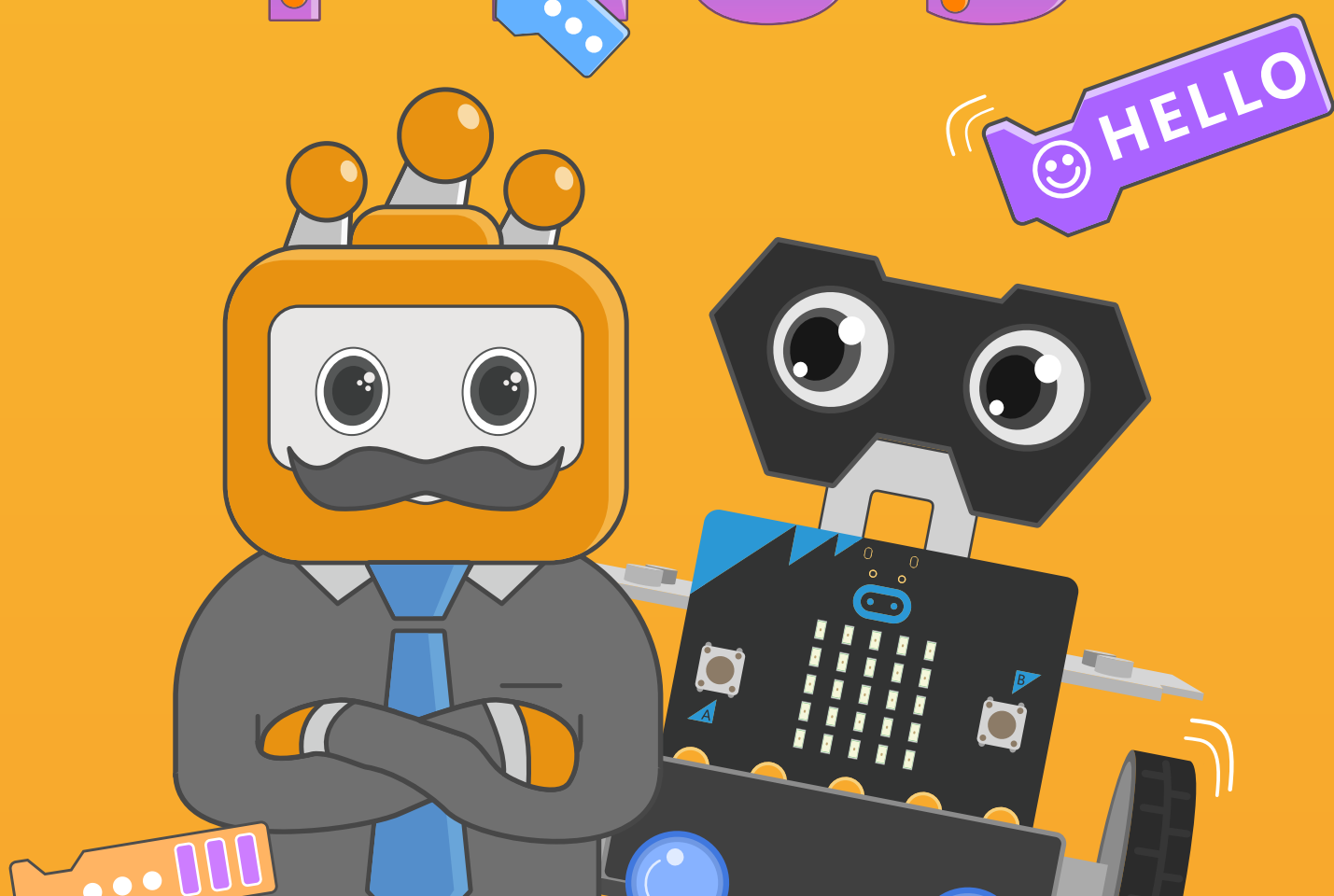# Chapter 1

Introduction to Maqueen Plus
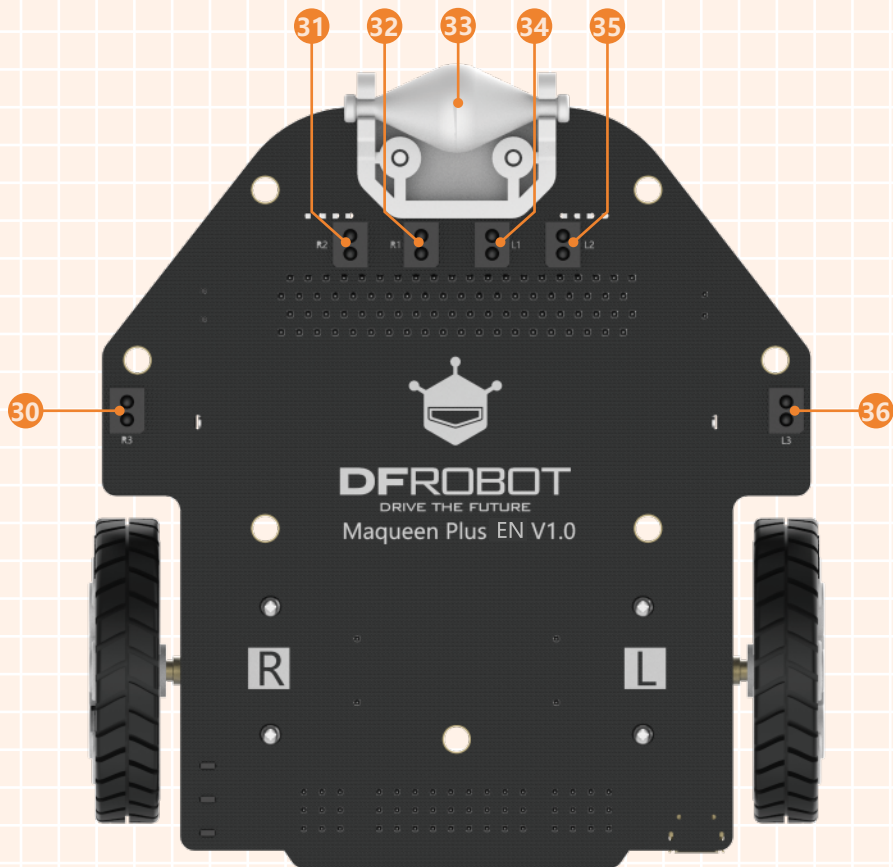
# Introduction 📖

## What is Maqueen Plus?

Maqueen Plus is a smart programmable educational robot designed for beginners. It supports Mind+ and MakeCode programming platforms, on which we can program Maqueen Plus to realize awesome functions by simply dragging and snapping the graphical blocks. Follow Maqueen Plus to enter the world of robotic, and while learn something about coding in playing!

Before we get started, let's see what Maqueen Plus has got there.
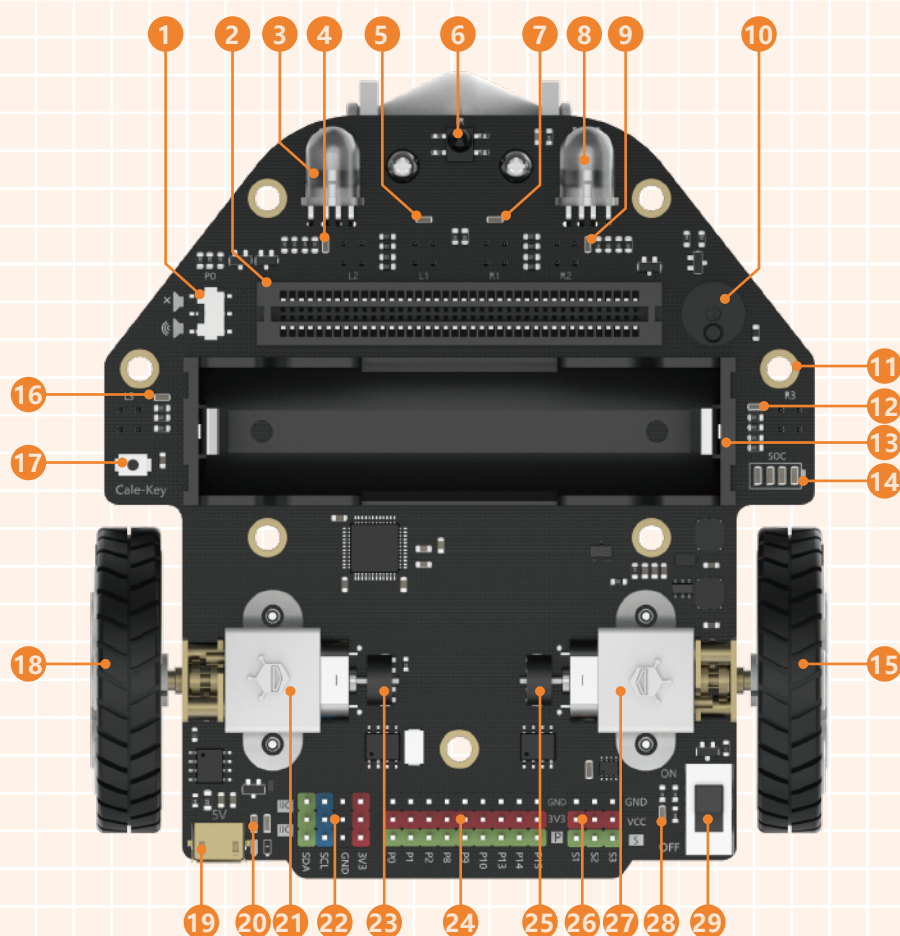


| | | | | |
|---|---|---|---|---|
| **1** Buzzer switch | **2** micro:bit socket | **3** RGB-LED-L | **4** L2 indicator LED | **5** L1 indicator LED |
| **6** Infrared receiver | **7** R1 indicator LED | **8** RGB-LED-R | **9** R2 indicator LED | **10** Buzzer |
| **11** M3 Mounting holes | **12** R3 indicator LED | **13** Battery case | **14** Electricity indicator LED | **15** Right wheel |
| **16** L3 indicator LED | **17** Line-tracking Calibration Key | **18** Left wheel | **19** Charging port | **20** Charging indicator LED |
| **21** Motor-L | **22** IIC expansion port | **23** Encoder-L | **24** GPIO port | **25** Encoder-R |
| **26** Servo port | **27** Motor-R | **28** Power supply indicator LED | **29** Power supply switch | |

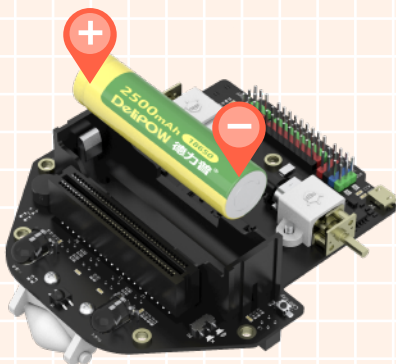| 30 | R3 line-tracking sensor | 31 | R2 line-tracking sensor | 32 | R1 line-tracking sensor | 33 | Support wheel | 34 | L1 line-tracking sensor |
|----|----|----|----|----|----|----|----|----|----|
| 35 | L2 line-tracking sensor | 36 | L3 line-tracking sensor | | | | | | |

We can see that Maqueen has equipped with so many functions, and now you must can't wait to try them. OK, here we go!
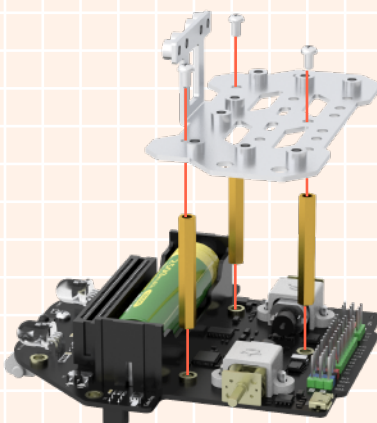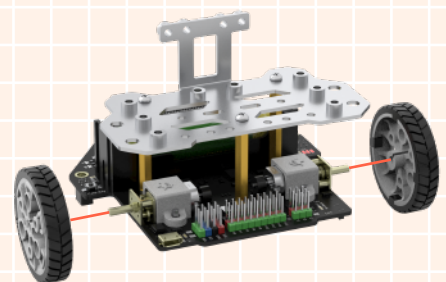
## Assembly

### Maqueen Plus Assembly Diagram
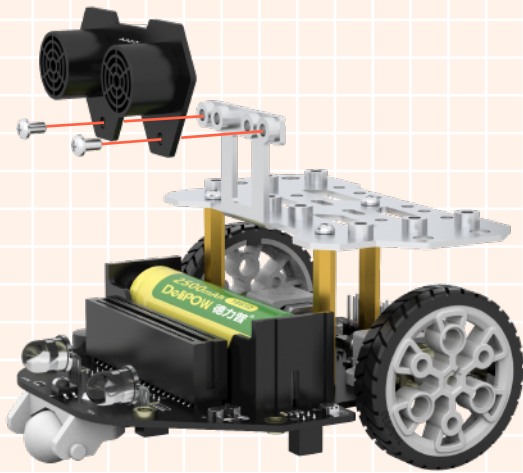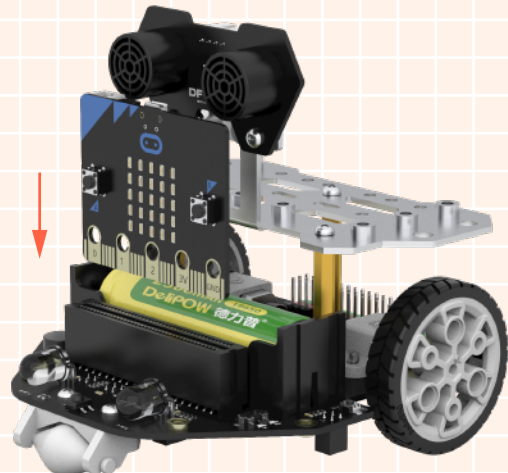


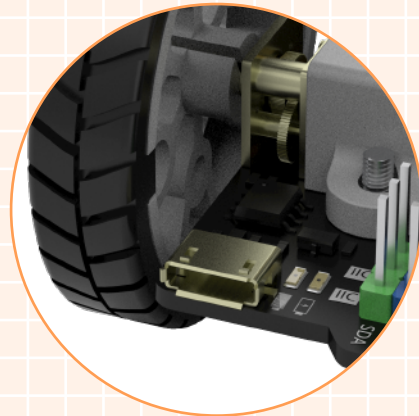1  Install 18650 battery    2  Install the expansion bracket    3  Install wheels

④ Install ultrasonic sensor

⑤ Plug in micro:bit board



Battery indicator



Charging port

Note: when the battery is fully charged, all LEDs will be on. The LEDs will be off one by one as the power gradually decreases. If all lights go out, the battery needs to be recharged.

After we assembled Maqueen Plus, put it aside because first, we need to get familiar with it's most important controller device---micro:bit. Just like the CPU in a computer, micro:bit is Maqueen's "brain" for storing and processing data, which also is the key to make Maqueen Plus "alive".

# Introduction to micro:bit

### What can micro:bit do?

The micro:bit can be programmed to do various interesting things, it can be a digital watch, fitness tracker, or a game console. The device features 25 LED lights and two programmable buttons, which can be used in game-play or to skip through tracks in a playlist. It also features an on-board compass to track the direction of the wearer...

In addition, micro:bit is equipped with commonly-used sensors like light sensor, temperature sensor, etc. It can be widely used in computer games, acousto-optic interactions, robotics, scientific experiments, wearable device and so on.

## micro:bit Function

On the credit card size board, it has 25 LED lights, two programmable buttons, light sensors, accelerometer, compass, temperature sensor, and Bluetooth module and so on.

### micro:bit Function Overview
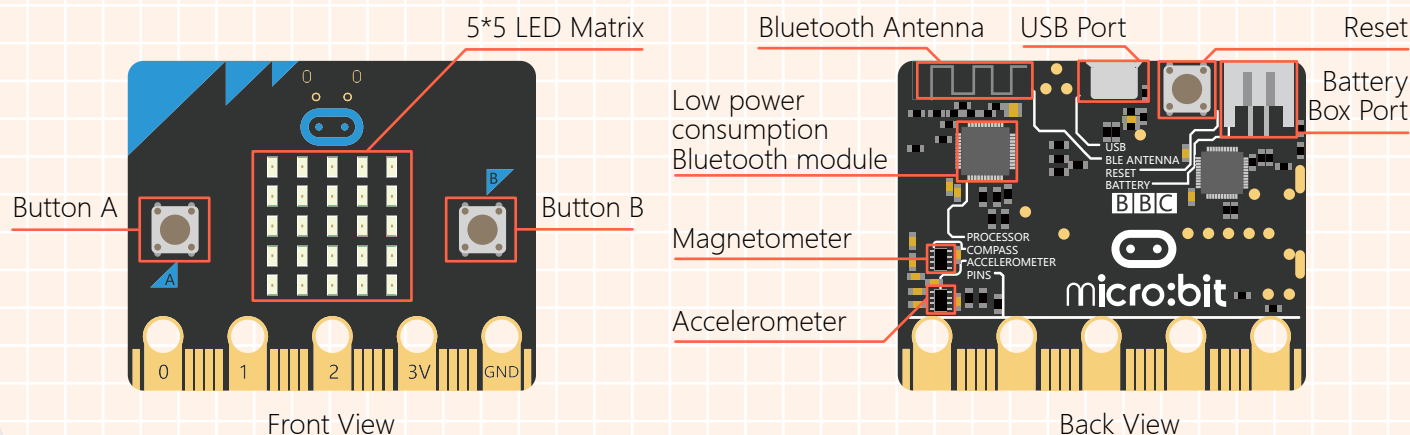


| | |
|---|---|
| 25 programmable LED Lights | Display patterns, words, and numbers |
| 2 programmable Buttons | Used separately or together to make things happen. For example, press down A to display a heart pattern. |
| Light Sensor | The 25 LEDs can act as sensors to measure how much light is falling on the micro:bit. |
| Accelerometer and Compass | Measure the gestures or forces in 3 dimensions. |
| Temperature Sensor | Detect the temperature in the current environment. |
| Bluetooth & Radio | Your micro:bit can communicate with other micro:bits by radio, and with other devices using Bluetooth. |

## micro:bit Programming

We can directly program micro:bit online without installing any software. There is a huge community of people making tools for programming and interacting with the micro:bit which means you can program your micro:bit in Python, C++ and other languages, including all kinds of block editors like Mind+, Blocks, Javascript, Python, Scratch.

In this tutorial, we will use MakeCode to program, click the link https://makecode.microbit.org/ to enter Make-Code online programming environment.

# MakeCode Online Programming

## MakeCode Introduction

Microsoft MakeCode is a framework for creating interactive and engaging programming experiences for those new to the world of programming. The primary goal of MakeCode is to introduce programming in a way that is approachable and inviting. MakeCode uses the blocks programming model to let the users learn coding concepts in a more tangible fashion. Once the user becomes comfortable with the coding elements and structure, they can progress to create more complex programs.
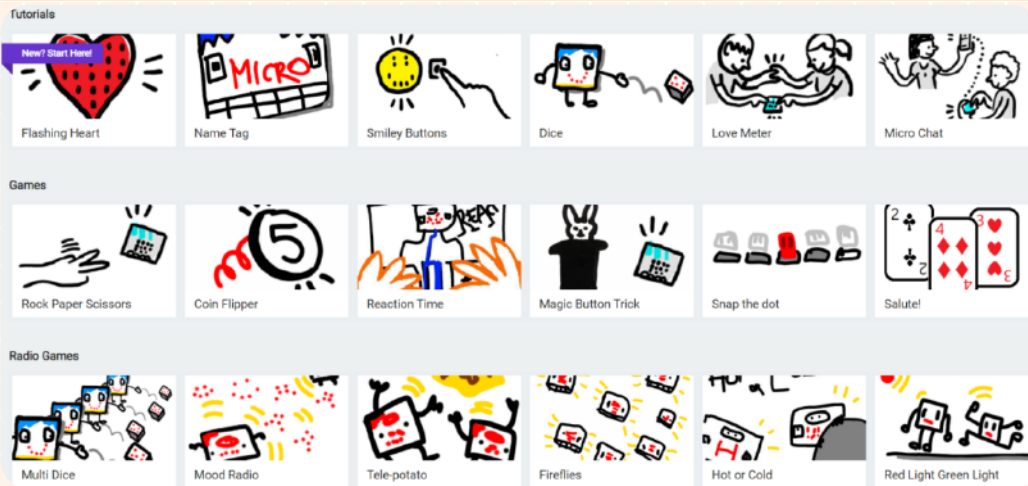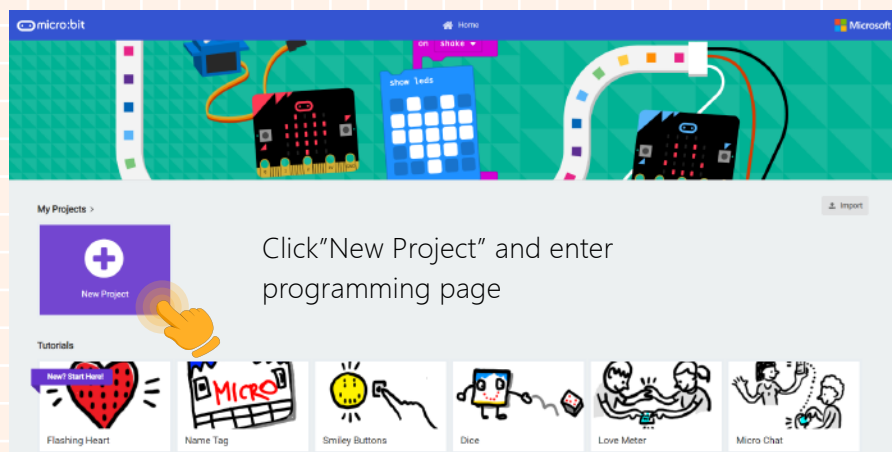
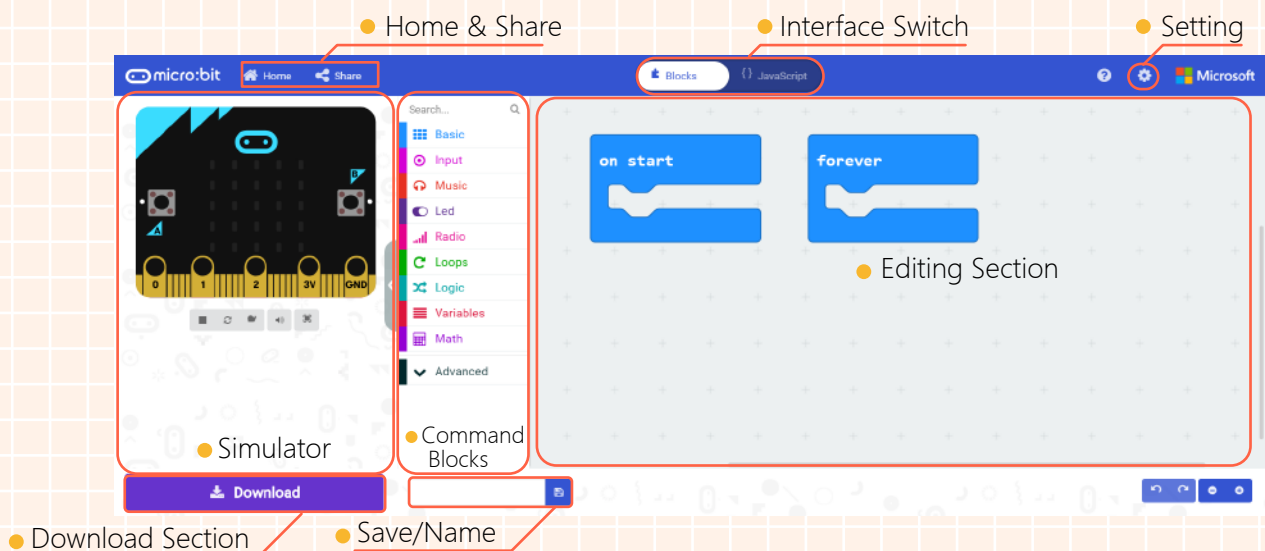## Build Up Programming Environment

1.Input https://makecode.microbit.org/ to your browser to enter the MakeCode programming environment.

Note: it should be operated on the computer with a good Internet connection. If it cannot be loaded properly, please try it again using Google browser.

**Enter MakeCode**



Click"New Project" and enter programming page

2.Open MakeCode editor and create a new project to enter MakeCode programming interface.



Home & Share    Interface Switch    Setting

Editing Section

Simulator

Command Blocks

Download Section    Save/Name

| Name | Function |
|---|---|
| Home & Share | Home: create a new project, open tutorial, game, music, fashion<br>Share: publish your project to share it or embed it in other web pages. |
| Interface Switch | Blocks: graphical programming, suitable for beginners, primary and middle school students.<br>JavaScript: code in JavaScript, suitable for high school, college students, and above. |
| Setting | Setting: project setting, extensions, language, delete project, reset, etc. |
| Simulator | Simulator: test the result of your program.<br>Preview Control: start, restart, stop the simulator, slow motion, mute audio, full-screen |
| Command Blocks | Blocks: 17 categories of programming blocks and more extended blocks. |
| Editing Section | Programming Editor: construct your program by dragging and snapping colorful blocks |
| Download Section | Download: download the program you edited into micro:bit. |
| Save/Name | Name: name your project.<br>Save: save your project.<br>Note: when you click "save", it will download the program at the same time. |

After we got a general understanding of MakeCode, let's step on our journey to code! In the first example, we will learn how to write and download a program.

## 1.Write a program

Step 1: drag the block we need to the editing section.
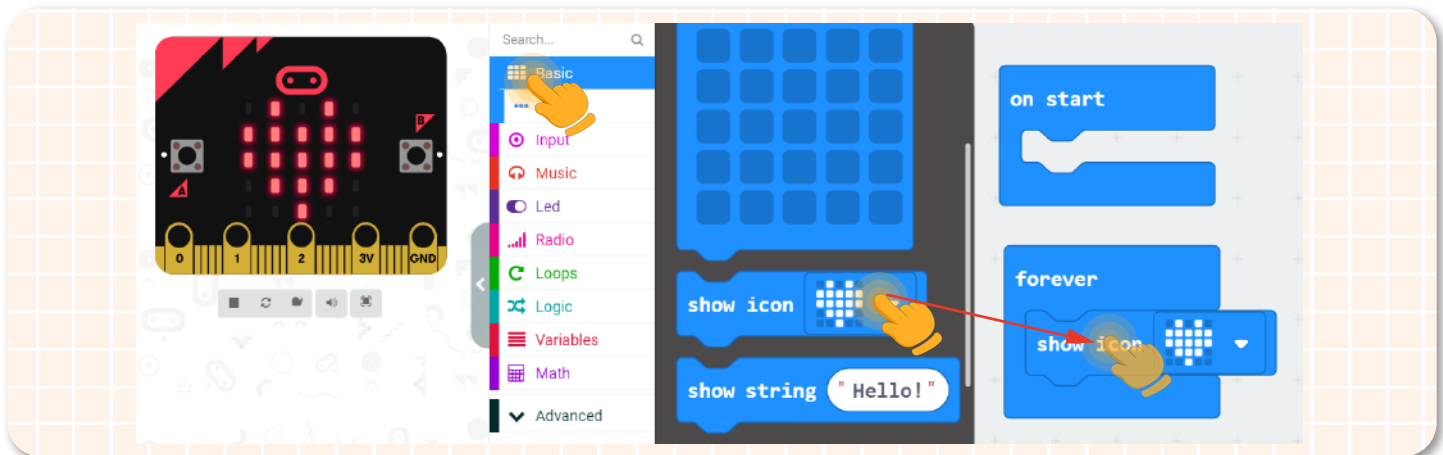


Step 2: to remove a block, drag it from the editing section to the command section, or right-click to delete.



### Knowledge Expansion

Hover your mouse pointer over the block, then the pointer will become " "; left-click to select the block, the pointer becomes " "; when you drag the block to the command section, it will become " " , then release the mouse to remove the block.

Step 3: after we completed a program, check its effect via the simulator.
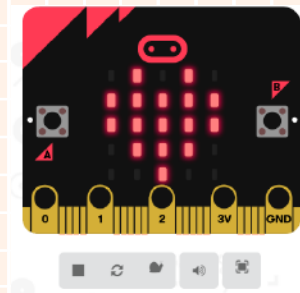


## 2.Prepare to download

Connect the micro:bit board to your computer by a USB cable. There will be a hard-disk named micro:bit appearing in your computer when the connection is successful.
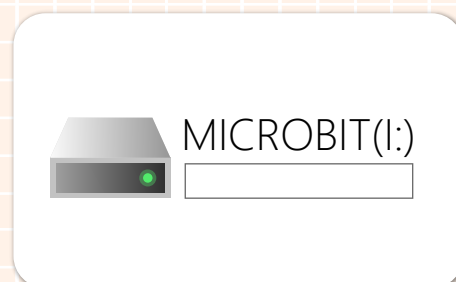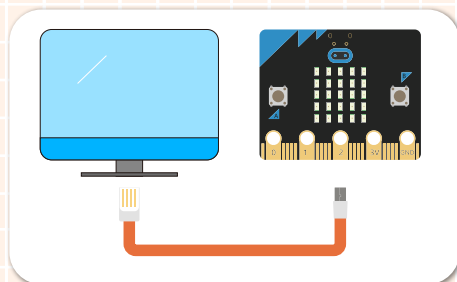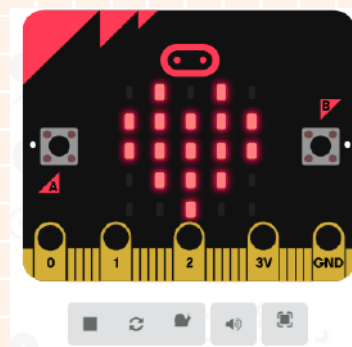


## 3.Download

Click "Download" to download the program into your micro:bit.

Note: when downloading a program, the micro:bit power indicator will keep flashing, and please do not disconnect the USB cable.
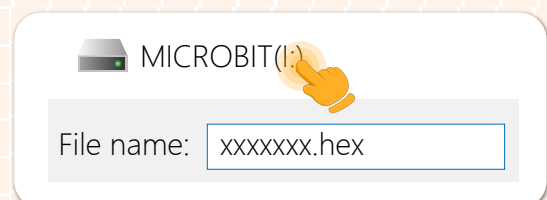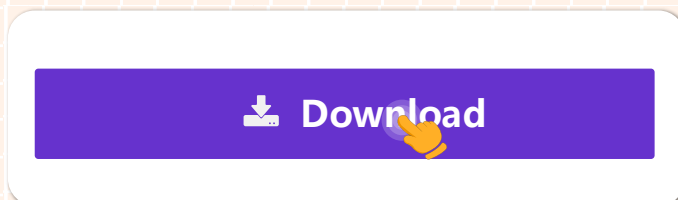


## 4. Download completes

Once the downloading is completed, the micro:bit LED screen will show a heart pattern.



Since we have learned the basics about Maqueen Plus, micro:bit and MakeCode programming, so for the next chapter, we are going to write a program to let micro:bit to drive Maqueen Plus.