mBuild Modules User Manual

Describes the functions and features, instructions, supporting software, and detailed hardware information of mBuild modules

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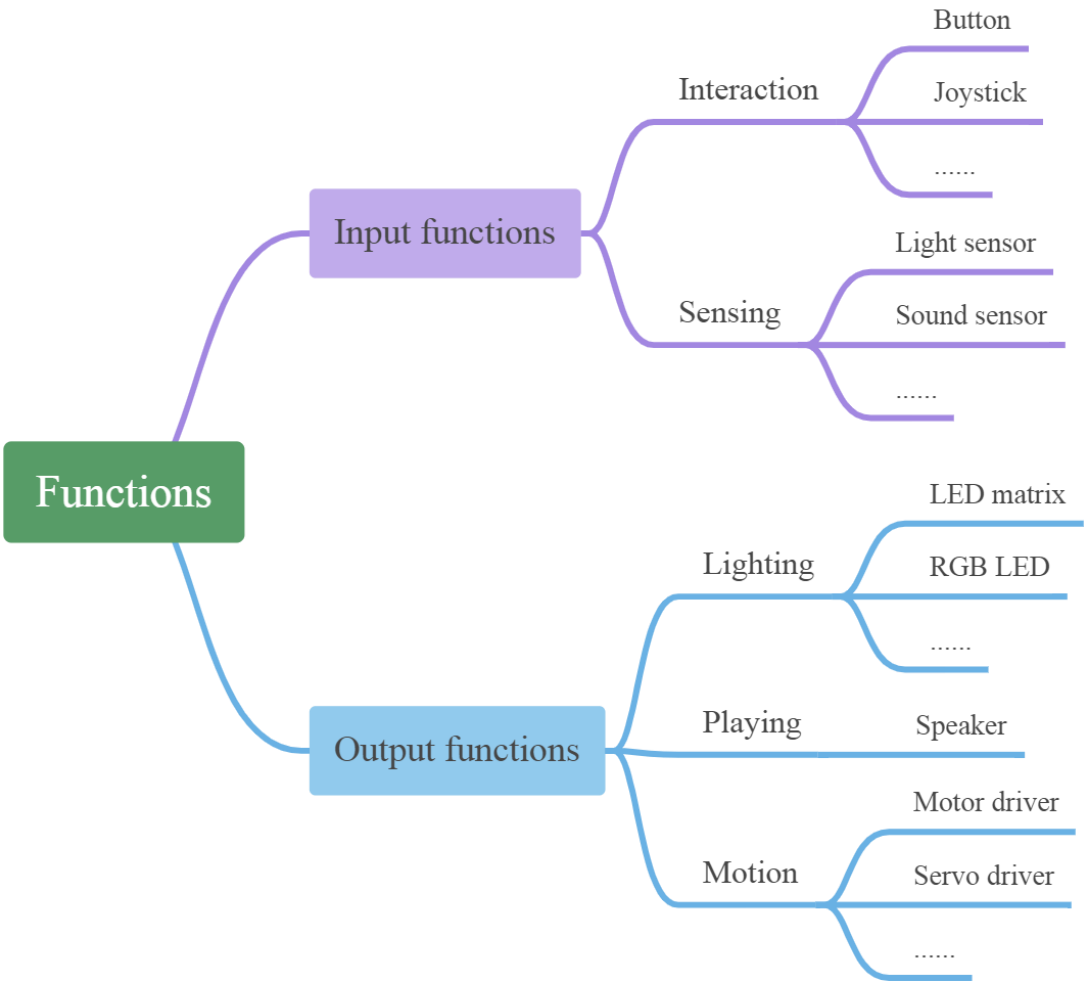
Functions and Features

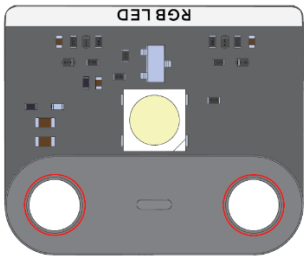
Functions

mBuild modules provide abundant input and output functions, allowing you to easily extend the functions of the supported main control boards, such as CyberPi and Halocode.



Structural characteristics

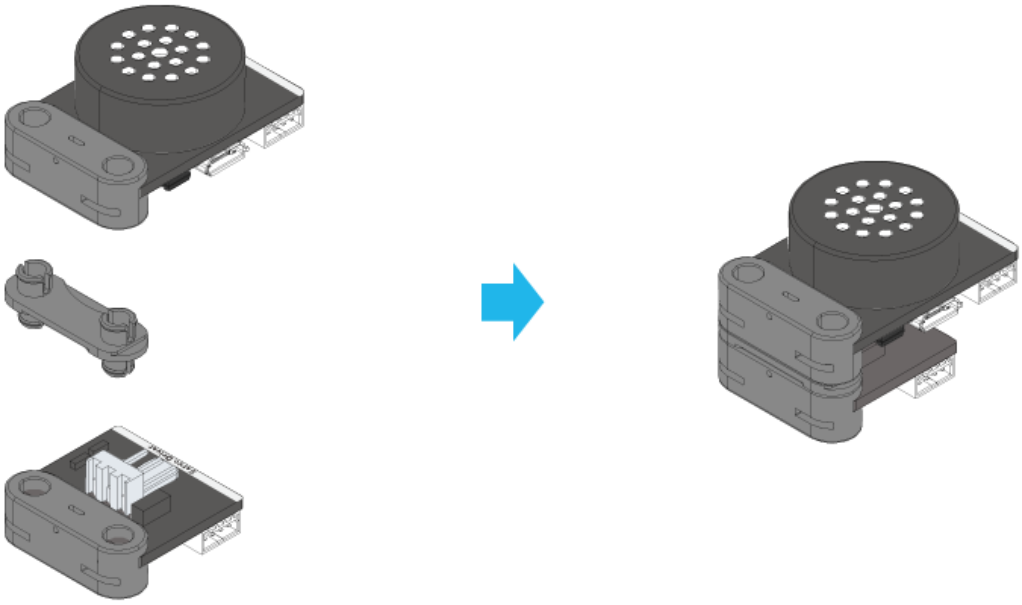
All mBuild modules are developed with two through-holes.



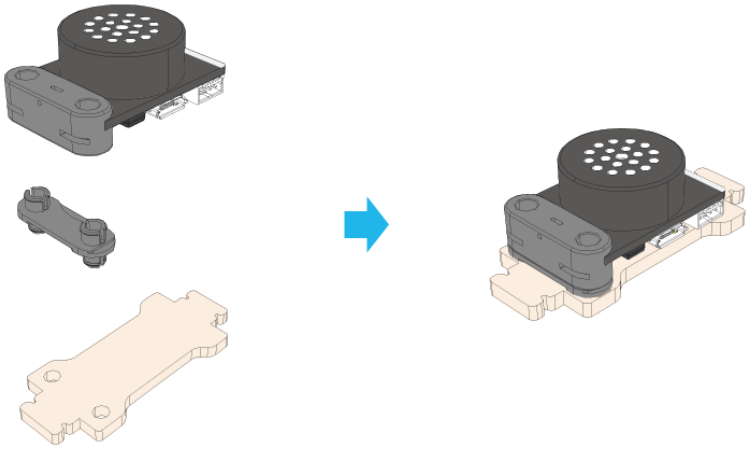
With the through-holes, mBuild modules can be mounted on each other with connectors, such as pins and screws. In addition, they can be connected to mechanical parts (M4), building blocks, and other structural parts through connectors.

The following provides some connection examples:

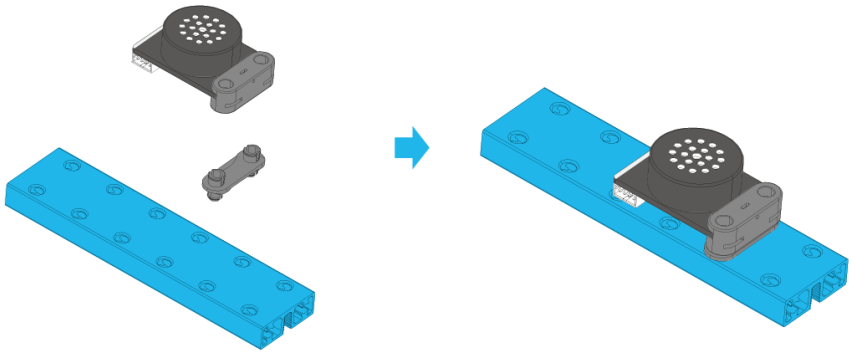
Example 1: Speaker + one pin + servo driver



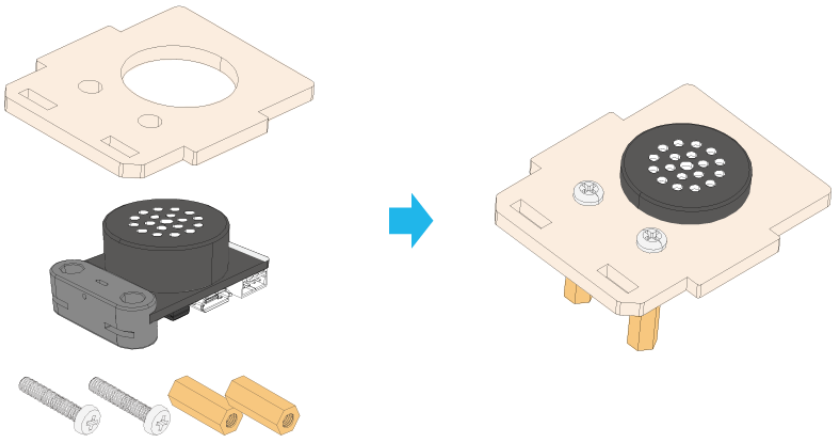
Example 2: Speaker + one pin + one cut board



Example 3: Speaker + one pin + one beam (M4)



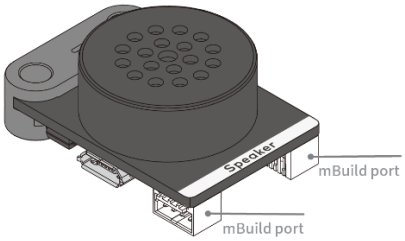
Example 4: Speaker + one cut board + two screws + two brass studs



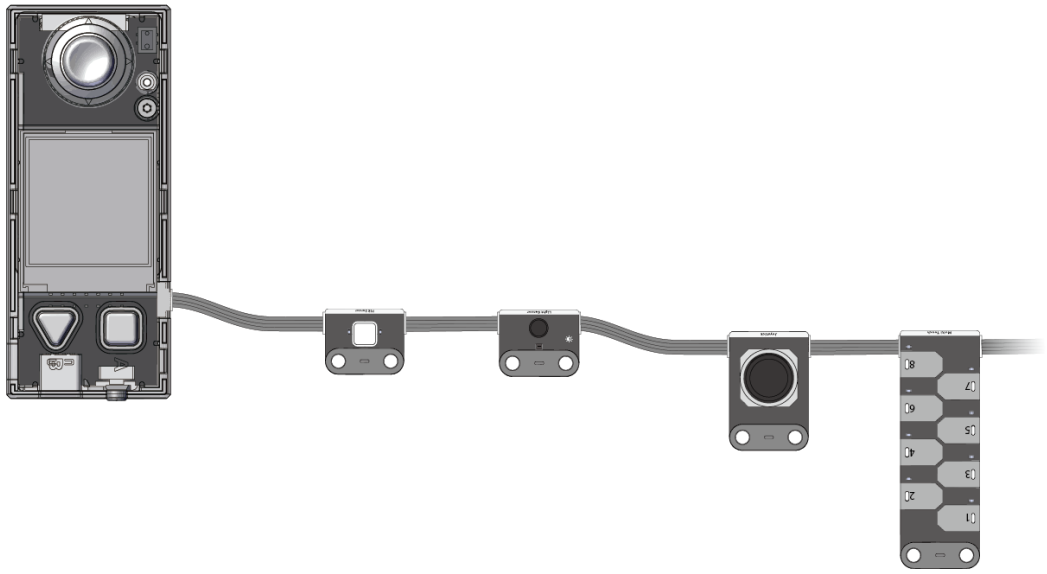
Electronic characteristics

mBuild ports

Most of the mBuild modules provide two mBuild ports.



With the mBuild ports, multiple mBuild modules can be connected in series.

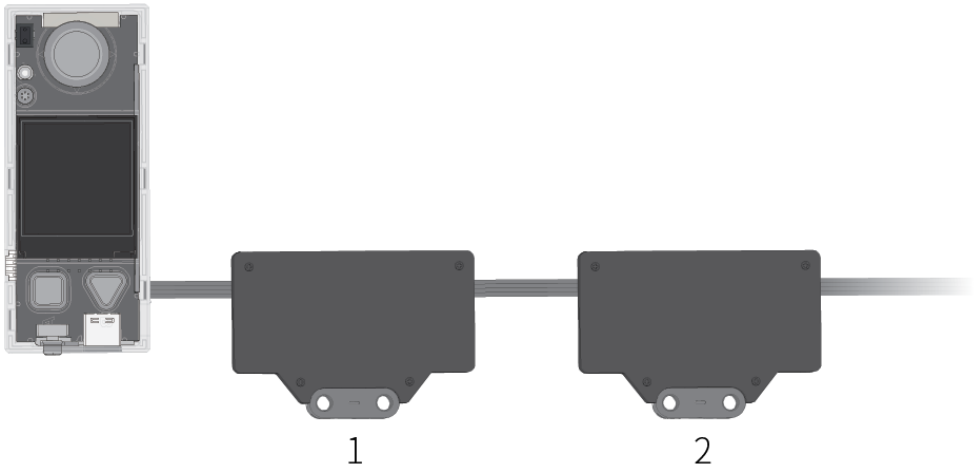


In addition, the positions of the modules can be intelligently identified when you program them on mBlock 5, which simplifies your programming. You don't have to set the information about the positions of the modules when you add or remove a module.

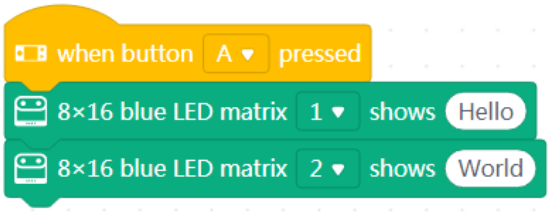
Intelligent position identification

Example:

Connect CyberPi to multiple LED matrixes

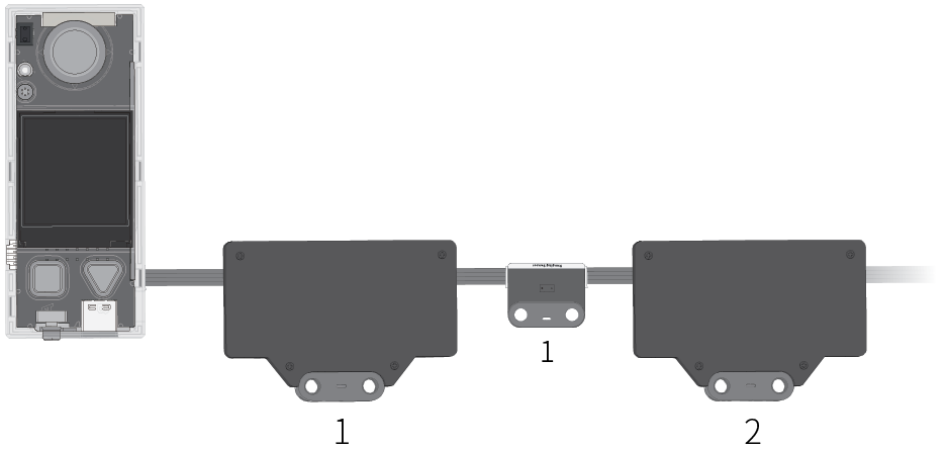


After connecting CyberPi to multiple LED matrixes, you need only to specify the place of an LED matrix among the ones connected instead of specifying the port to which the LED matrix is connected when compiling a program. As shown in the preceding figure, the first LED matrix connected to CyberPi is numbered 1, the second one numbered 2, and so on.



When you press button A on CyberPi, the first LED matrix displays "Hello," and the second one displays "World."

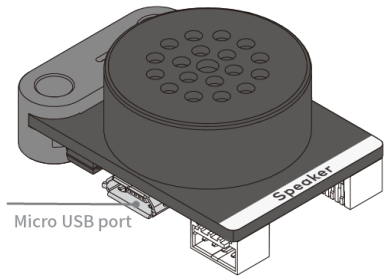
Change the positions of the modules, as shown in the following figure.



The preceding program still works after you add a ranging sensor. When you press button A on CyberPi, the first LED matrix displays "Hello," and the second one displays "World."

Micro USB port

Some of the mBuild modules, such as Speaker, Power Module, and Smart Camera, provide a Micro USB port, which allows a module to directly connect to a computer for power supply or communication.



For details about how to get started with mBuild modules, see Getting Started.

For details about the technical specifications and functions of each module, see mBuild Modules.

Adblocker

Getting Started

Thank you for choosing mBuild modules!

If you use mBuild modules for the first time, read this page carefully and follow the instructions so that you won't miss their functions.

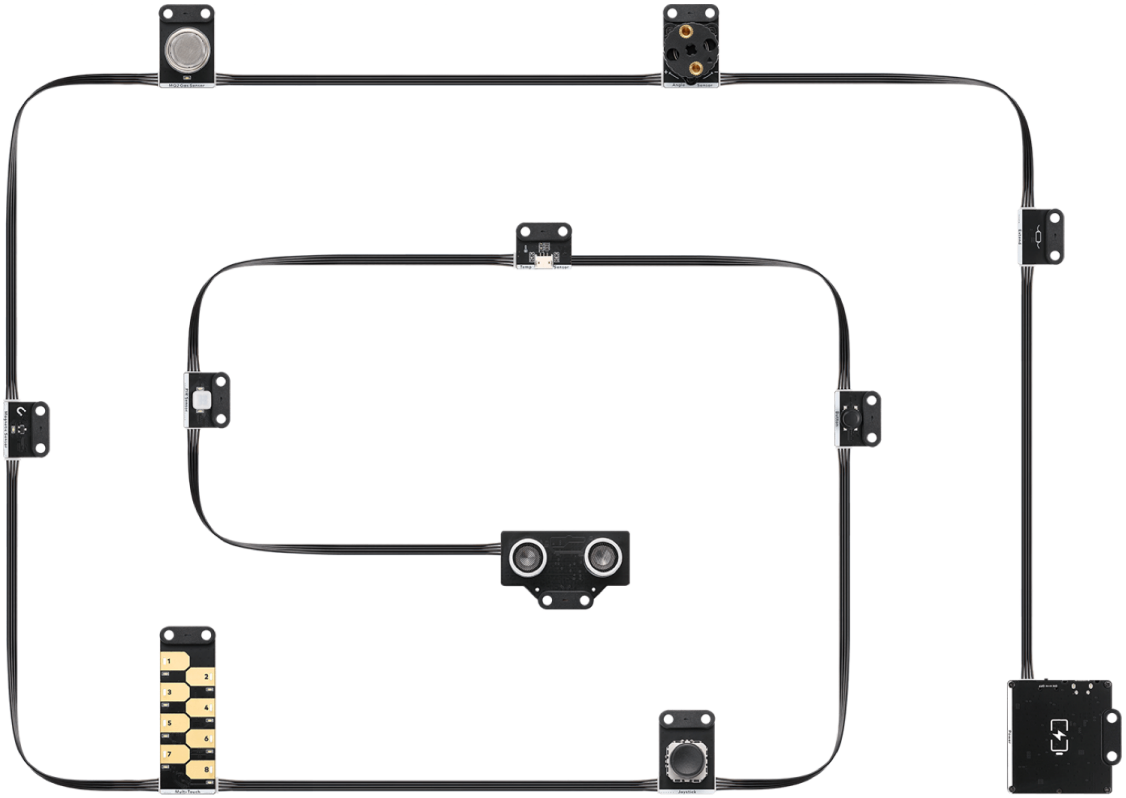
Before you use mBuild modules

Know about the wiring

Most of the mBuild modules provide two mBuild ports and therefore can be connected to main control boards or other mBuild modules through 4-pin cables. Some also provide a Micro USB port, which allows a module to directly connect to a computer for power supply or communication. For example, after connecting the speaker module to a computer, you can store audio files on it.

The following figure shows a 4-pin cable.

The following figure shows a connection example.

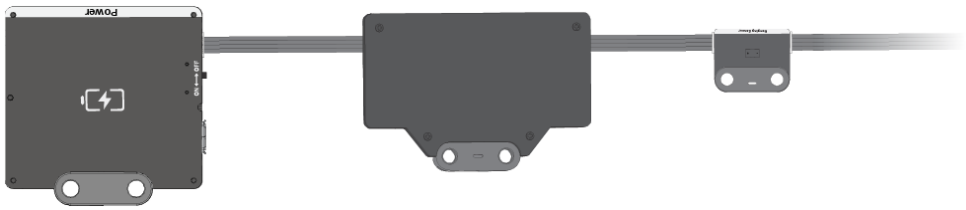


Power on mBuild modules

You can power on mBuild modules in one of the following ways:

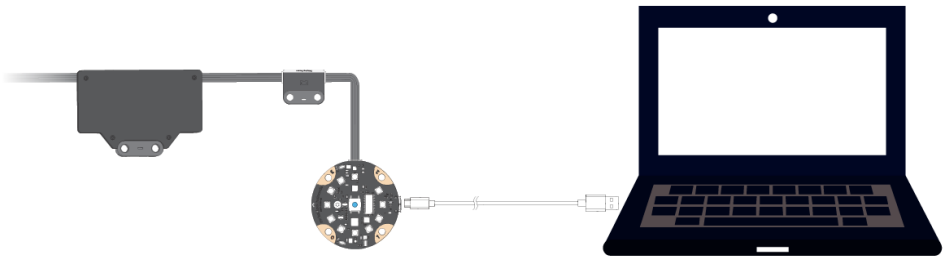
Way 1: use the power module

Connect the power module to the other modules through 4-pin cables. The power module is rechargeable. You can charge it by connecting it to a computer or charger.



Way 2: use a computer

Connect the mBuild modules to a main control board, such as Halocode or CyberPi, through 4-pin cables and then connect the main control board to a computer.



Start programming

With mBlock 5, you can program mBuild modules to implement their input or output functions. mBuild modules can be programmed as a device or as extension modules of a main control board.

Obtain mBlock 5

Select the version applicable to your device. For example, if you use a PC, you can download the version for PCs or use mBlock 5 on the web.

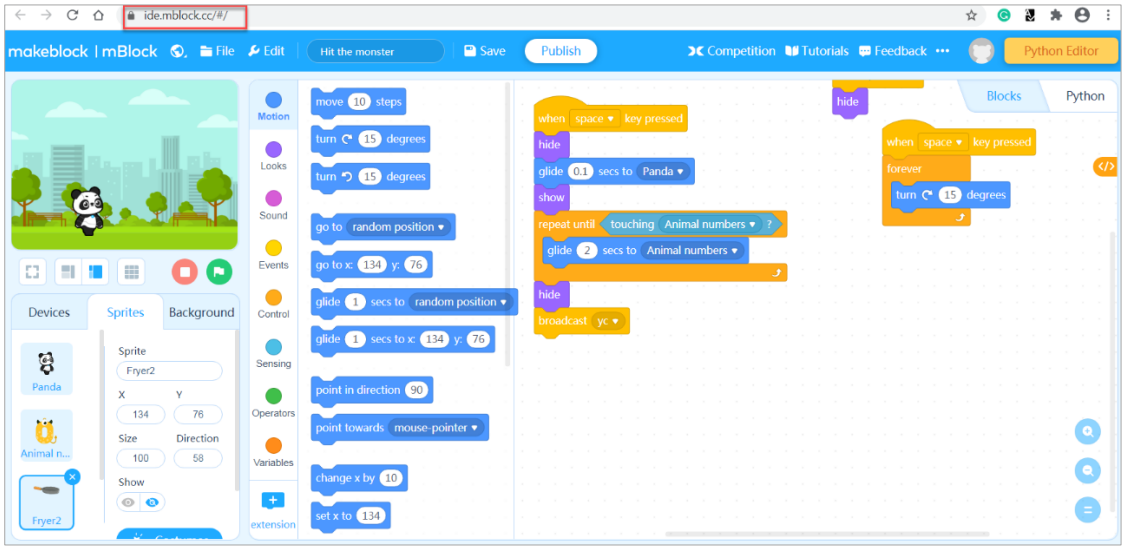
- For PCs
- On the Web (mLink Required)
- On Chromebook (mLink Required)
- For Android and iOS

Block-based programming

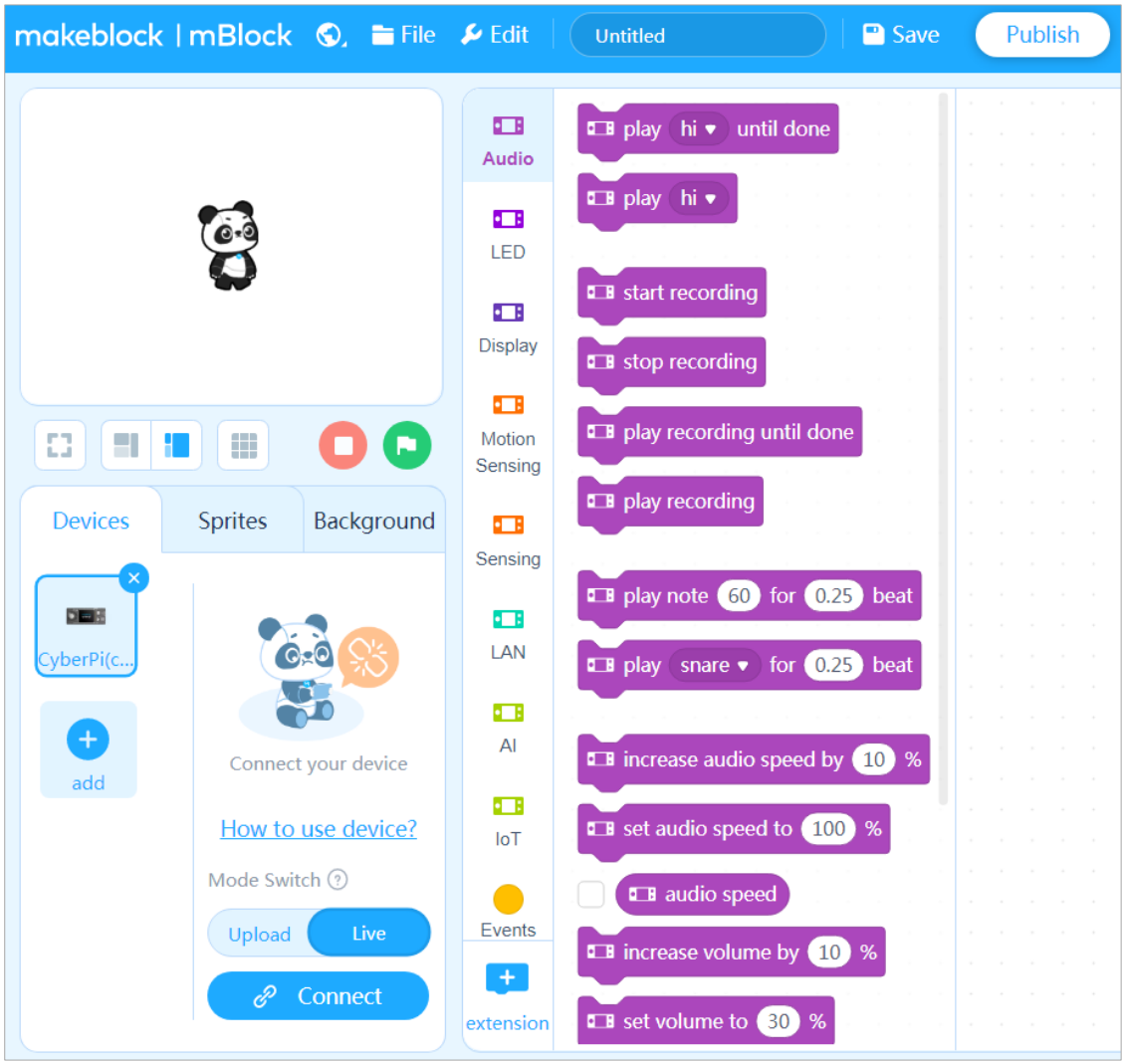
Program mBuild modules as a device

In the following steps, mBlock 5 on the web is used.

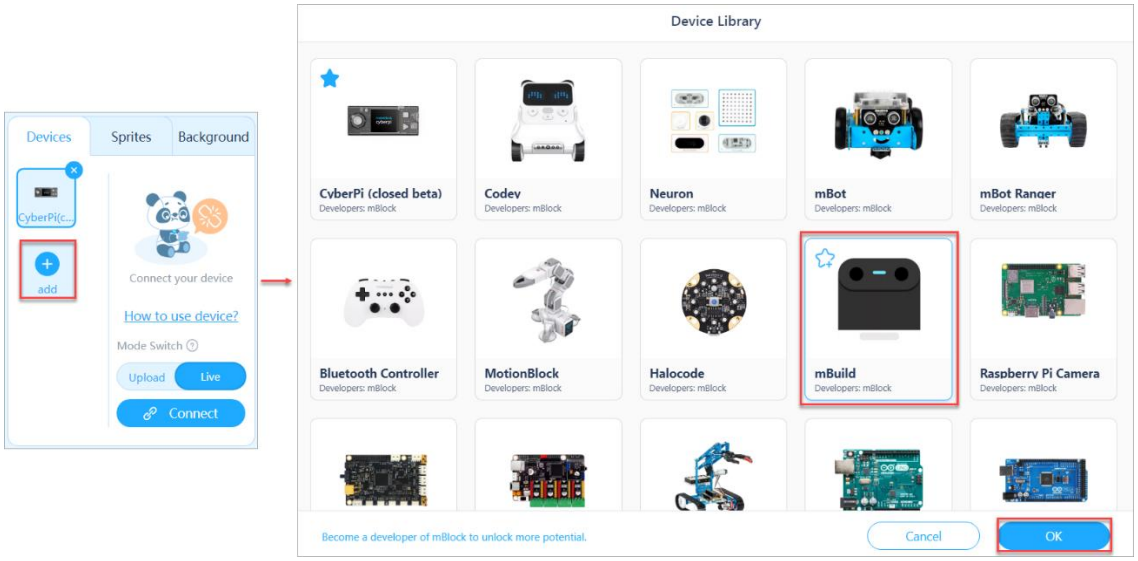
1. Open the web version of mBlock 5 on your PC.



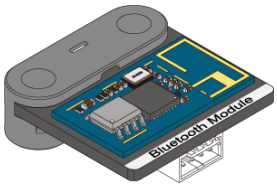
Choose **File** > **New** to start a new project.



2. Click **+ add** on the **Devices** tab and add **mBuild** from the device library.

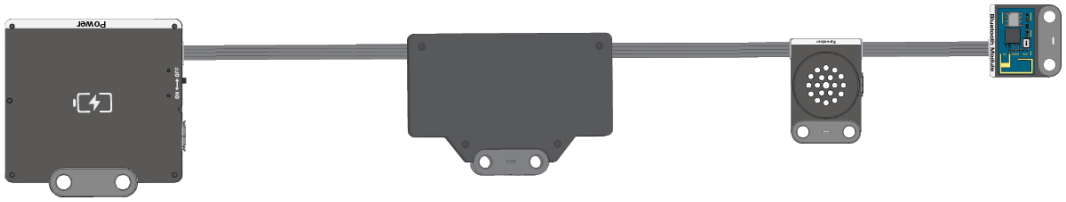


3. Connect the mBuild modules to mBlock 5 through the Bluetooth module.



Note:
To program mBuild modules as a device, you must connect them to mBlock 5 through the Bluetooth module.

(1) Connect the modules to be programmed in series and connect the Bluetooth module last.

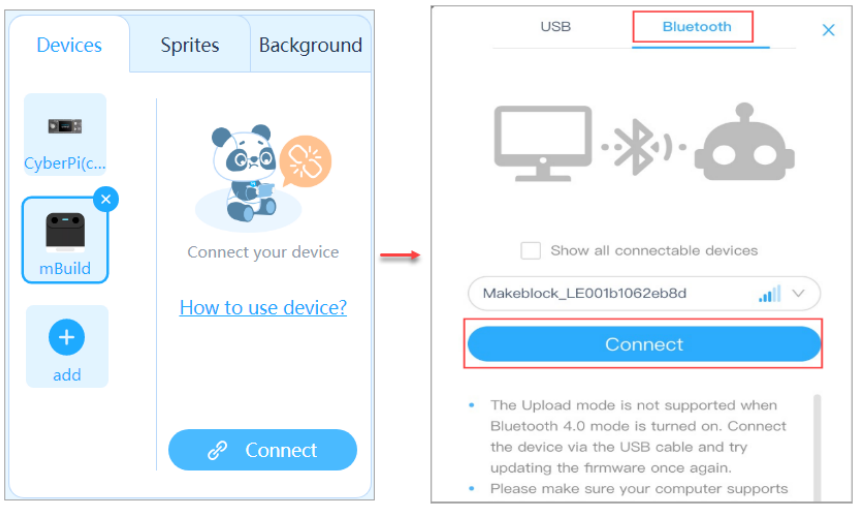


(2) Turn on the power module, enable the Bluetooth function of your computer, and then place the module close to the computer until the indicator on the Bluetooth module keeps on.

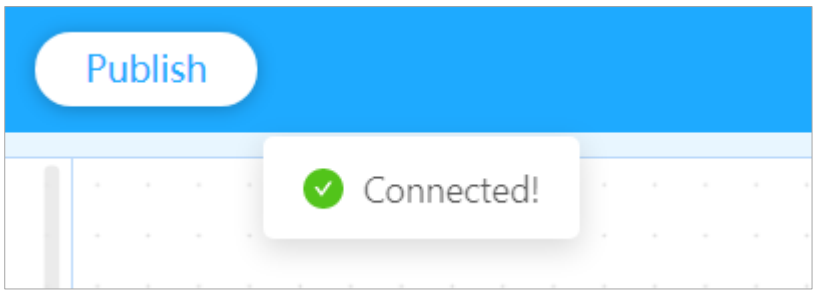
Note: Currently, the mBlock 5 web version on Windows doesn't support the connection of the mBuild Bluetooth module to it through system Bluetooth. If your PC runs Windows or if it runs another system but the Bluetooth module

can't be connected to mBlock 5 properly, you can use the mBlock 5 PC client (mBlock V5.2.0 recommended) or Makeblock Bluetooth dongle. For details about how to use Makeblock Bluetooth dongle, see the section "Connection through Makeblock Bluetooth dongle" in the mBlock 5 Online Help.

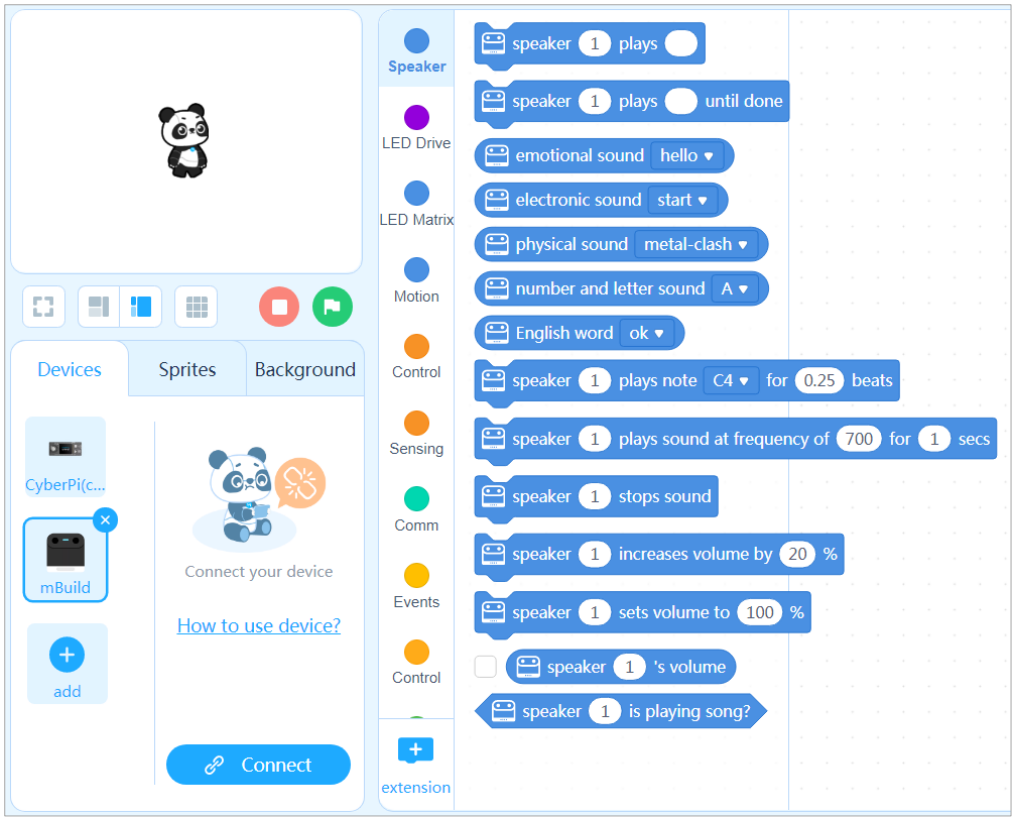
(3) Click **Connect**, choose **Bluetooth** in the dialog box that appears, and then click **Connect**.



A message is displayed after the mBuild modules are connected, indicating that the connection is successful.

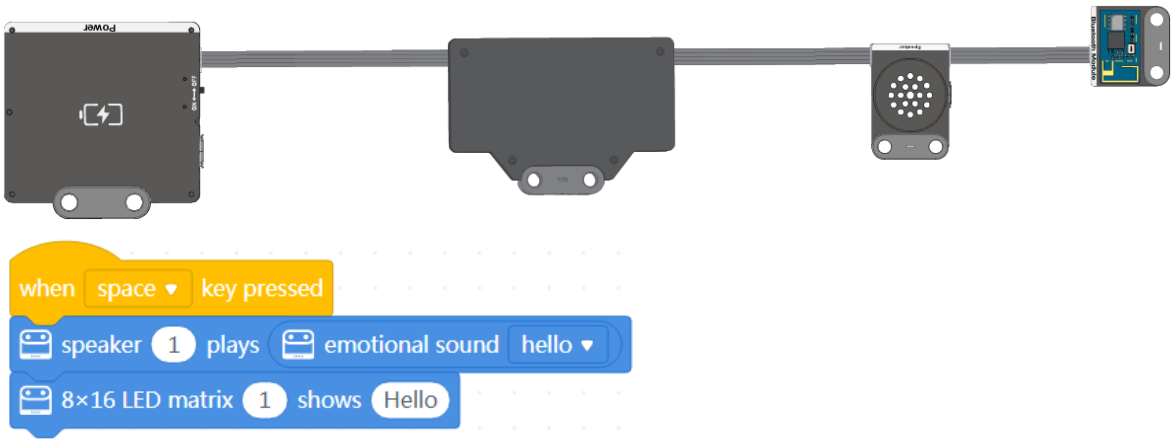


Now, you can drag and drop blocks to the scripts area to compile your program!



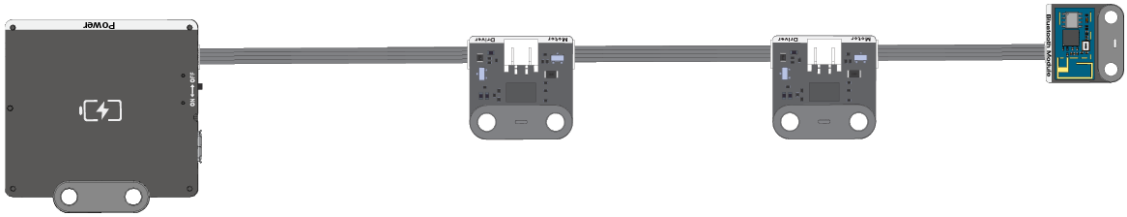
Example programs

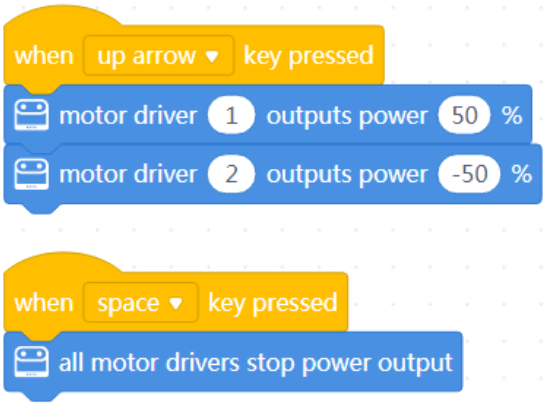
Example 1



When you press the space key, the speaker says "hello," and the LED matrix displays **Hello**.

Example 2





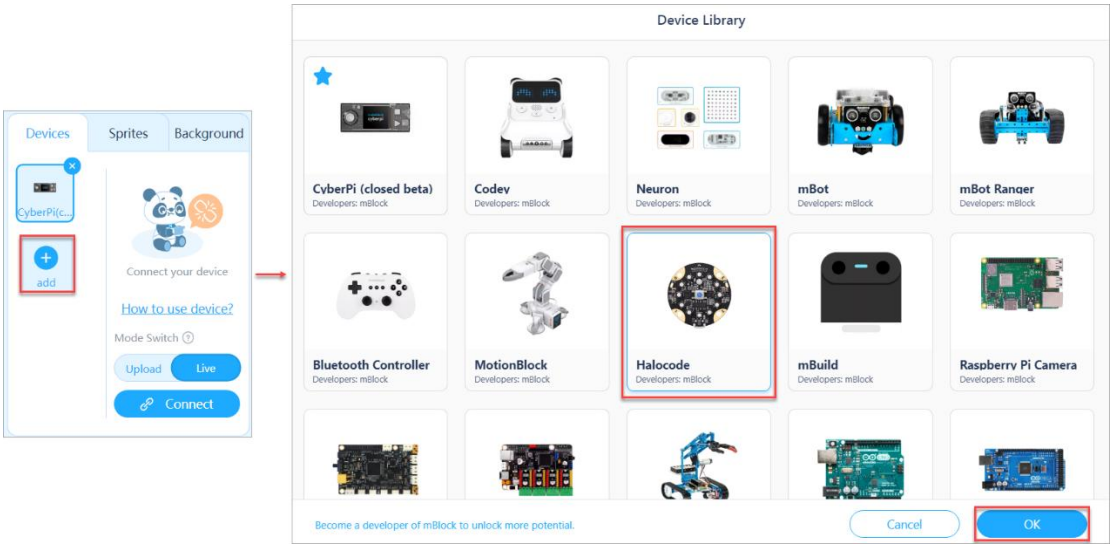
When you press the up arrow key, the two motor drivers provide power; and when you press the space key, they stop providing power.

Tips: After connecting the motor drivers to motors, you can control the motion of the motors through programming.

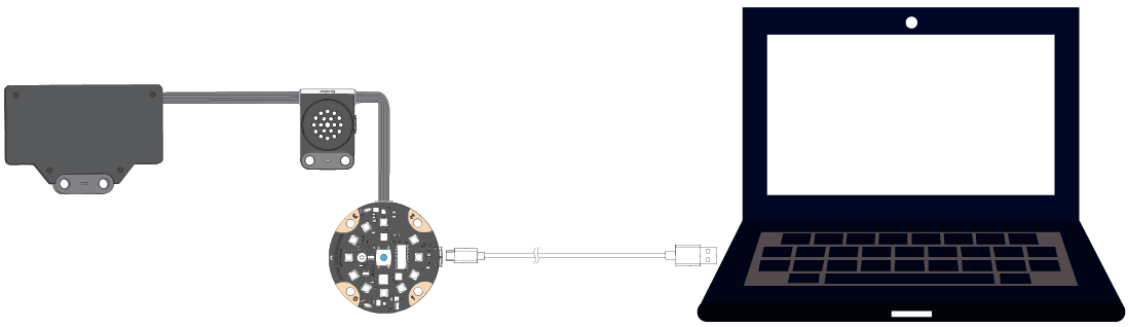
Program mBuild modules as extension modules of a main control board

In the following steps, Halocode is used as the main control board.

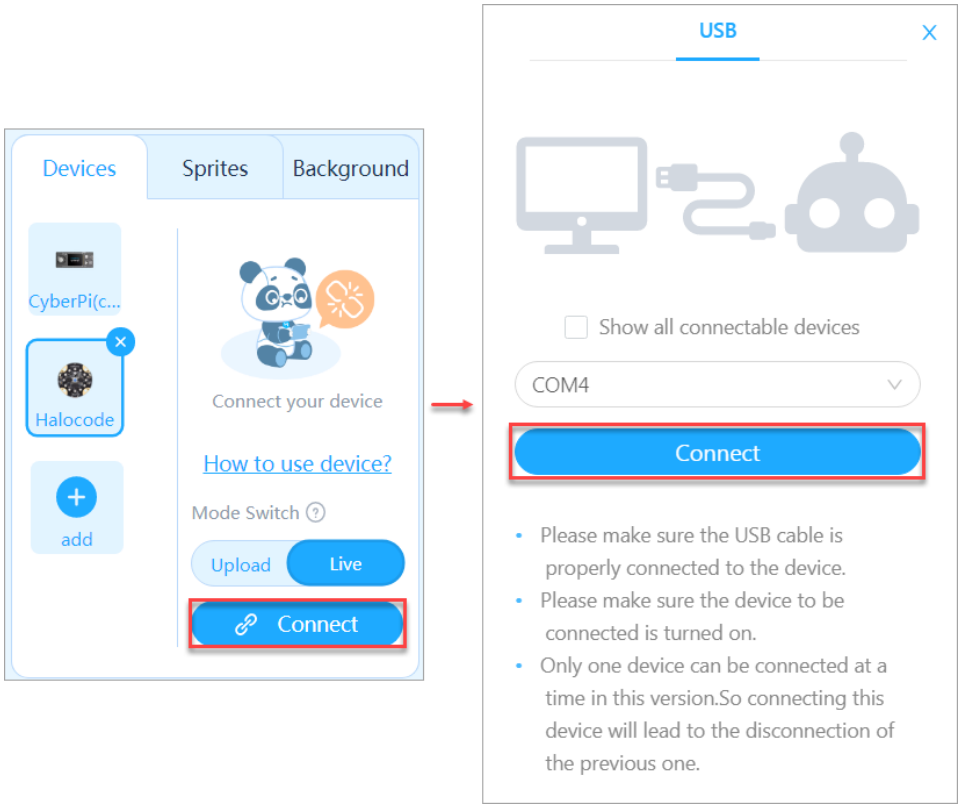
1. Click **+ add** on the **Devices** tab and add **Halocode** from the device library.



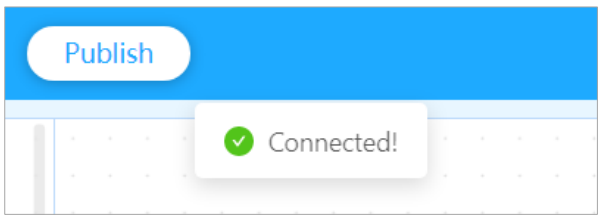
2. Connect Halocode and the mBuild modules to your computer through a Micro USB cable.



3. Click **Connect** and then click **Connect** in the dialog box that appears.

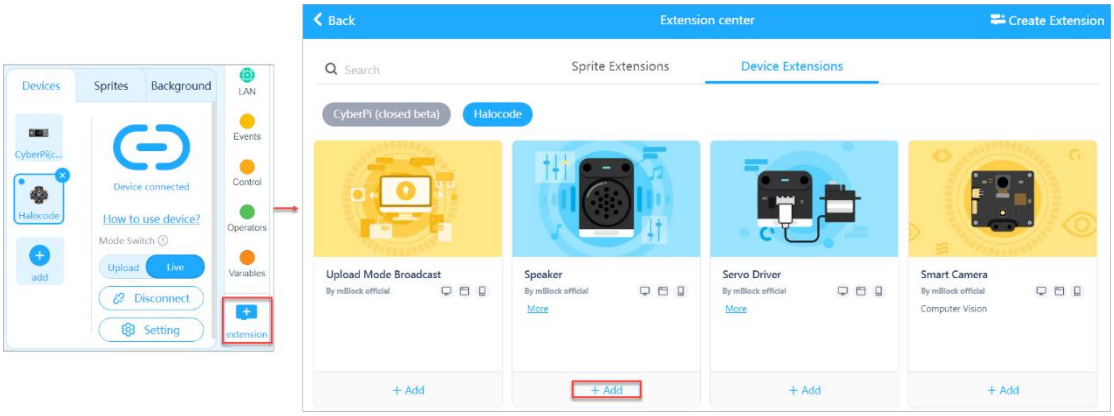


A message is displayed after Halocode is connected, indicating that the connection is successful.

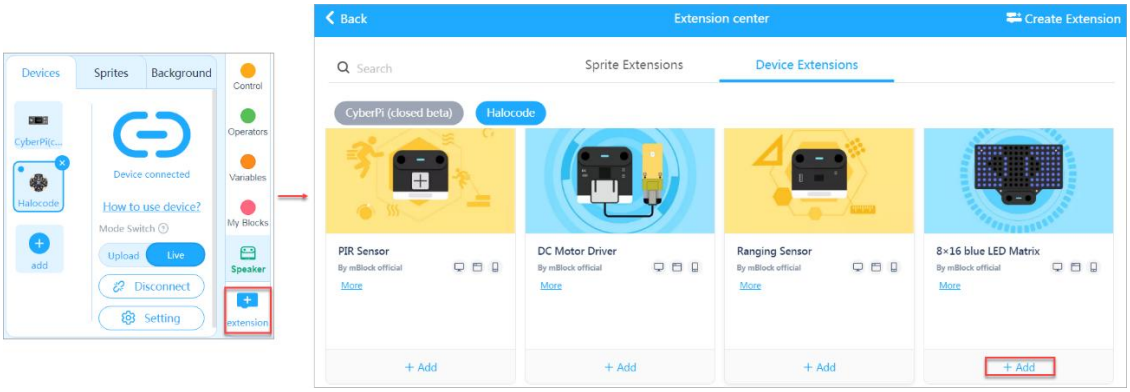


4. Add the Speaker and LED matrix extensions.

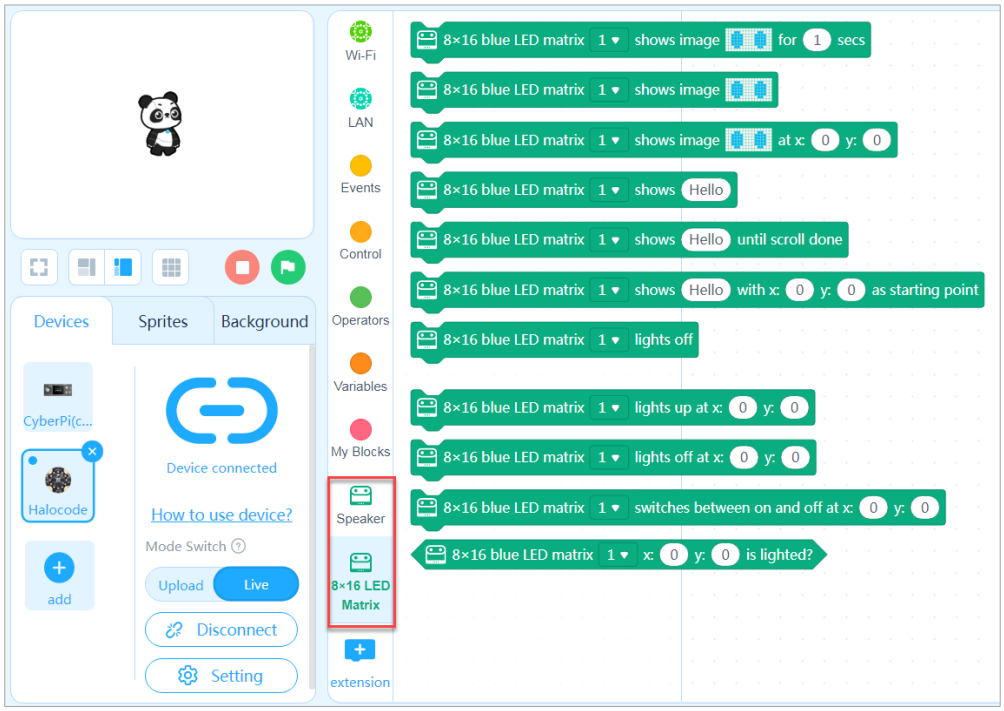
(1) Add the Speaker extension.



(2) Add the LED Matrix extension.

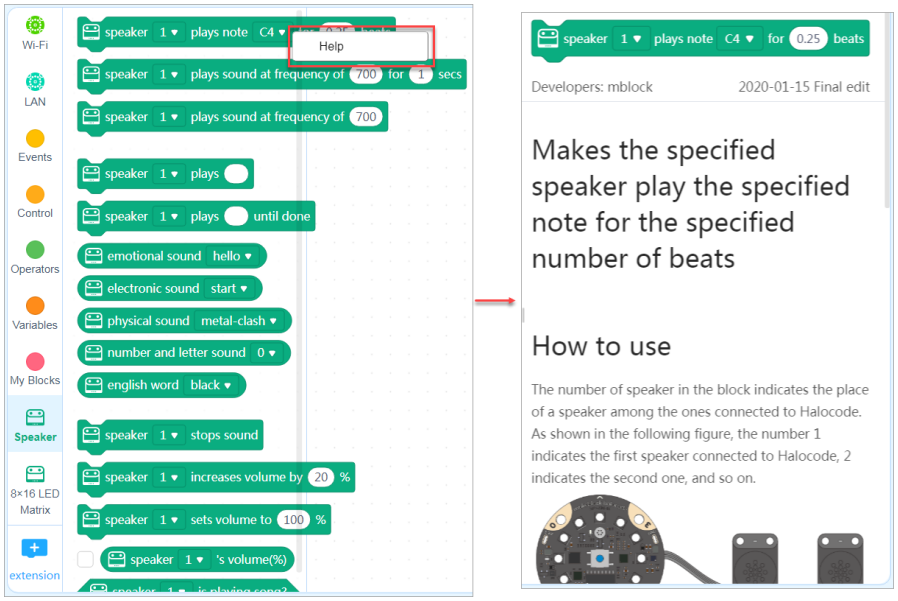


Now, you can drag and drop blocks to the scripts area to compile your program!



Block help

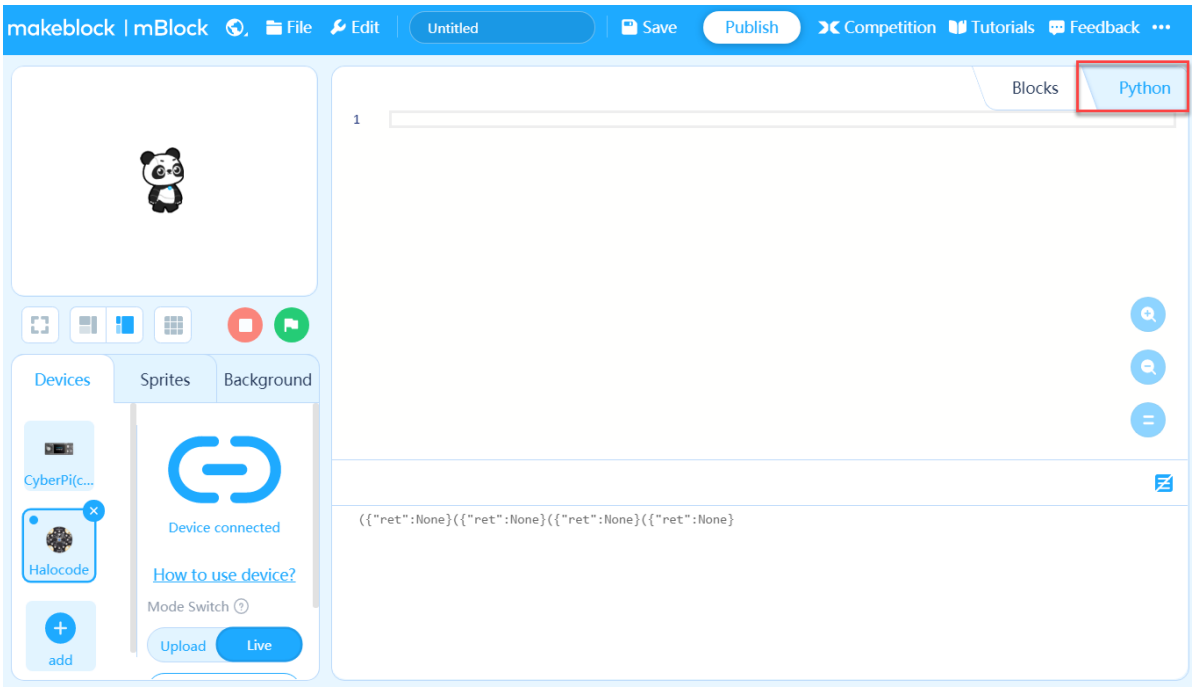
If you don't understand a block when using it, you can right-click it and click **Help** that appears to view its help information.



Python programming

You can also use MicroPython to program mBuild modules.

Set the programming language to Python.



For the Python API documentation of mBuild modules, see [Python APIs for mBuild Modules](#).

Tips:

You can select mBuild modules and mount or install them on structures made of cut boards or mechanical parts as required. For example, you can install the motor driver modules on a car made of mechanical parts.

More information

For the functions and features of the mBuild modules, see [Functions and Features](#).

For details about the technical specifications and functions of each module, see [mBuild Modules](#).

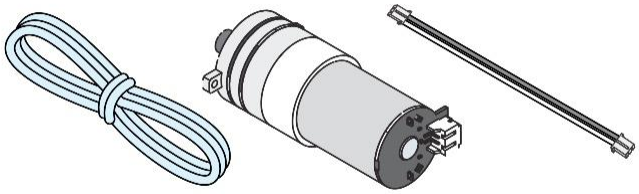
Water Pump

With the specified connection cables, the water pump can work together with Pocket Shield, mBot2, and DC motor drivers.

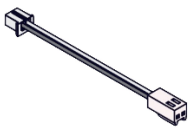
Driven by Pocket Shield, mBot2, or a DC motor driver, the water pump draws water or blows air to control the flow of water.

Note:

The water pump must be used in combination with a tube that supports it.
The water pump can't be used in water.

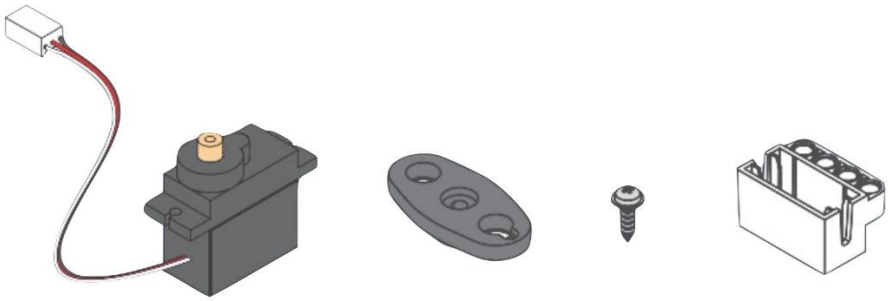


Compatibility description

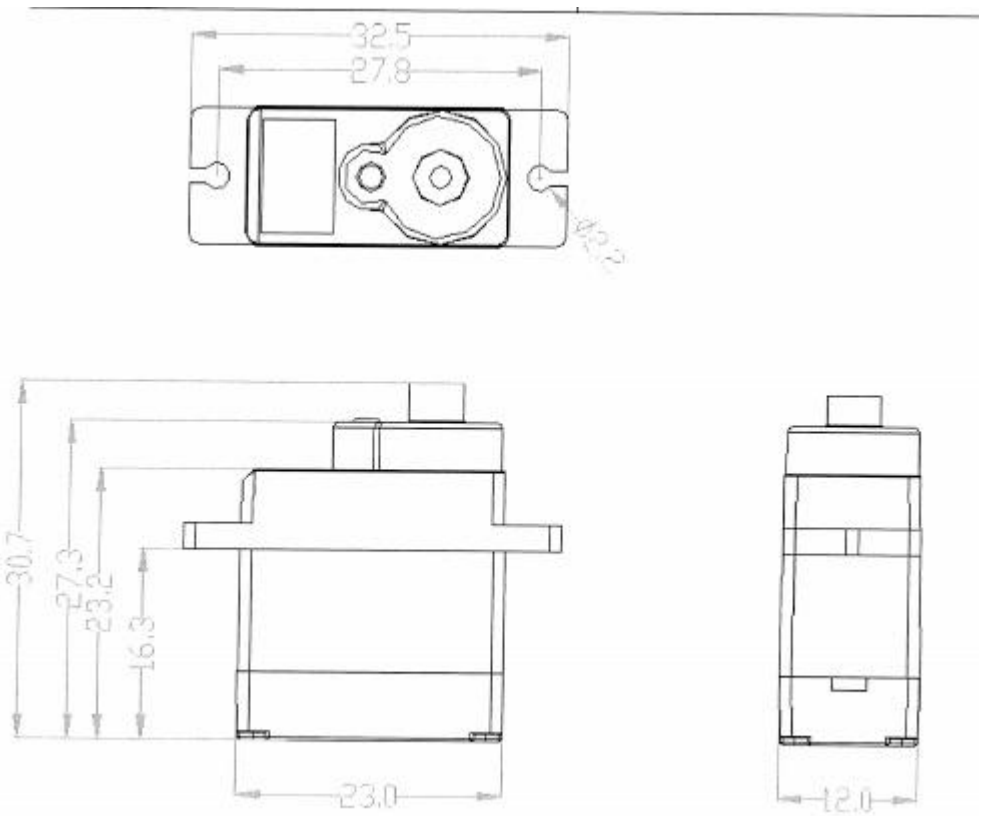
Driven by	With
DC motor port—Pocket Shield	
DC motor port—mBot2 Shield	
mBuild DC motor driver	
DC motor driver port that supports the voltage output of 5 V and peak current output of higher than 1 A	Connect them through welding or use a connection cable that supports the driver

9g Micro Servo (Metal Gear)

Makeblock 9g Micro Servo (metal gear) is a high-quality servo customized by Makeblock. It may be delivered assembled or unassembled in a pack, including the following four parts: 9g micro servo (metal gear), servo horn, screw, and servo holder.



Dimensions



Parameters

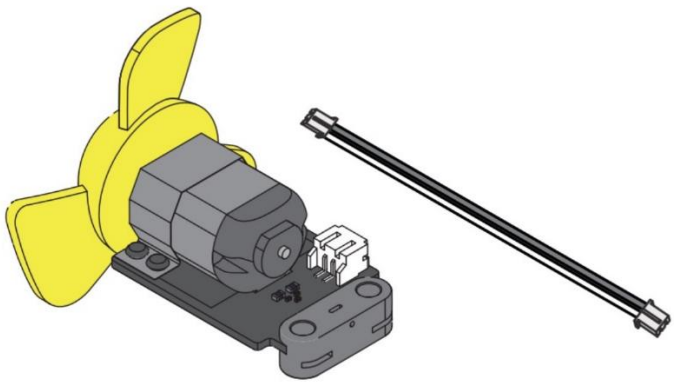
Electrical specifications		
Item	**4.8 V**	**6.0 V**
Operating speed (without load)	0.15±0.015 sec/60°	0.13±0.015 sec/60°
Running current (without load)	80±35 mA	90±35 mA
Max. load in operation	1.0±0.05kg·cm	1.1±0.1kg·cm
Stall torque (locked)	1.5±0.05kg·cm	1.8±0.1kg·cm
Stall current (locked)	680±40 mA	750±50 mA
Idle current (stopped)	6±1 mA	6±1 mA
Temperature drift (at 25℃)	≤5°	≤7°
Mechanical specifications		
Overall dimensions	See "Dimensions."	
Limit angle	180°±10°	
Weight	13.5±0.5g	
Connector wire gauge	#28 PVC, black-red-white, plug: 2510-3P, white	
Connector wire length	260±5 mm	
Horn gear spline	40T	
Horn type	Double-arm	
Reducation ratio	1/324	
Excessive play	≤1°	
Screw	PM2×5 mm	
Control specifications		
Control system	Changing the pulse width	
Amplifier type	Analog controller	
Operating travel	180°±10° (600 to 2400 μ sec)	

Left & right travelling angle deviation	≤7°
Centering deviation	≤1°
Neutral position	1500 μ sec
Dead band width	≤7 μ sec
Rotating direction	Counterclockwise (1500 to 2000 μ sec)
Pulse width range	500 to 2500 μ sec
Max. travel	About 190° (500 to 2500 μ sec)

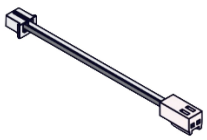
Fan

With the specified connection cables, the fan can work together with Pocket Shield, mBot2, and DC motor drivers.

Driven by Pocket Shield, mBot2, or a DC motor driver, the fan can run clockwise or counterclockwise to control the wind power and direction.



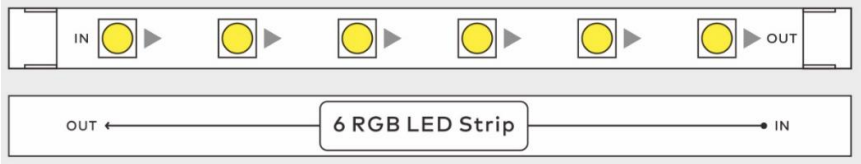
Compatibility description

Driven by	With
DC motor port—Pocket Shield	
DC motor port—mBot2 Shield	
mBuild DC motor driver	
DC motor driver port that supports the voltage output of 5 V and peak current output of higher than 1 A	Connect them through welding or use a connection cable that supports the driver

Mini LED Strip and Ring

Due to the physical port and control protocols, the mini LED strip and ring can work properly only with the mBuild LED driver. Color deviation may be caused if you use a third-party driver to drive the mini LED strip or ring.

LED strip



The LED strip can be used to make a light sword or glowing words, or used to create an atmosphere.

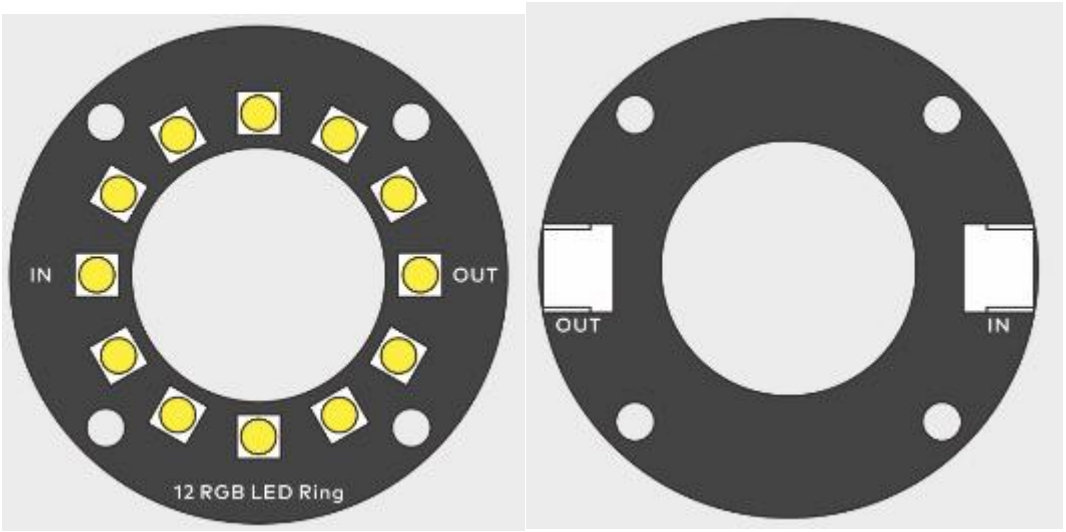
When using the LED strip, connect the IN plug to the LED driver or the OUT plug of another LED, LED strip, or LED ring.

The LED strip is not waterproof. Using it in water may cause damage to it, and such damage is not covered in the warranty.

Parameter

- Dimensions: 8 mm × 112 mm

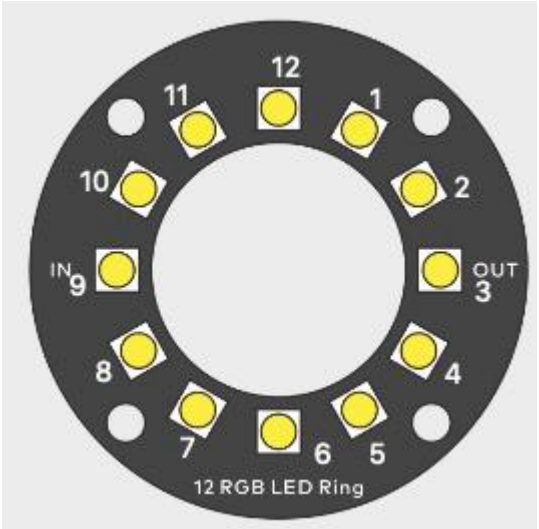
12-LED ring



When using the LED ring, connect the IN plug to the LED driver or the OUT plug of another LED, LED strip, or LED ring.

The LED strip is not waterproof. Using it in water may cause damage to it, and such damage is not covered in the warranty.

The places of the LEDs on the 12-LED ring are defined in the same way as a clock, as shown in the following figure.



Parameter

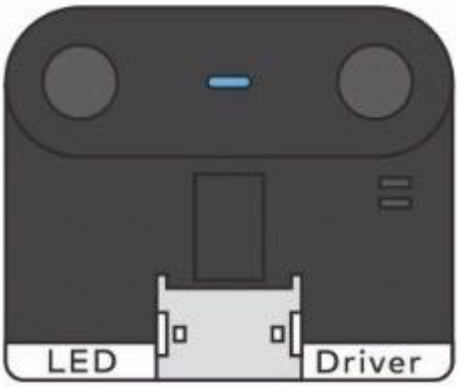
- Dimensions: diameter of 45 mm

Compatibility description

Driven by	With
mBuild LED driver	

LED Driver

The LED driver can drive various light accessories, including LEDs, LED strips, and LED rings.



Parameters

Dimensions: 24 mm × 20 mm

Reference current: depending on the load

Supported accessories: Mini LED Strip and Ring