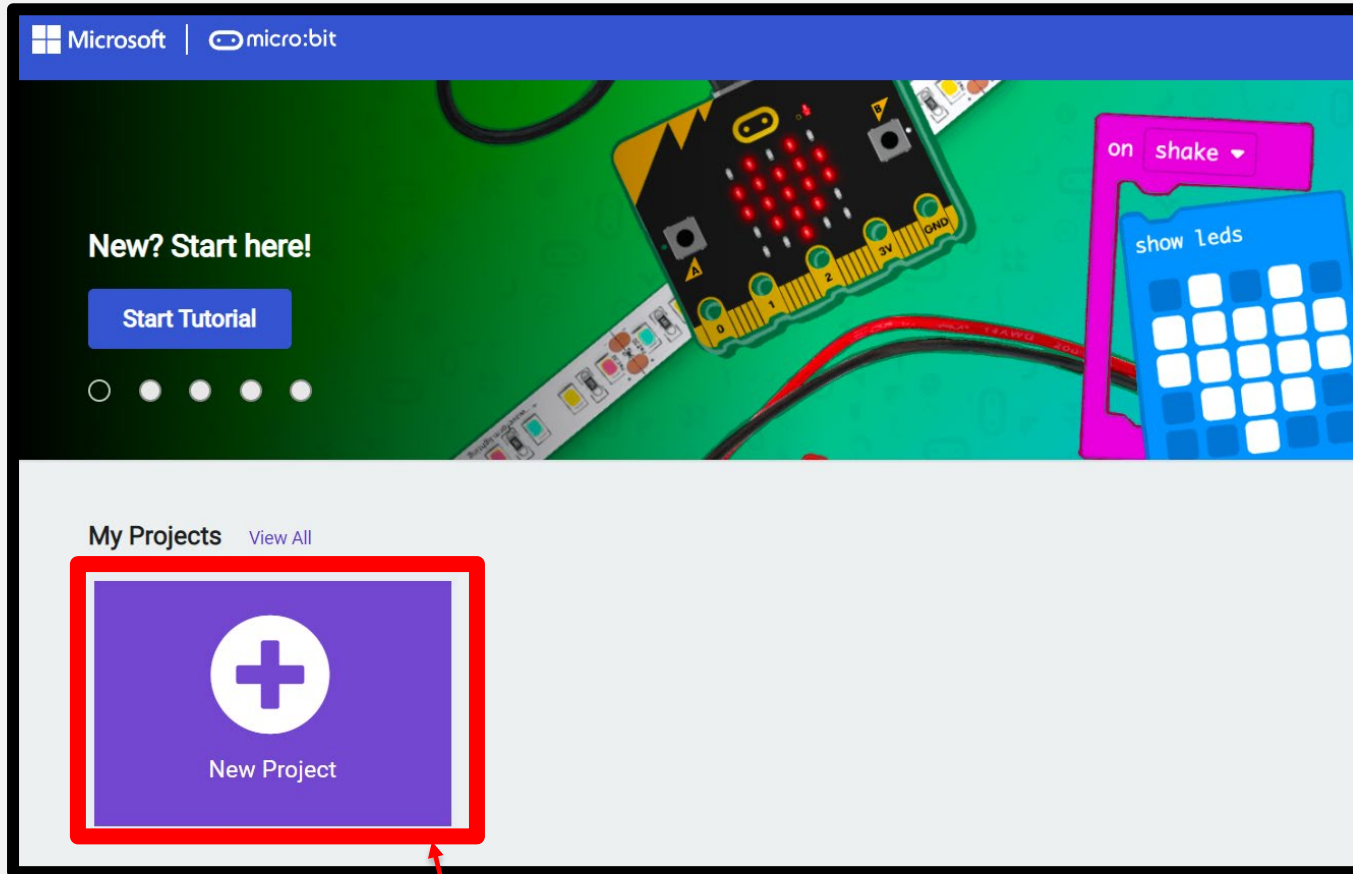
- Microsoft MakeCode
- Python
- Mobile and tablet apps
- Scratch

Microsoft MakeCode

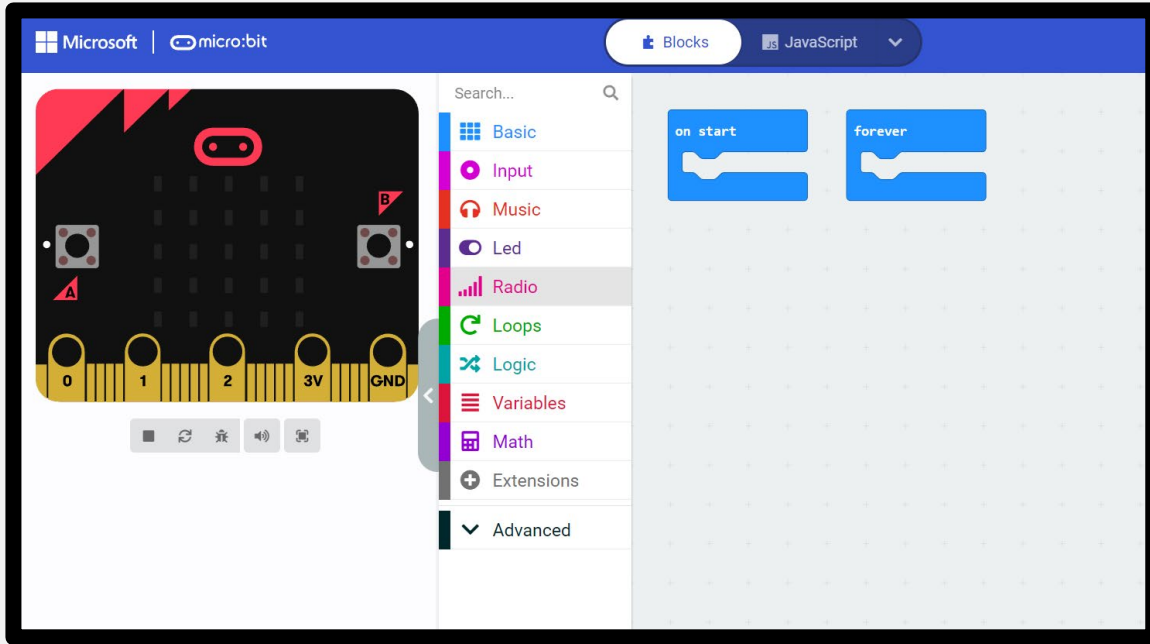
Microsoft's MakeCode editor is the perfect way to start programming and get creating with the BBC micro:bit. The colour-coded blocks are familiar to anyone who's previously used Scratch, and yet powerful enough to access all the [features of this tiny computer](#). You can also switch to JavaScript to see the text-based code behind the blocks.

Our getting started pages will guide you through your first steps.

Click “MakeCode editor”

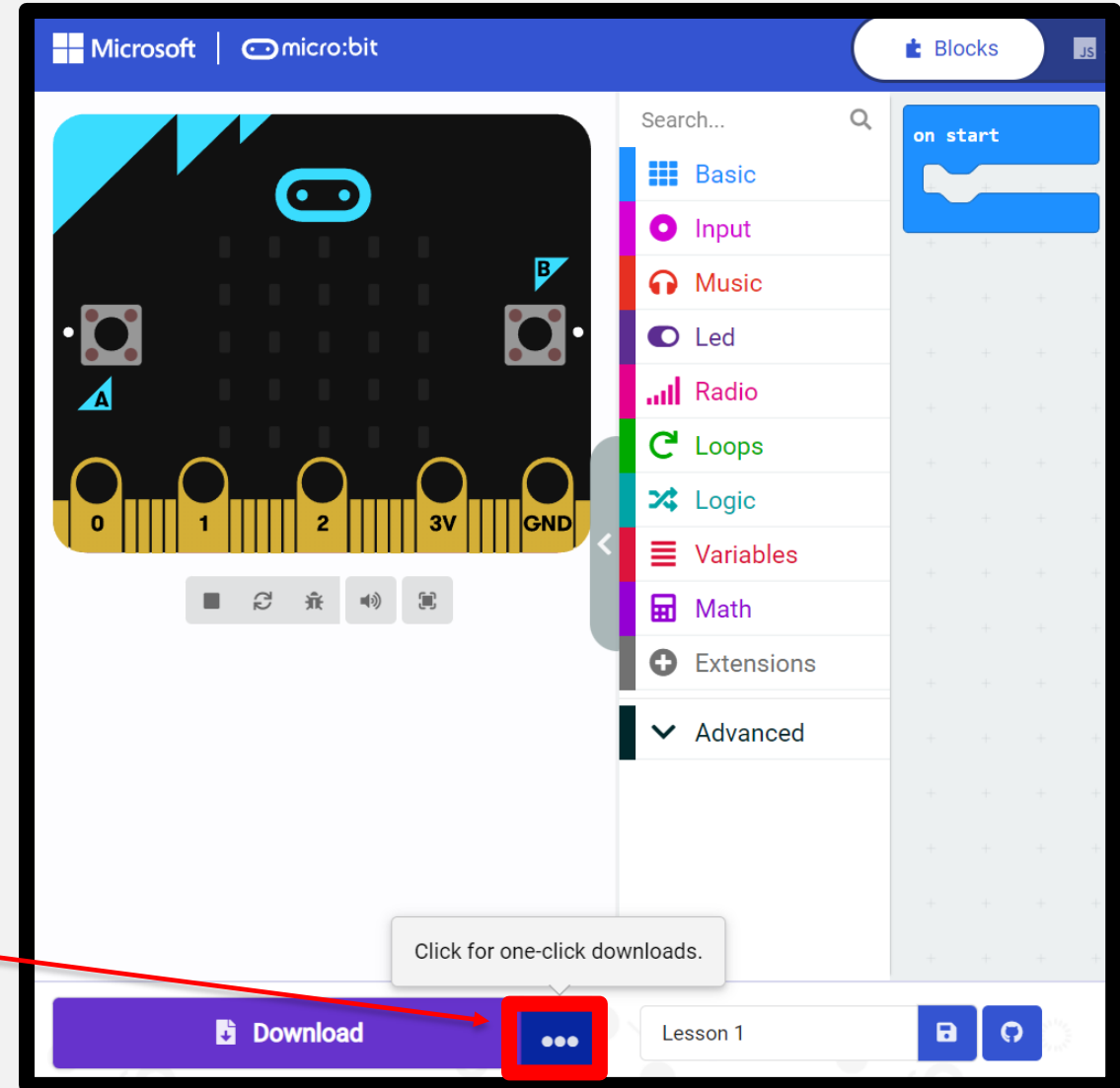


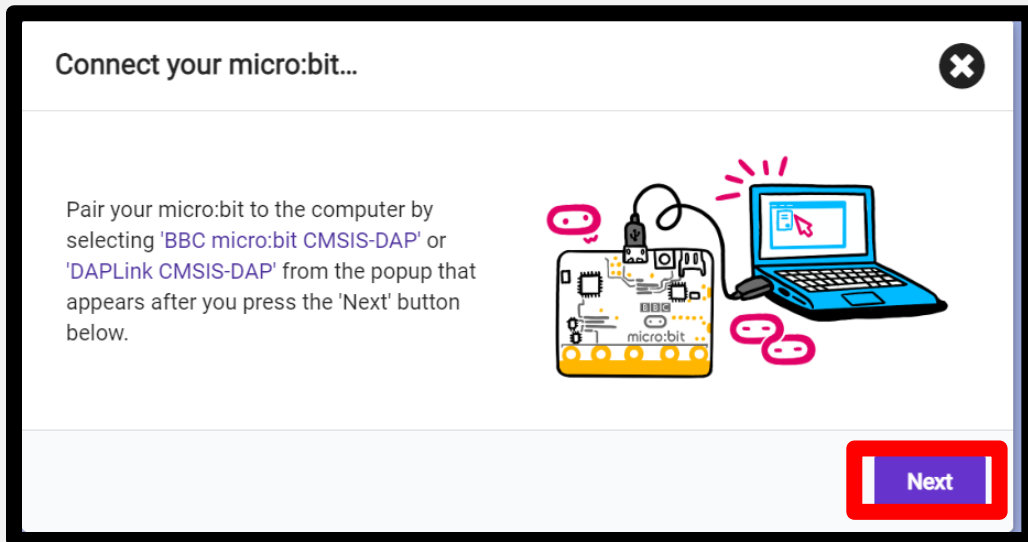
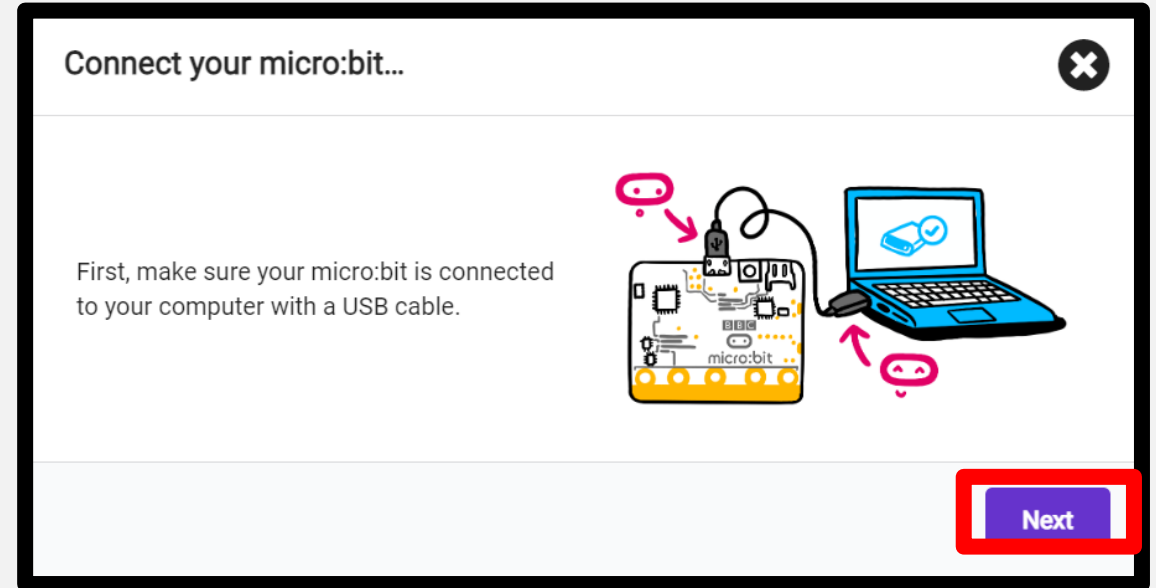
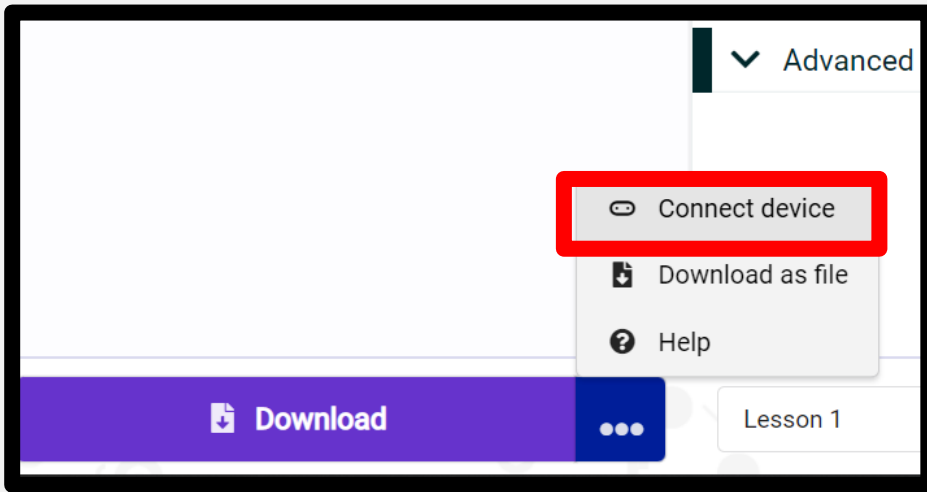
Click “New Project”

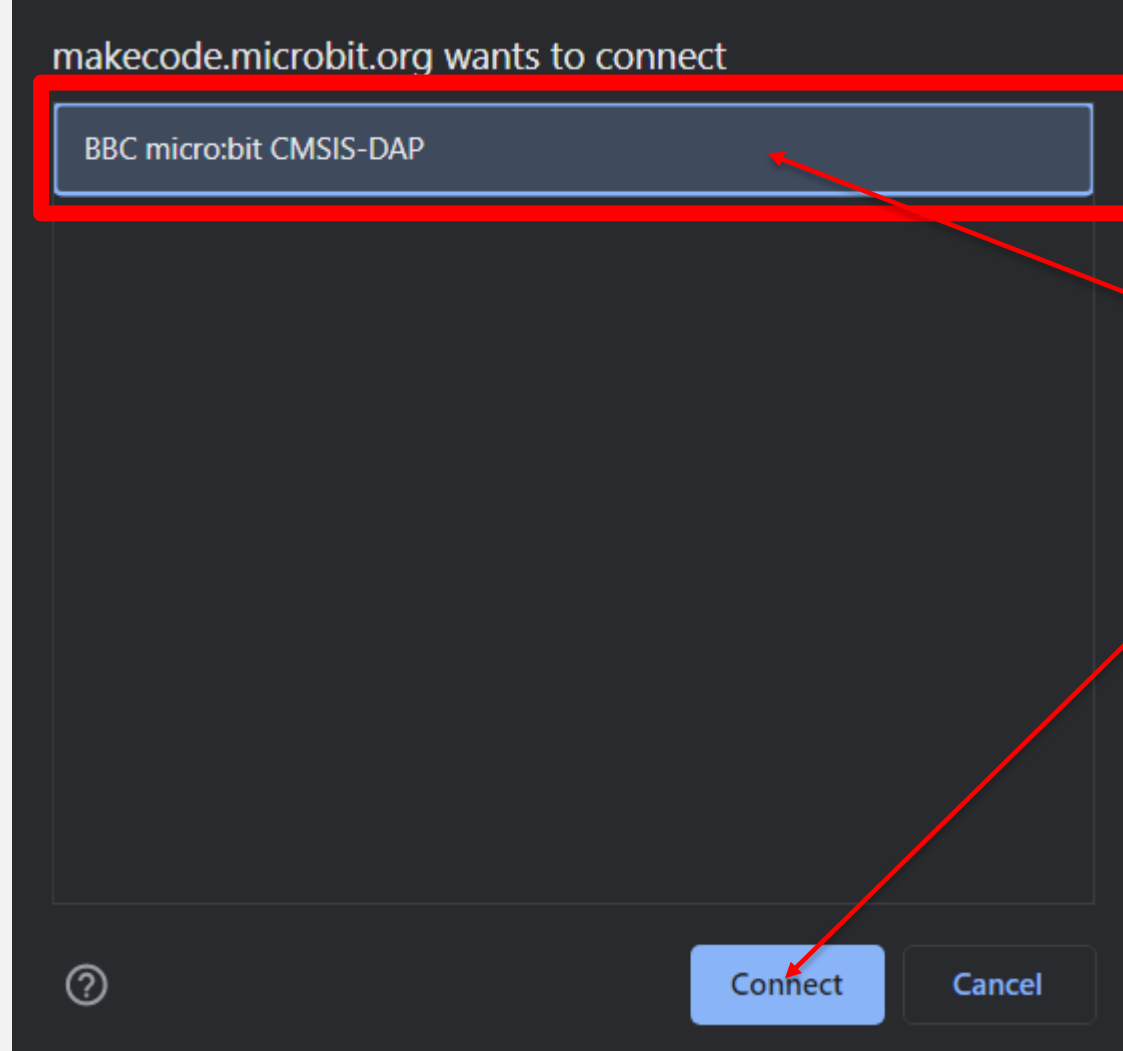


Before we start programming, let's **connect our micro:bit** first,

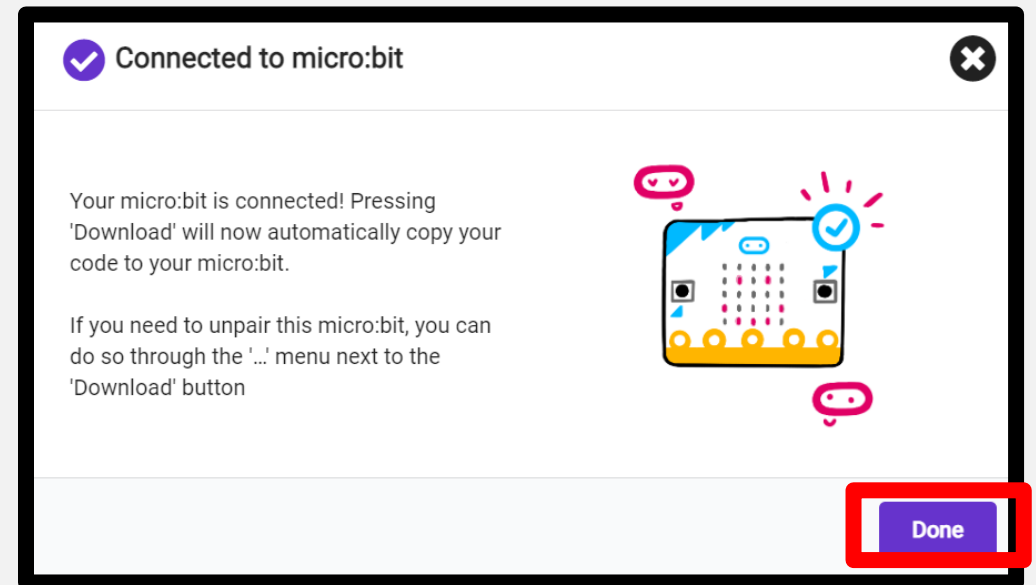
Click the three dots



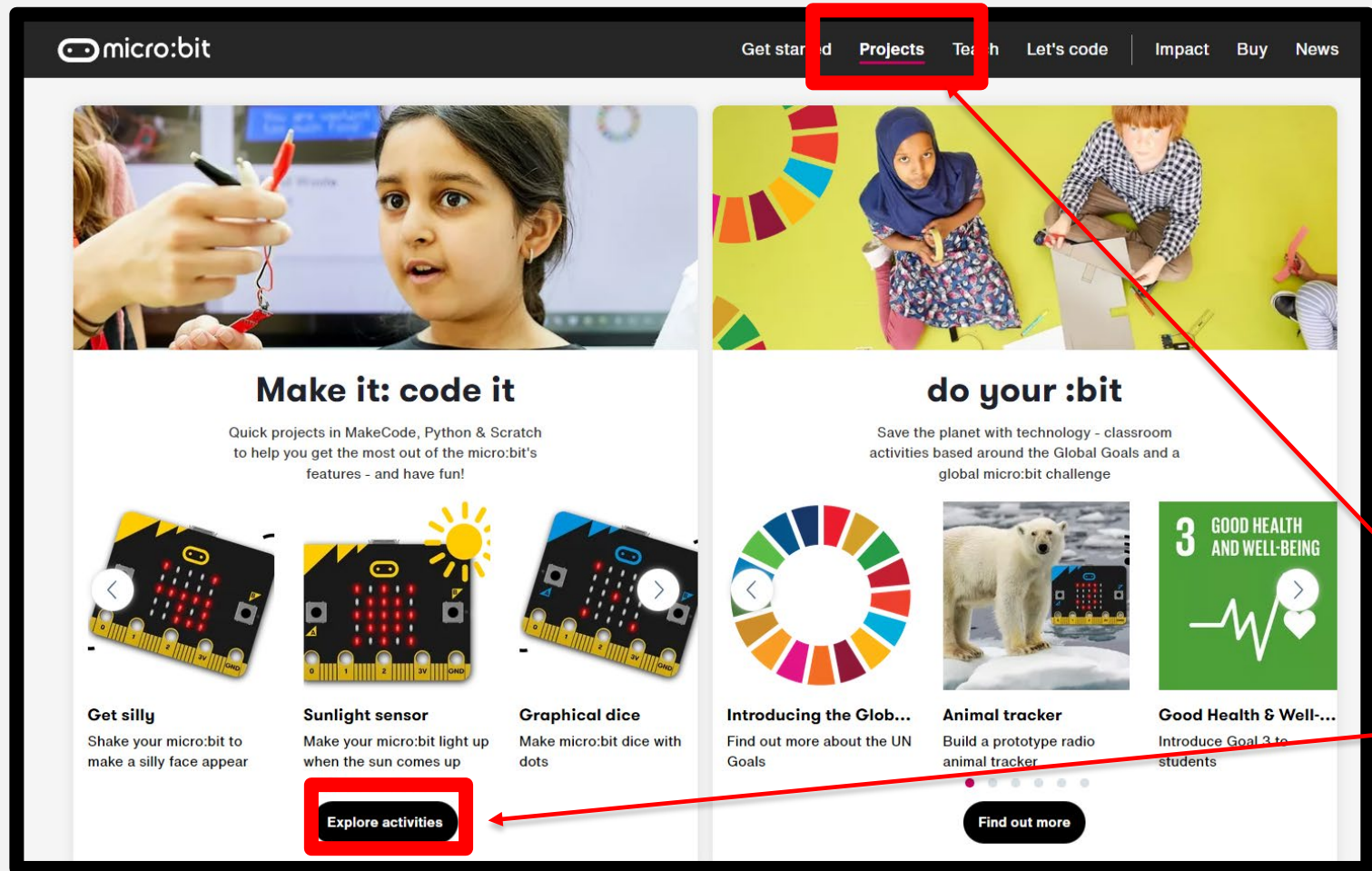




Click and then press connect button



Now you are **ready** to program your micro:bit!



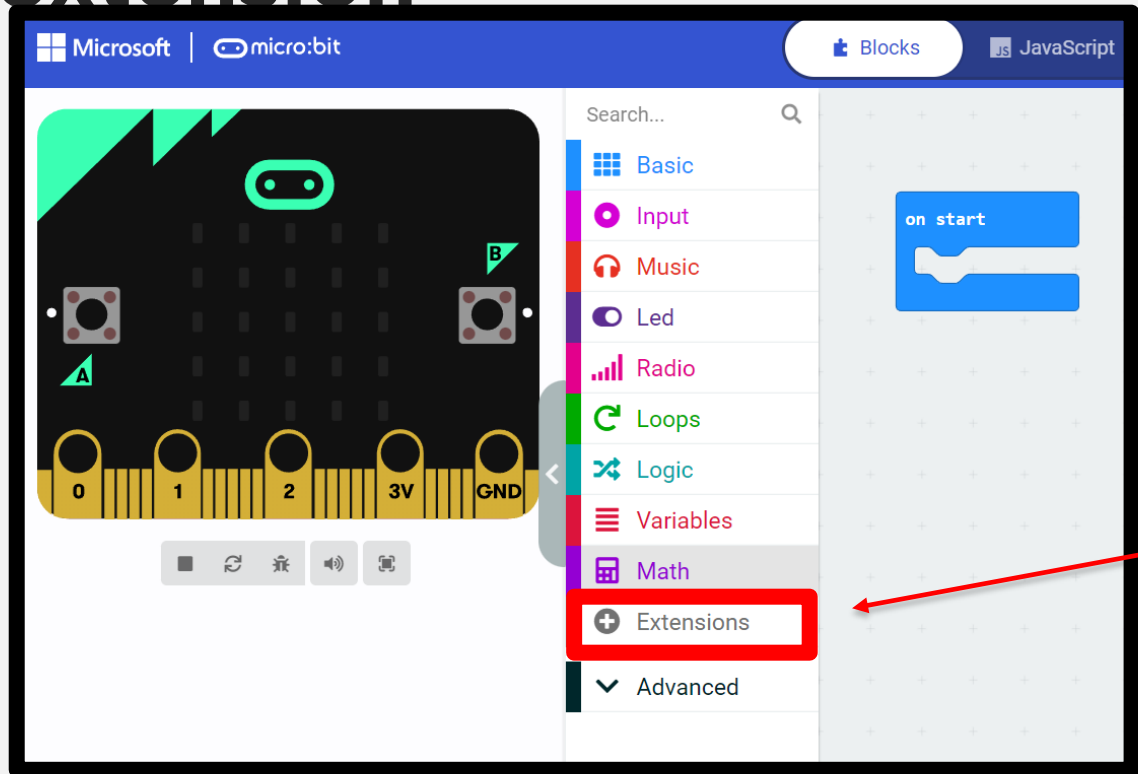
The screenshot shows the micro:bit website homepage. At the top, the navigation bar includes 'Get started', 'Projects', 'Teach', 'Let's code', 'Impact', 'Buy', and 'News'. The 'Projects' link is highlighted with a red box. Below the navigation bar, there are two main sections: 'Make it: code it' and 'do your :bit'. The 'Make it: code it' section features three project cards: 'Get silly', 'Sunlight sensor', and 'Graphical dice'. The 'do your :bit' section features three project cards: 'Introducing the Glob...', 'Animal tracker', and 'Good Health & Well-being'. A red arrow points from the 'Projects' link to the 'Explore activities' button at the bottom of the 'Make it: code it' section.

You can **try** these later!

Just click on **Projects**, and **Explore activities**

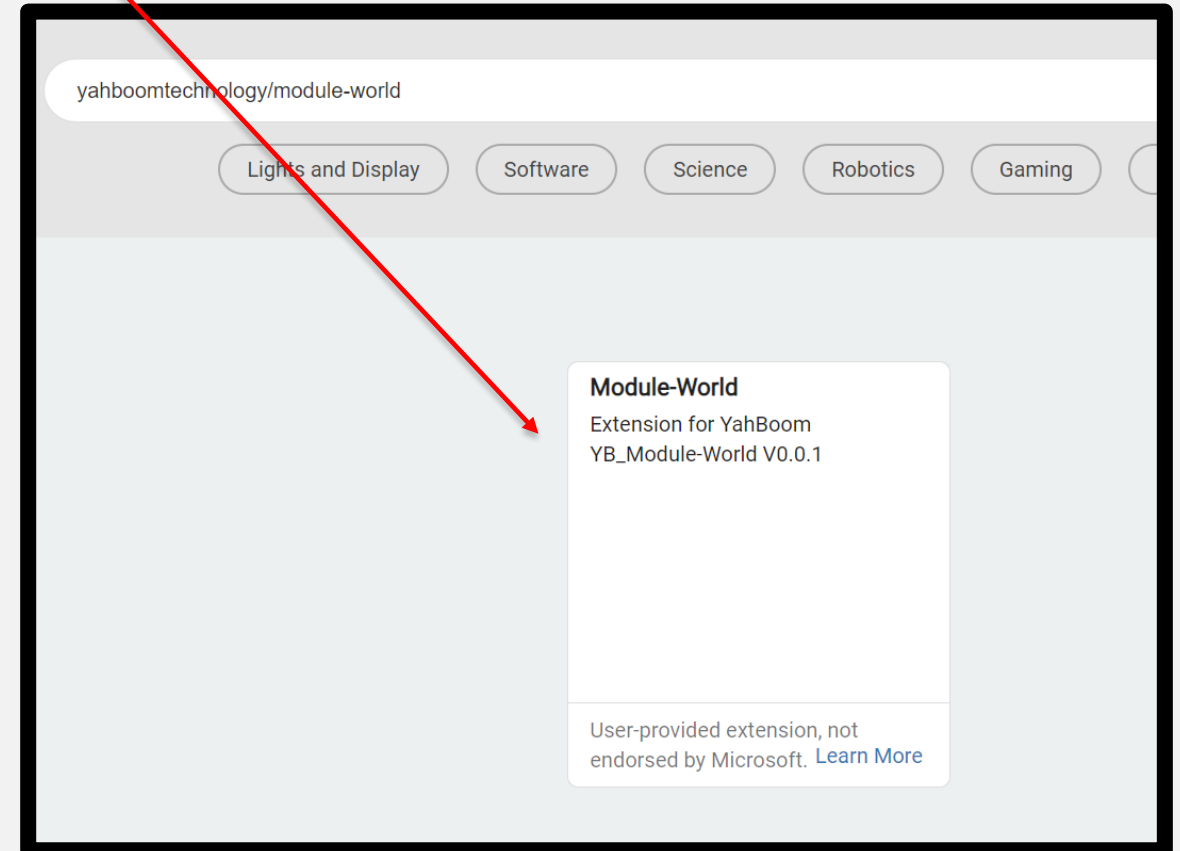
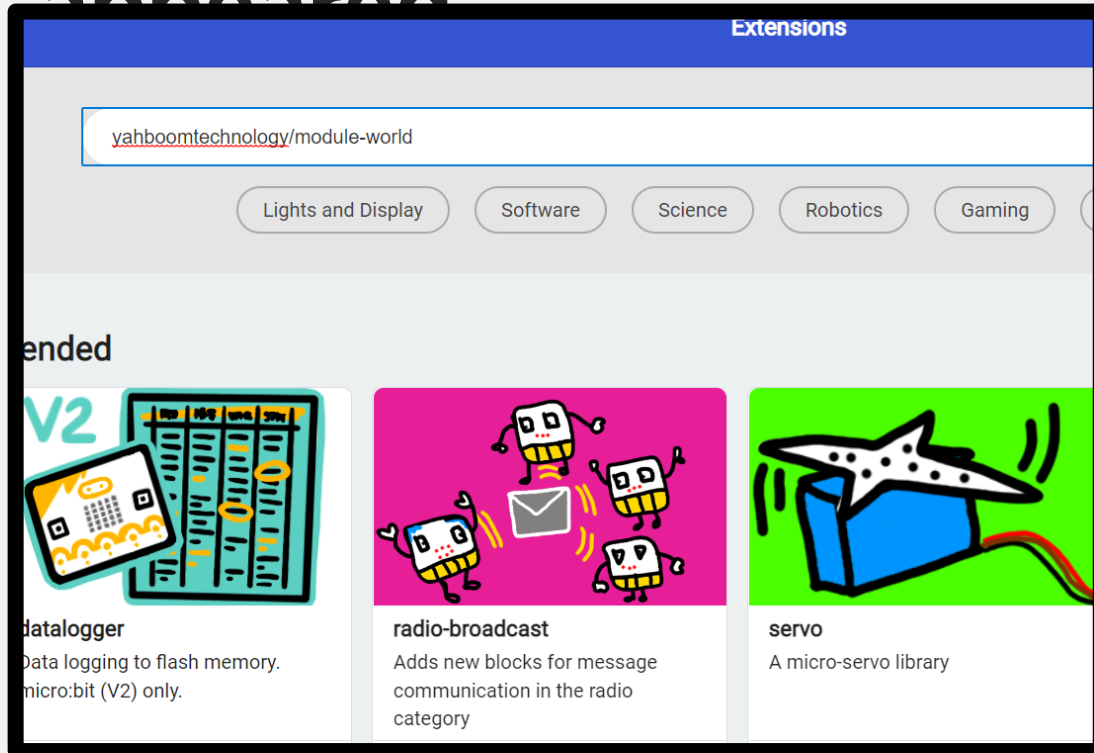
Let's program our Module's Sensor Kit

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

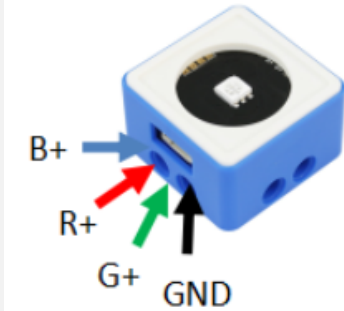


Click "Extensions"

Search and **click** the extension appeared

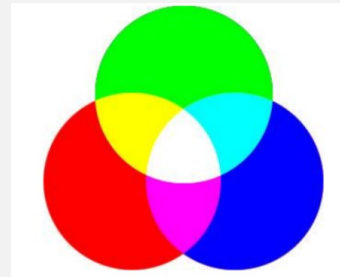


RGB Module



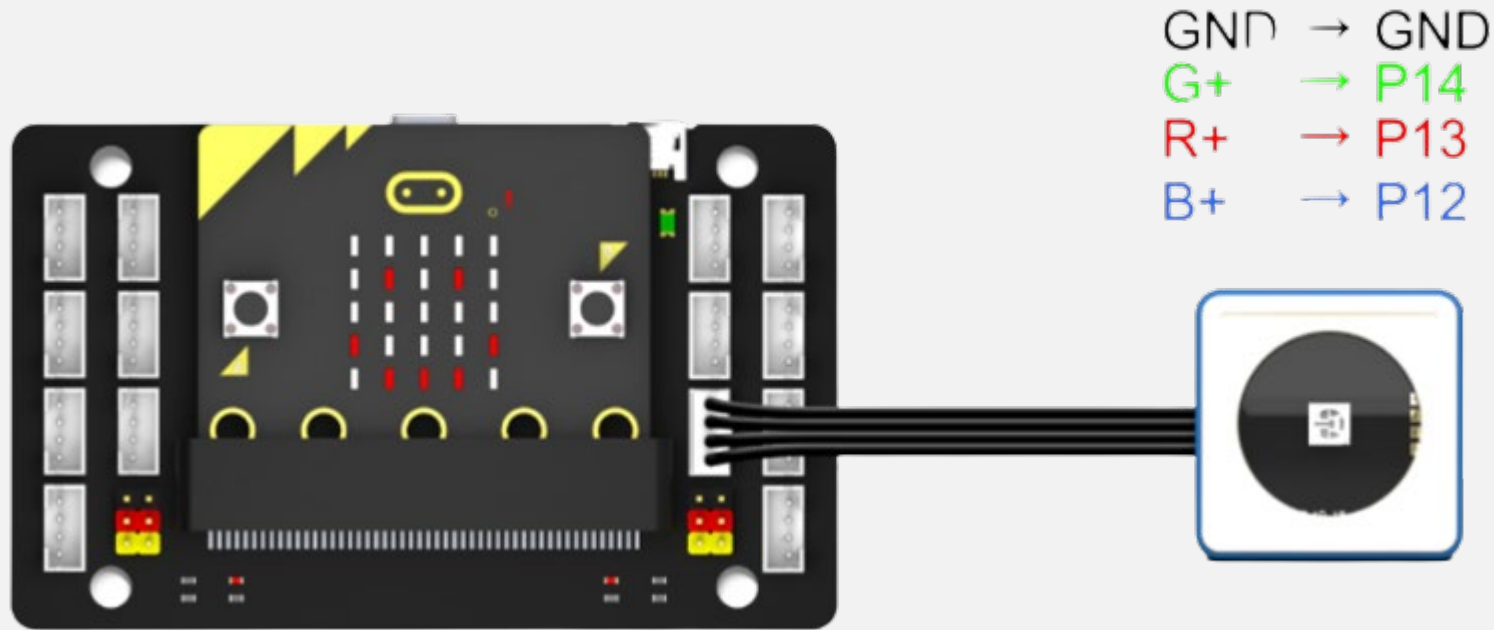
RGB: Three primary colors	GND: connect <u>gnd</u>
R+: Control the brightness of red	Working Voltage: 3.3V/5V
B+: Control the brightness of blue	Rated power: 0.2W
G+: Control the brightness of green	Size of module: 29.4mm*28.8mm

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

Variables

Math

ModuleWorld_Digital

ModuleWorld_Analog

ModuleWorld_PWM

RGB (P12P13P14) value1 0 value2 0 value3 0

RGB (P12P13P14) value OFF

forever

RGB (P12P13P14) value1 255 value2 0 value3 0

3. Changing the corresponding value will display different colour

Green Light:

```

forever
  RGB (P12P13P14) value1 0 value2 255 value3 0
  
```

Blue Light:

```

forever
  RGB (P12P13P14) value1 0 value2 0 value3 255
  
```

White Light:

```

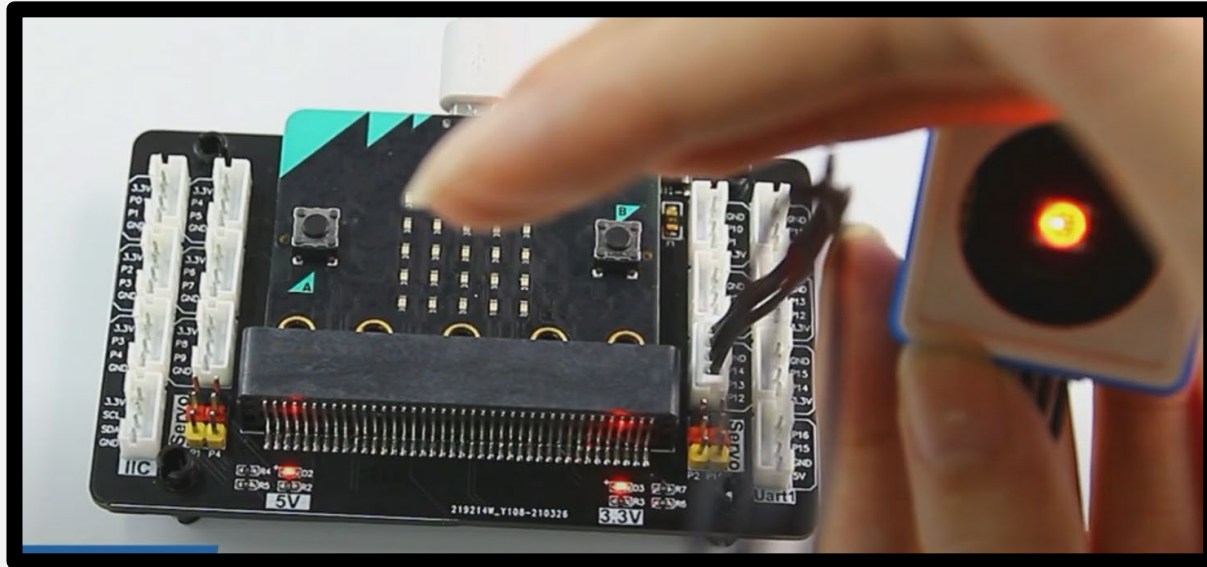
forever
  RGB (P12P13P14) value1 255 value2 255 value3 255
  
```

Close RGB Light:

```

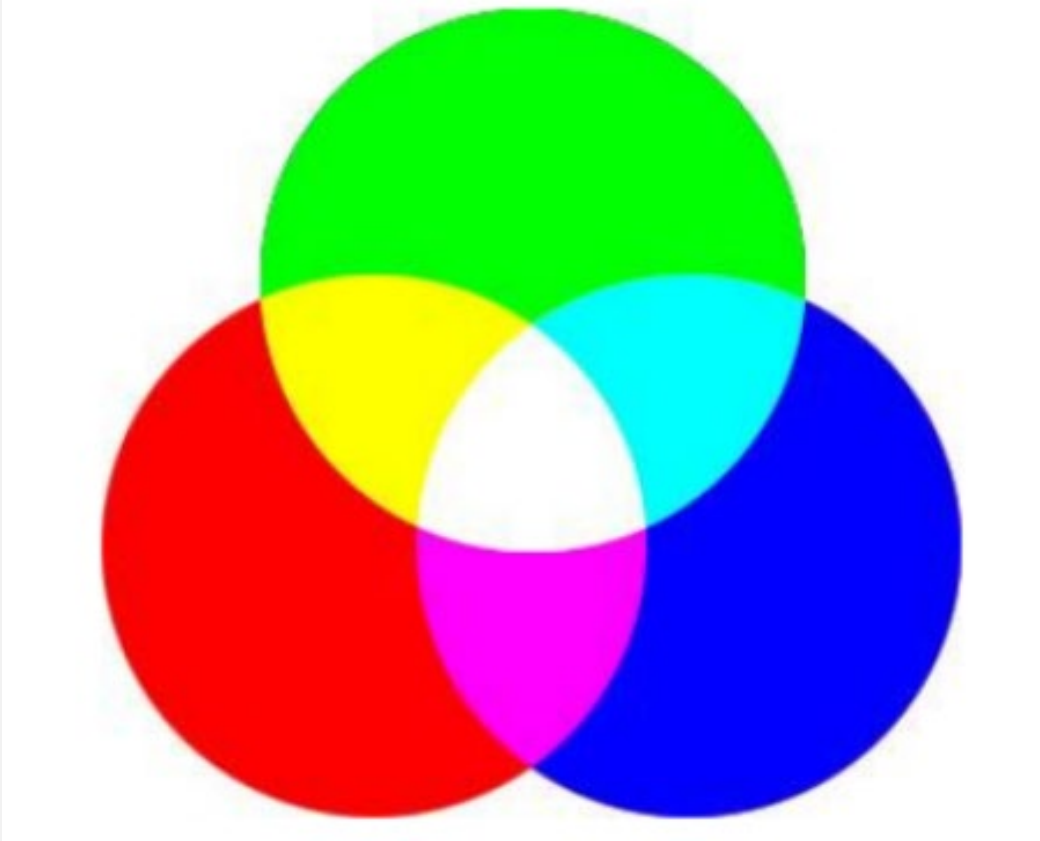
forever
  RGB (P12P13P14) value1 0 value2 0 value3 0
  
```

4. Light appeared



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

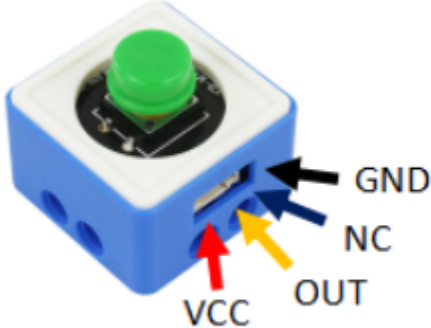
Challenge 1: Different Color



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

1. Yellow
2. Cyan
3. Magenta

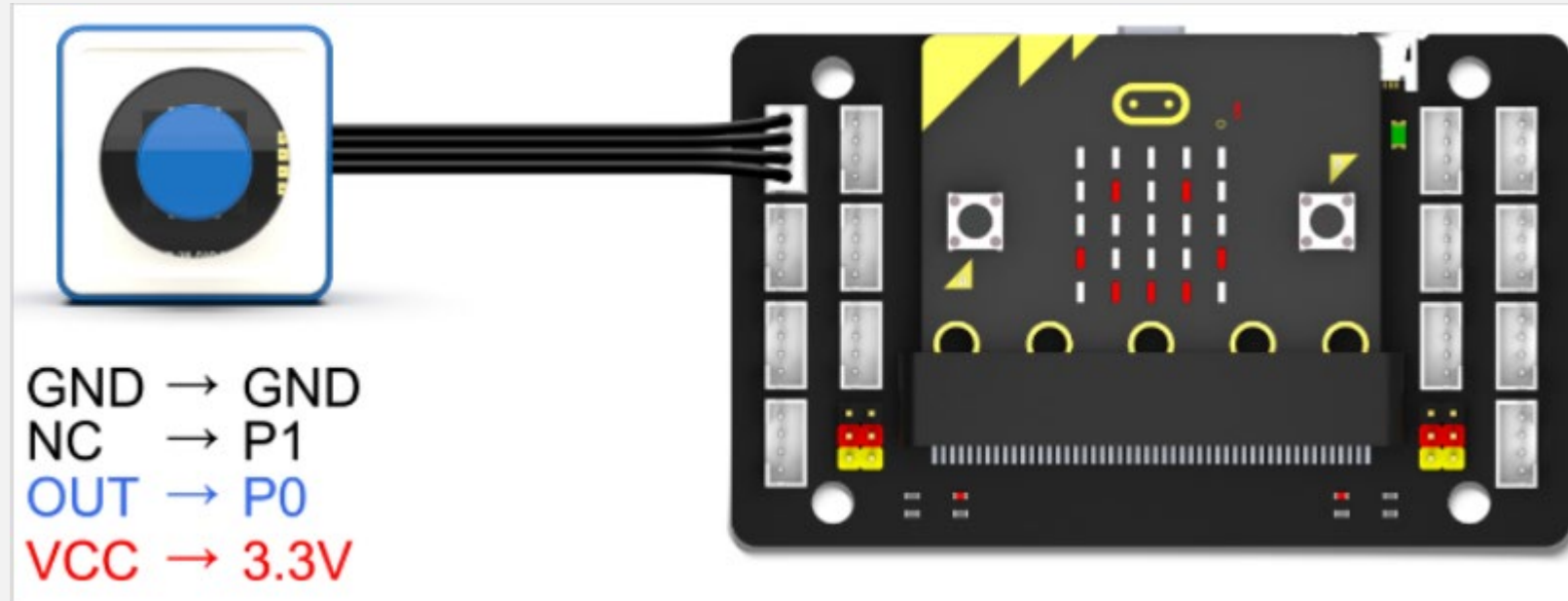
Button Module



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

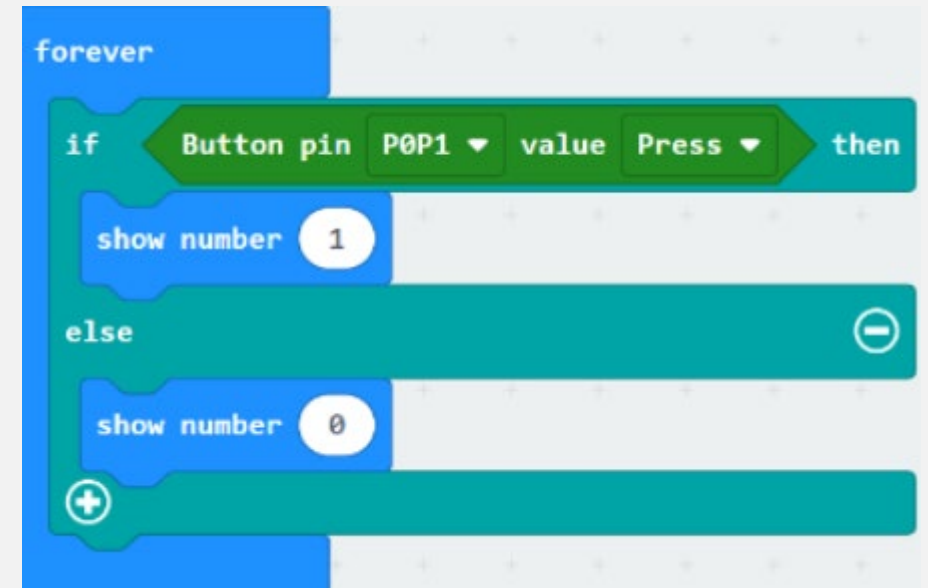
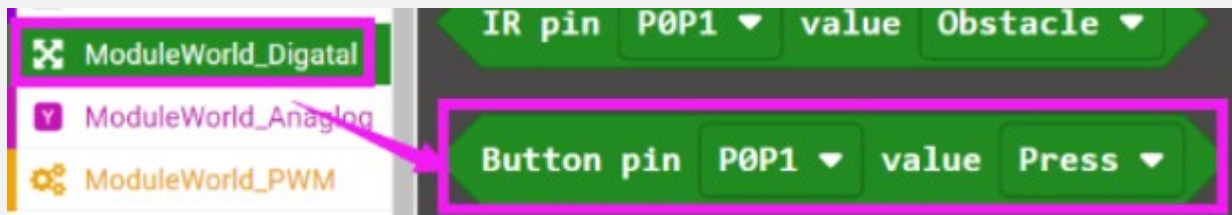
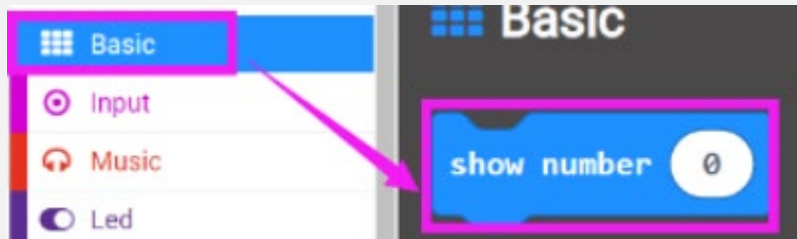
This button module is a **self-resetting** button

Button Detection



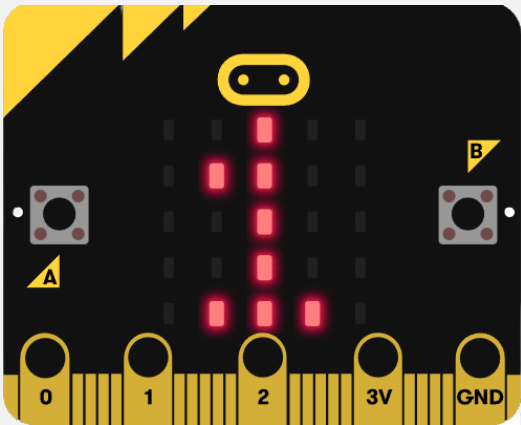
1. **Connect** Button to expansion board

2. Combine Blocks

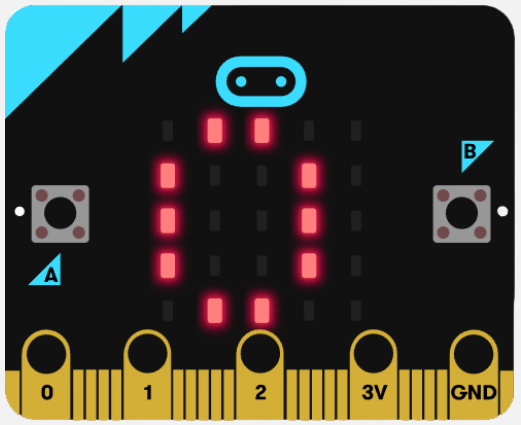


3. Number displayed

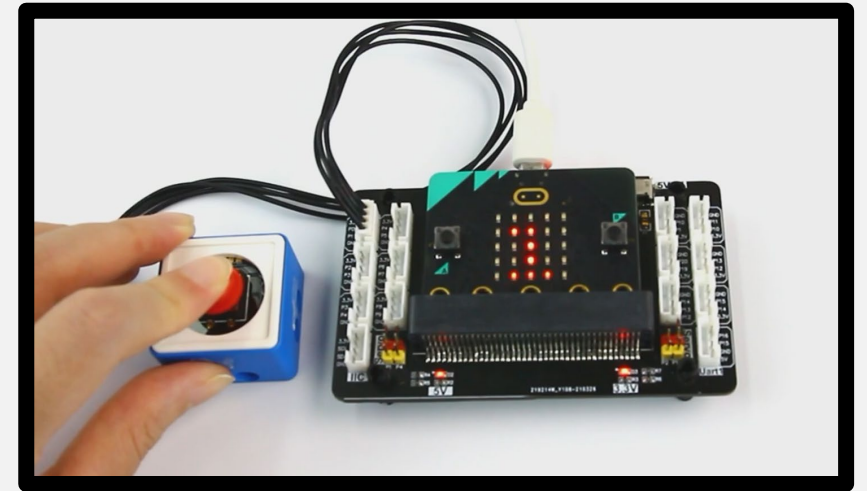
After the program is downloaded successfully,



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



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



Challenge 2: Button control light

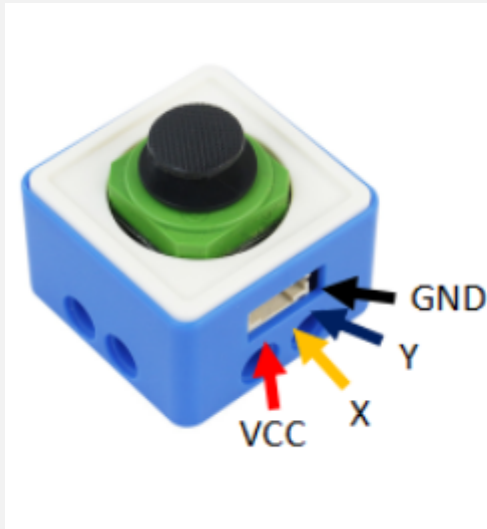


Connect your RGB light module to the expansion board to P14, P13, P12.

Try to program:

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

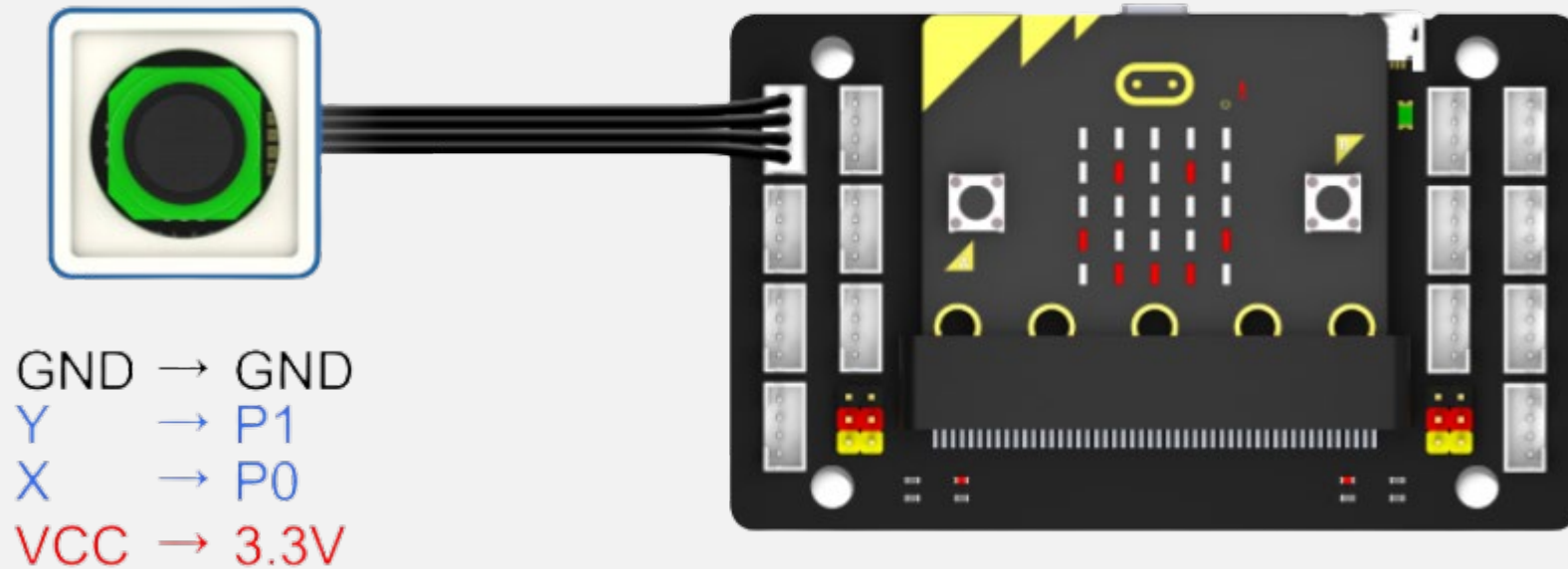
Rocker Module



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

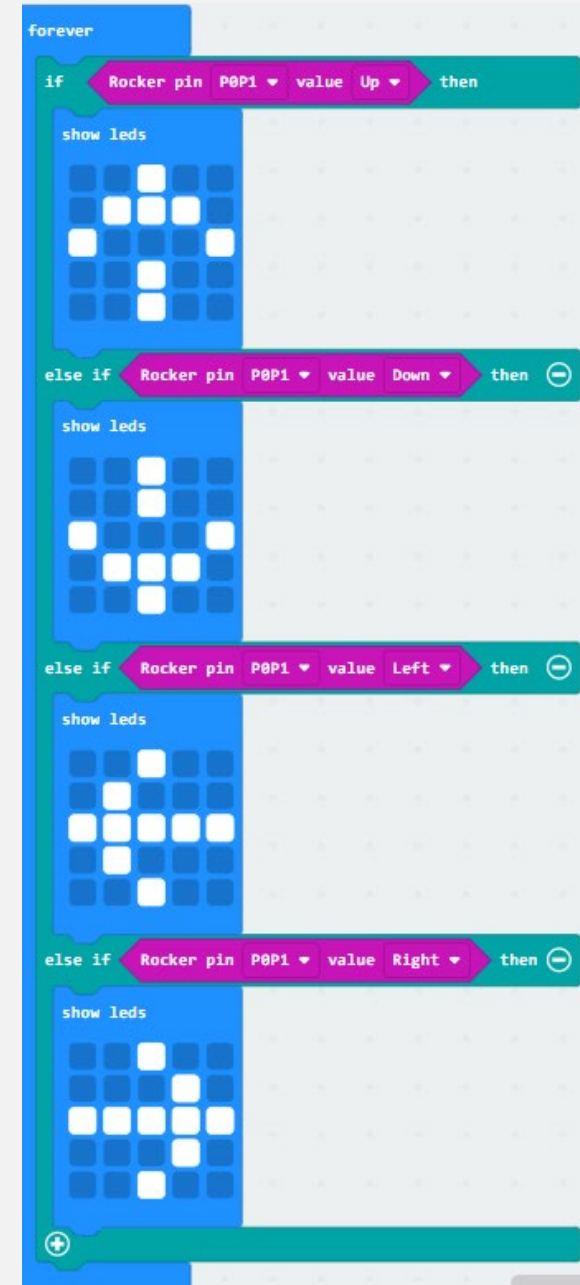
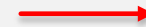
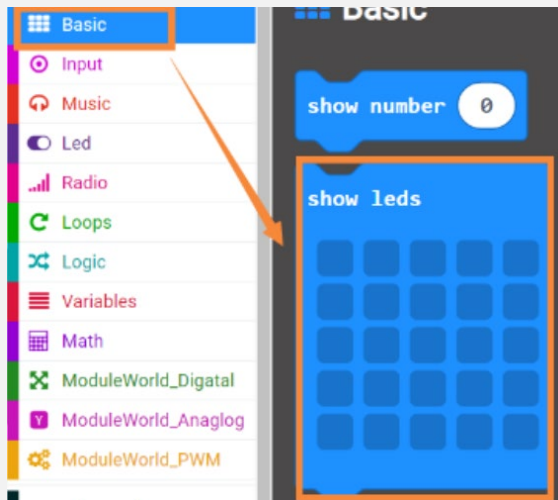
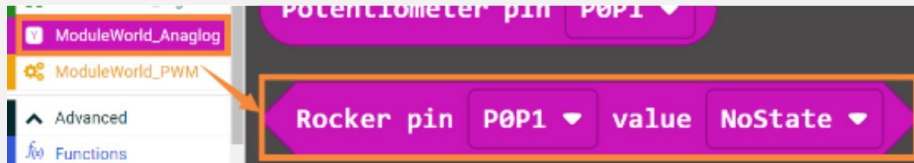
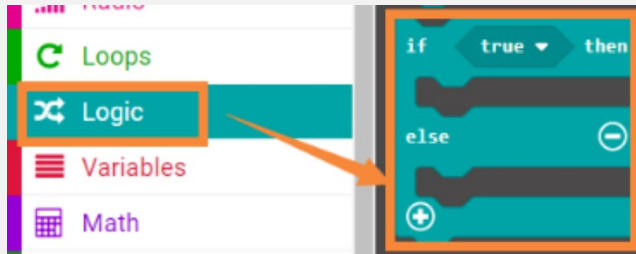
Rocker module can be regarded as a potentiometer with two channels, which can output the **X-axis and **Y-axis** analog values.**

Control rocker



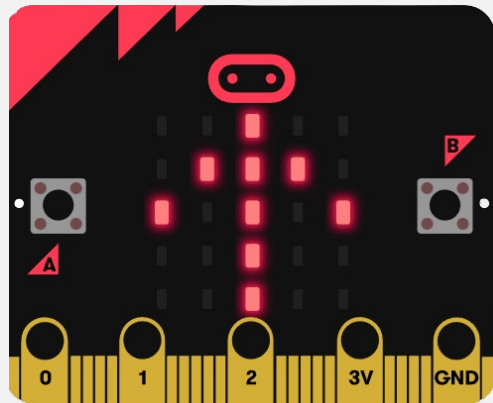
1. **Connect** Rocker to expansion board

2. Combine Blocks

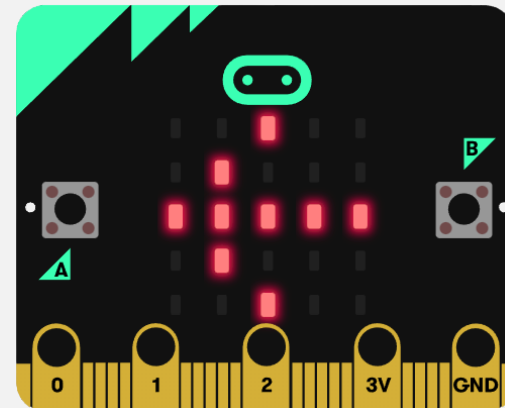


3. LED displayed

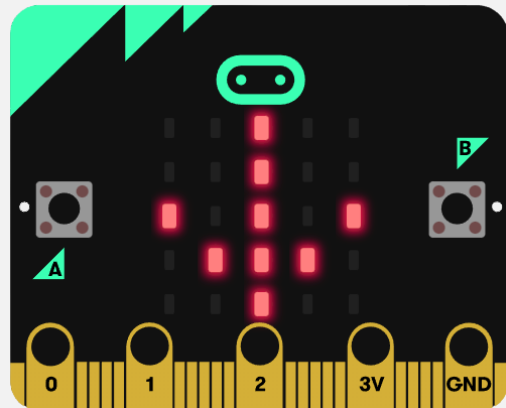
After the program is downloaded successfully,



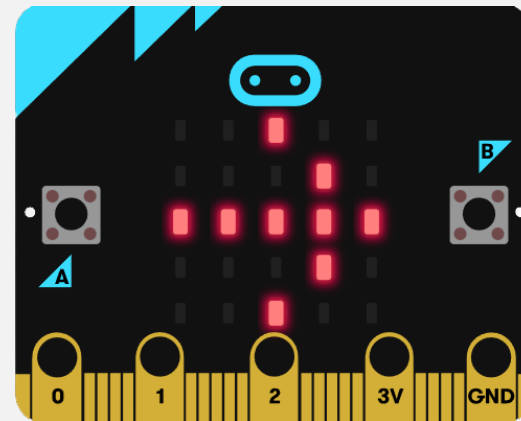
Joystick when pushed up



Joystick when pushed to the left

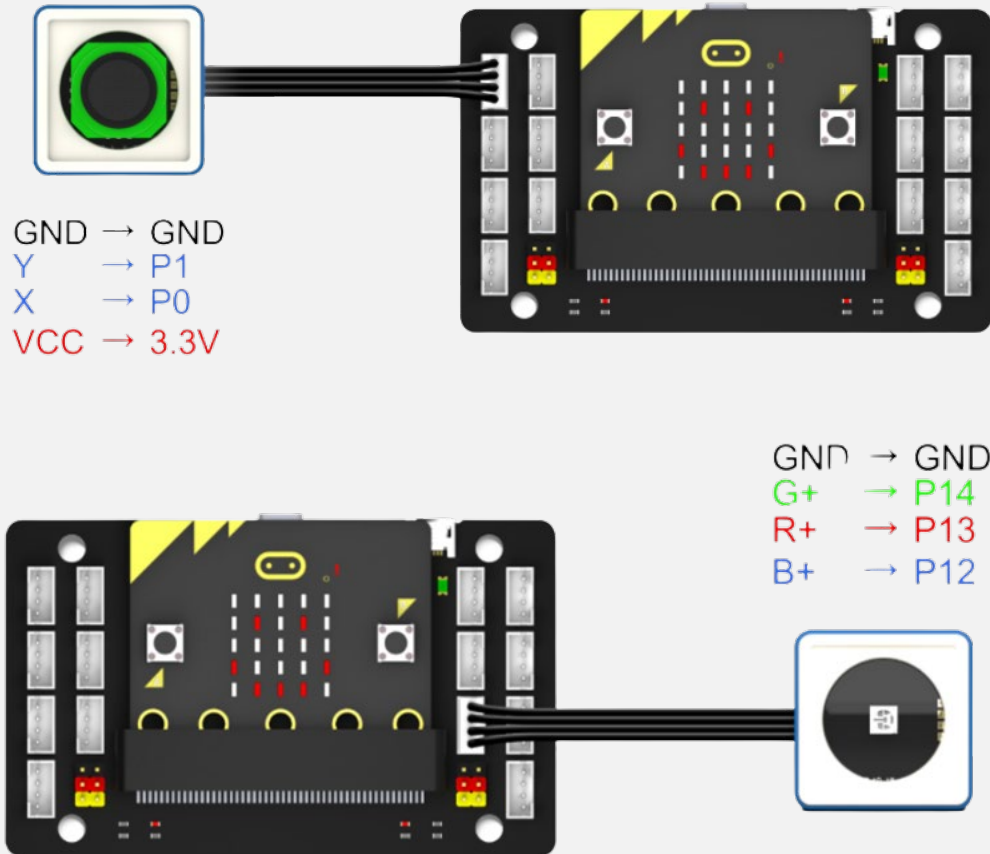


Joystick when pushed down



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**

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 :)