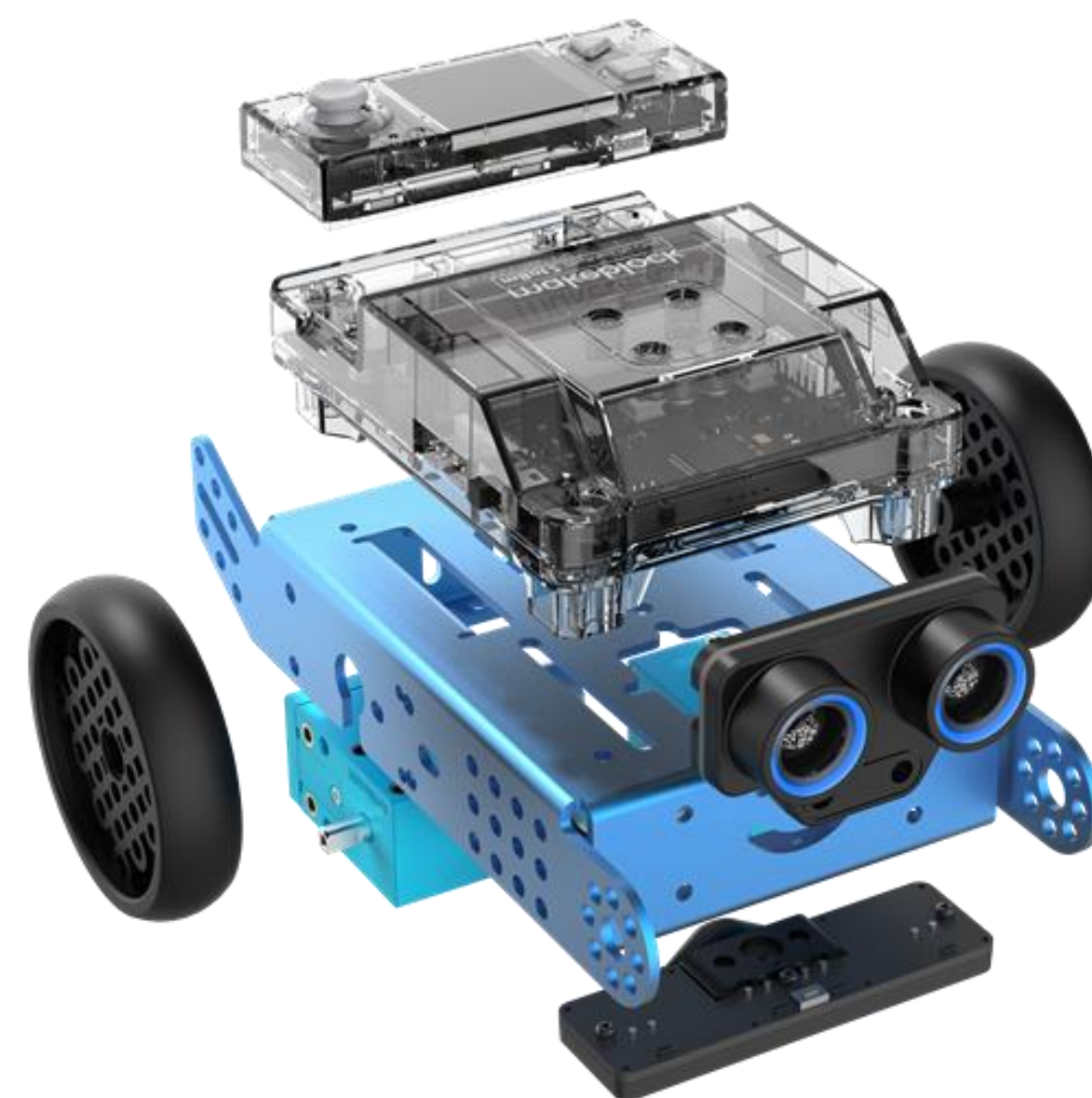




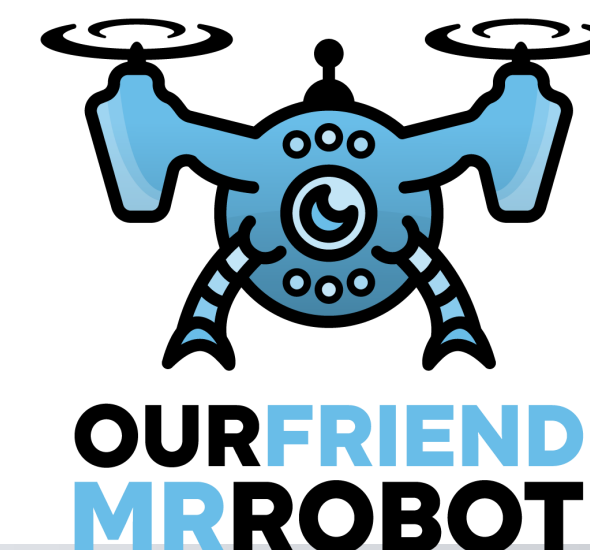
# mBot 2.0

A new generation  
educational robot

*More about  
the device*



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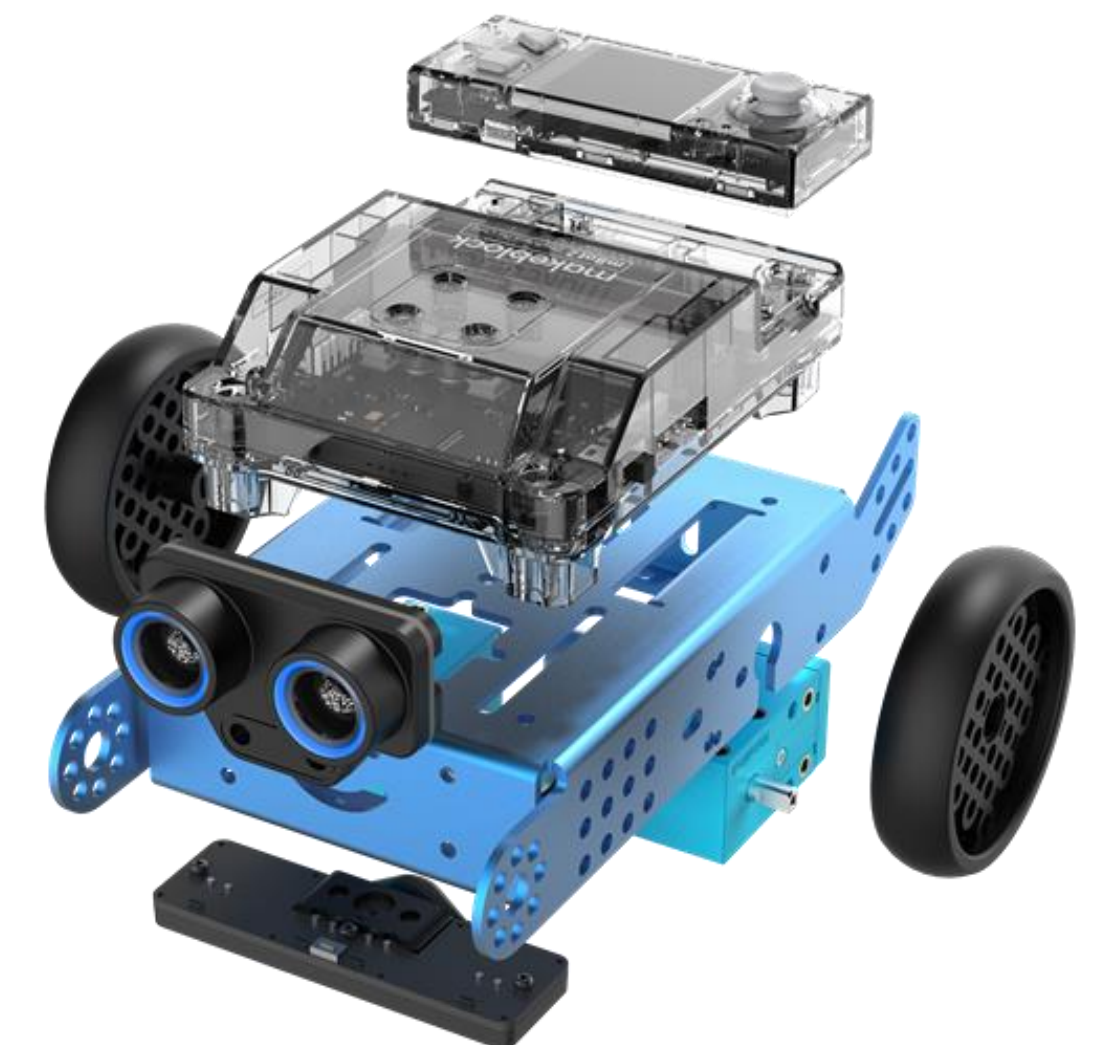
# mBot 2.0

mBot2 is designed for children attending:

- higher grades of elementary school
- secondary school

Using mBot.20 you learn about:

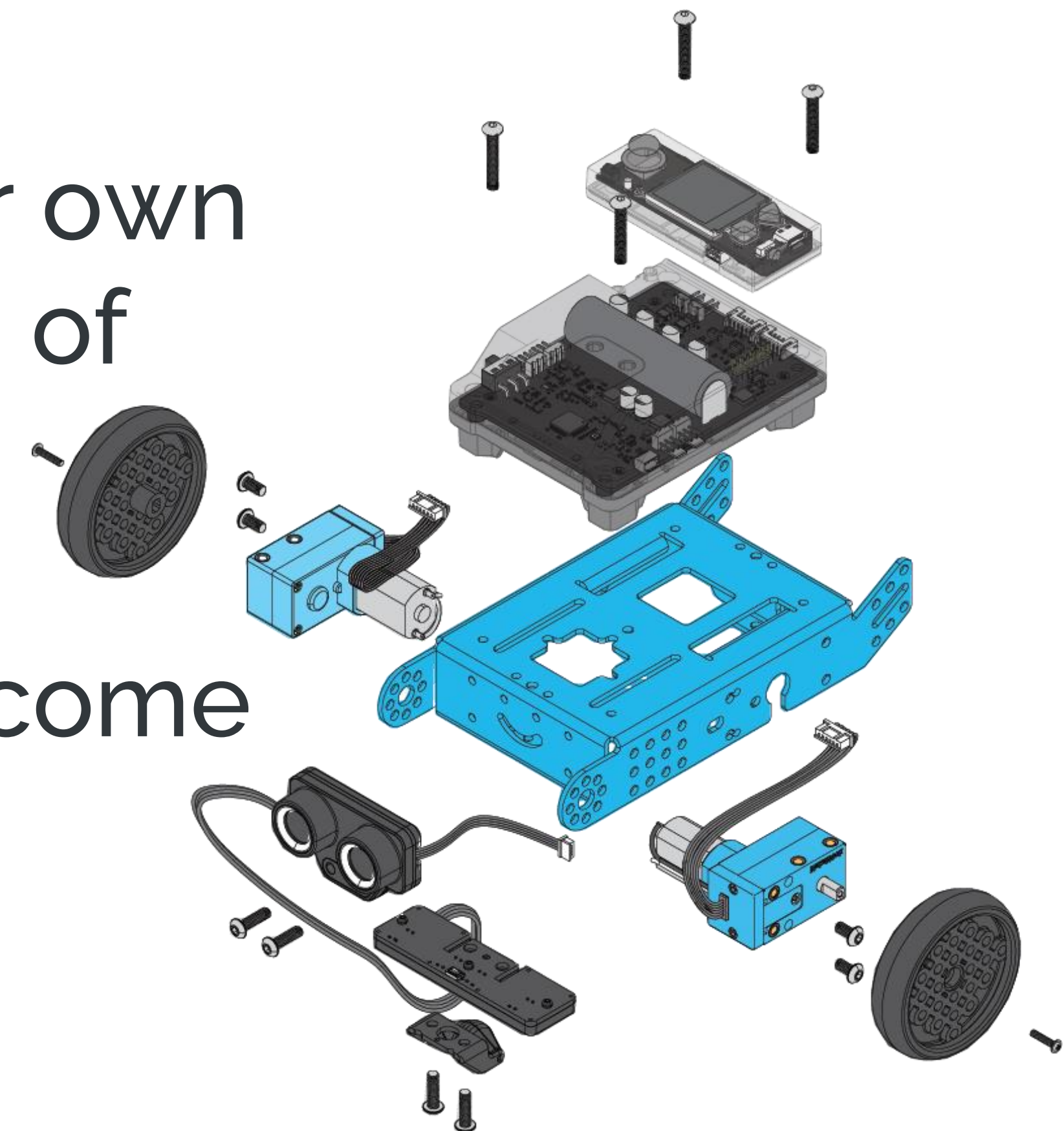
- coding
- learn
- technology and
- roboticists



# mBot 2.0

With a simple tool and step-by-step instructions, you'll learn to build your own robot from scratch and enjoy the fun of hands-on creation.

By building your own robots, you become familiar with the basics of robotic machinery and electronic parts.

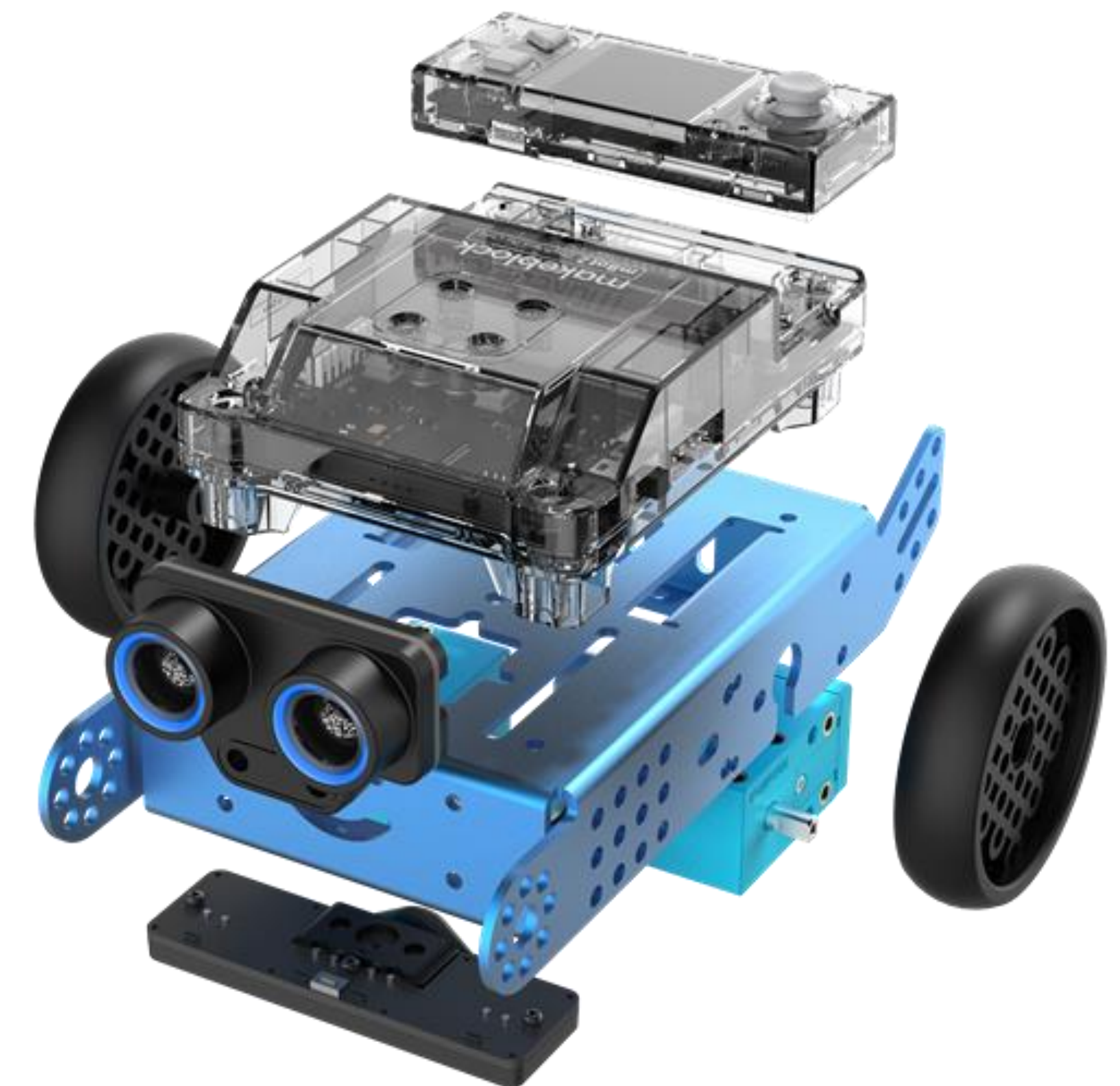




# mBot 2.0

The model we will use has the following electronic modules:

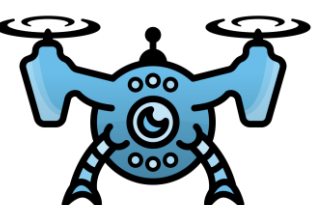
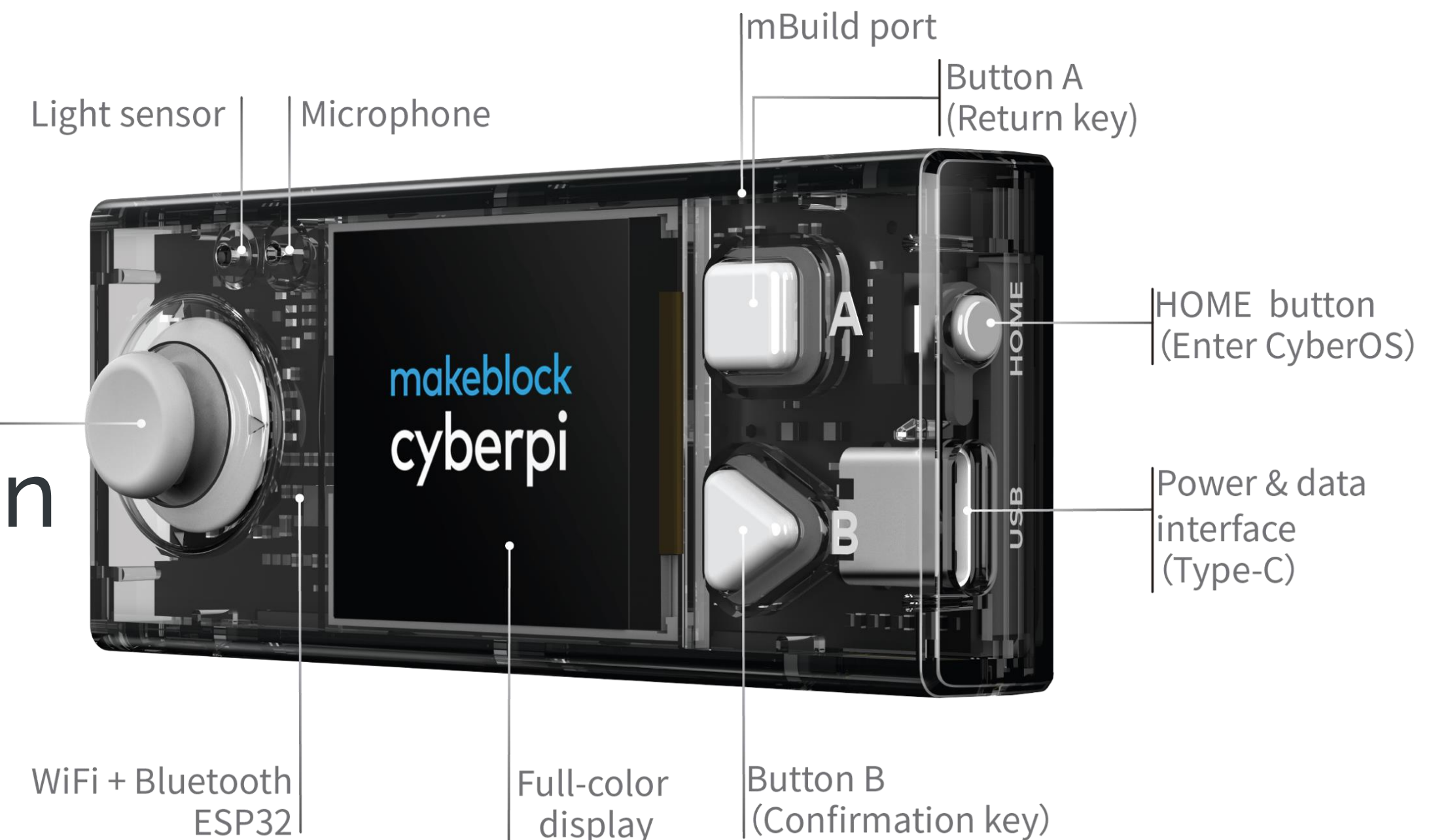
- CyberPi
- mBot Neo Shield
- Ultrasonic sensor 2
- Quad RGB sensor
- Encoder motor



# CyberPi

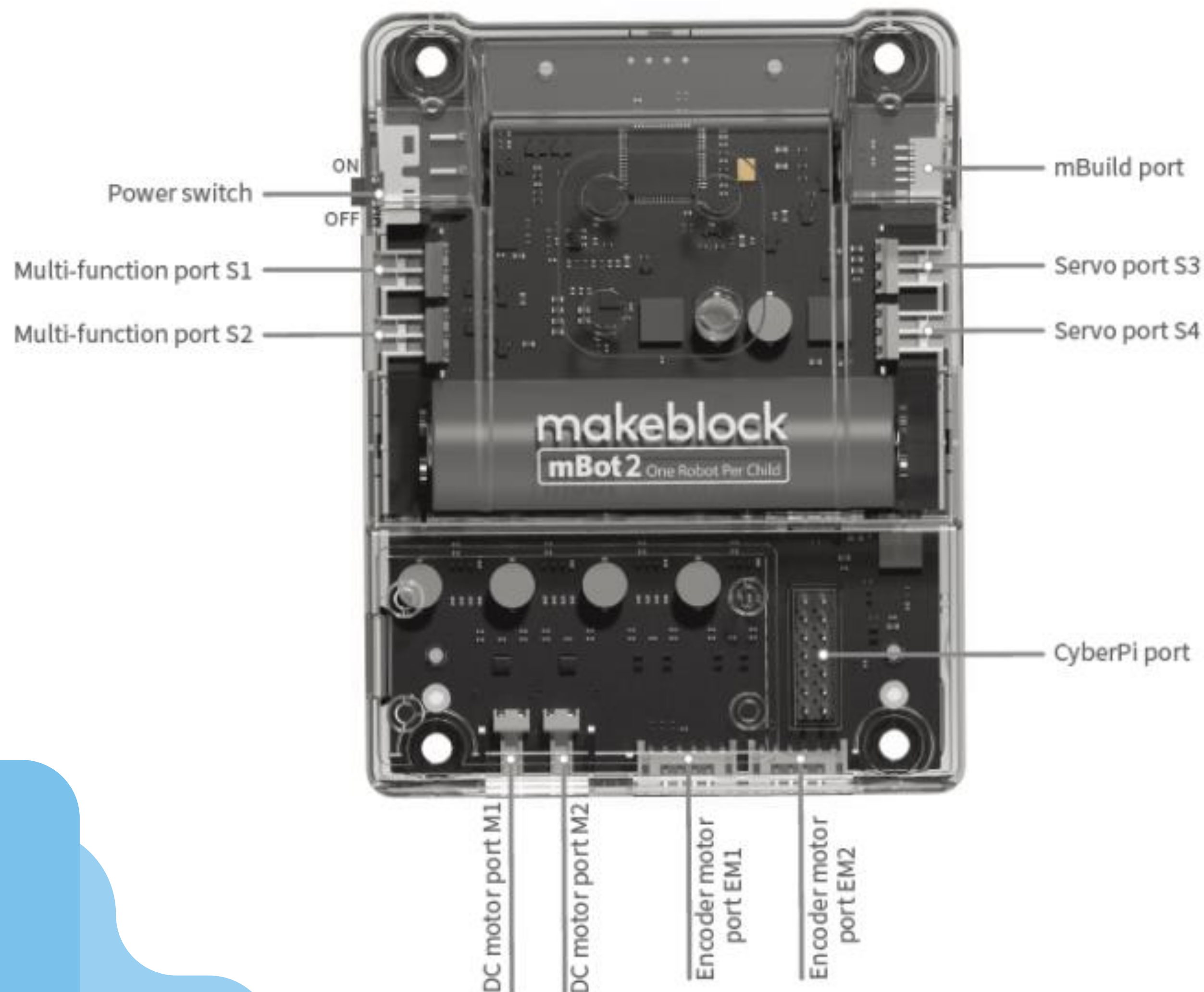
CyberPi is a main control board independently developed by Makeblock. With a compact structure and built-in ports, it can be easily expanded to meet a variety of educational needs:

- AI (Artificial intelligence)
- IoT (Internet of Things)
- data science
- user interface design



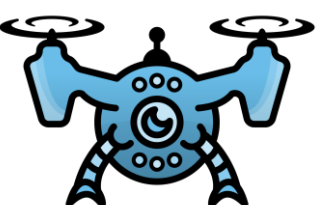


# mBot2 Shield



The mBot2 Shield is equipped with a built-in rechargeable lithium-ion battery that can power the CyberPi.

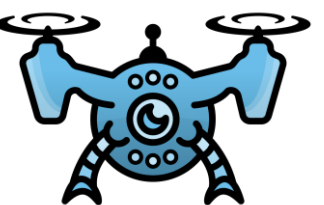
With multi-function, servo and motor ports, it can drive motors, servo motors and LED strips.



# Ultrasonic Sensor 2

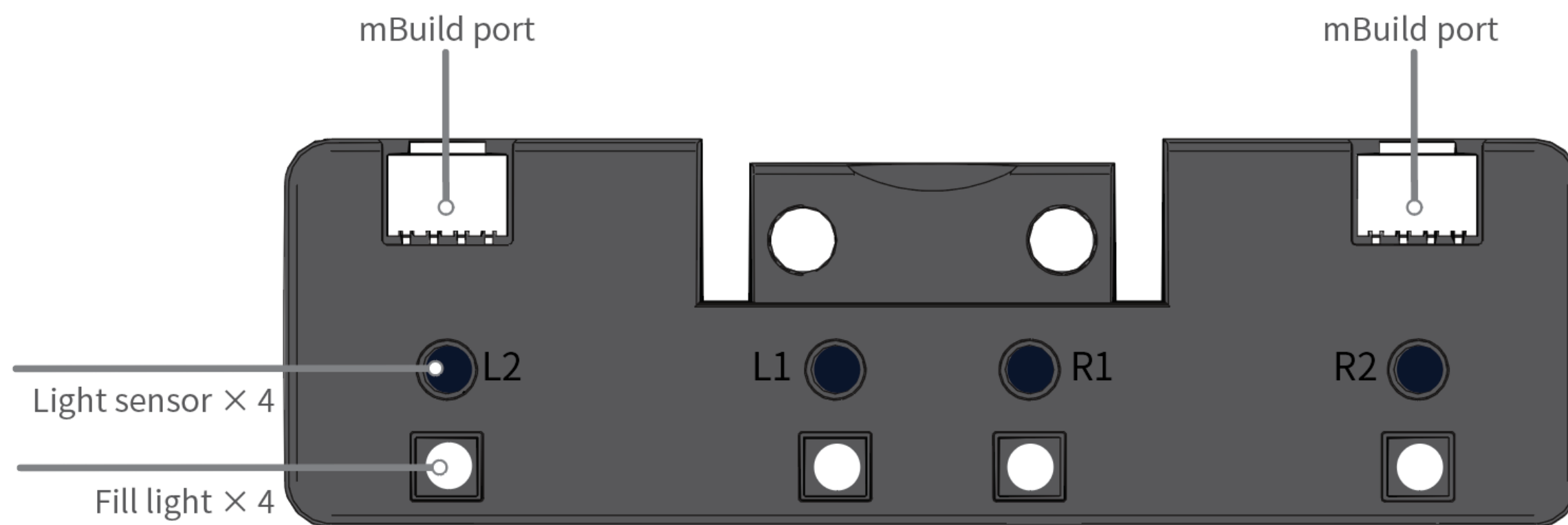
An ultrasonic sensor can be used to detect the distance between an obstacle and it.

The transmitter on the left emits ultrasound waves and the receiver on the right receives the reflected ultrasound waves.





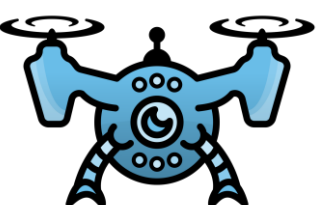
# Quad RGB Sensor



The quad RGB sensor uses visible light as supplemental lights, which significantly reduce ambient light interference. In addition, it provides a color recognition function.

With four light sensors, it can support multiple programming scenarios.

Detection range: 5-15 mm from the object to be detected



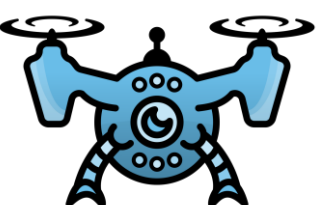
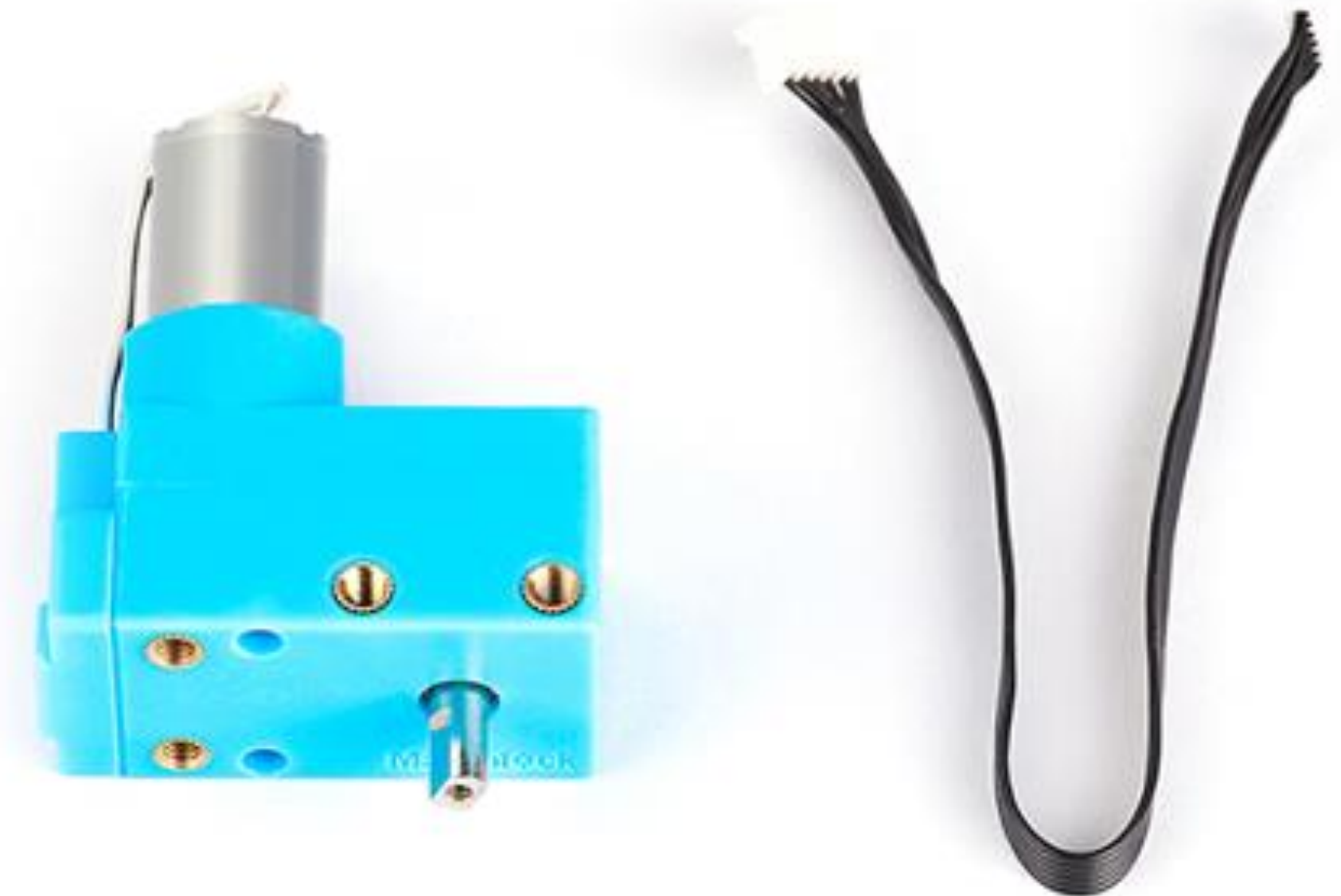


# Photoelectric Encoder Motor 180 RPM

It is equipped with an optical encoder that enables high-precision control.

It is easily connected to Makeblock mechanical parts and thus can be flexibly used in combination with various other parts.

The custom material it uses reduces noise and promises high torque output



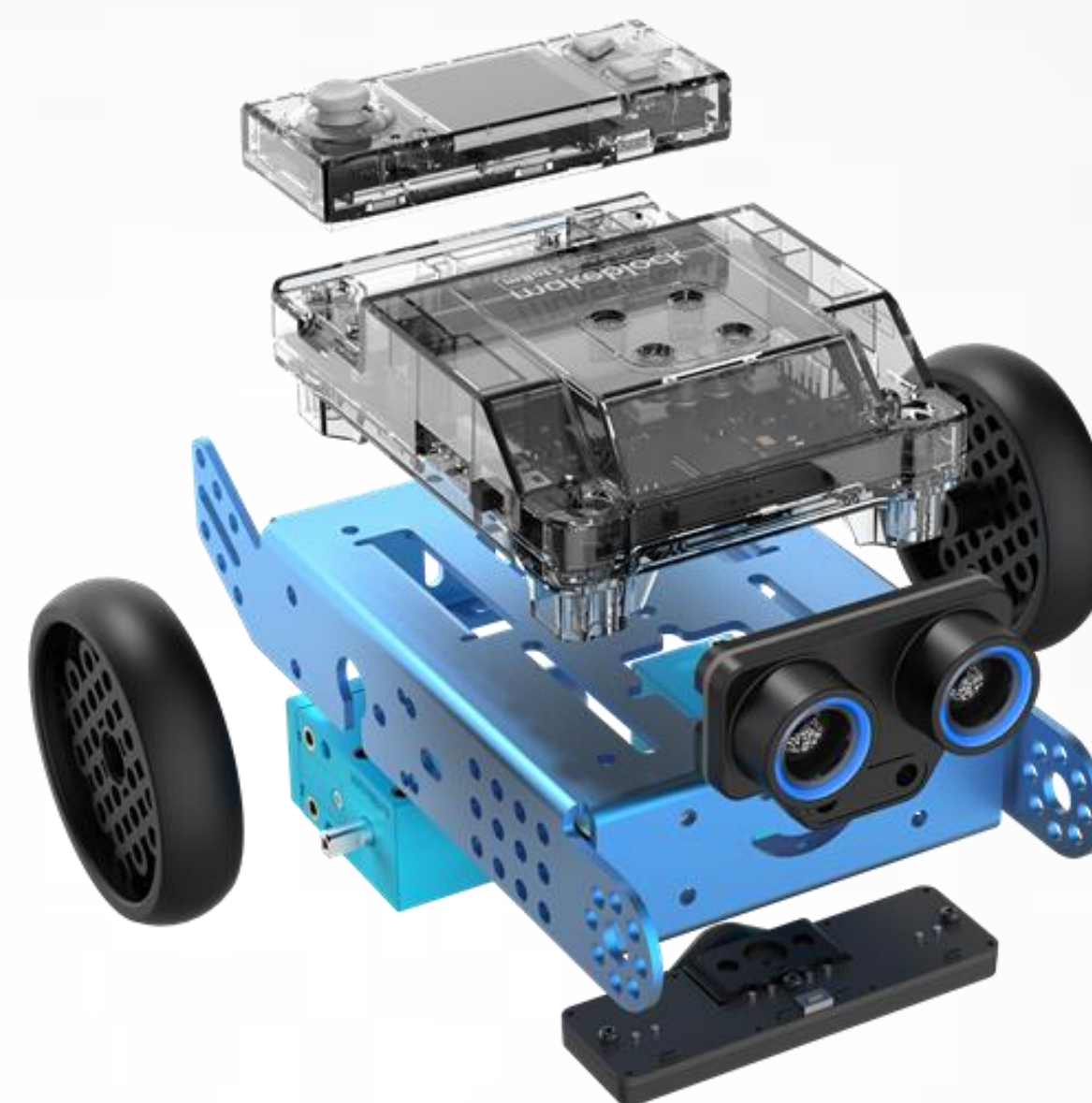




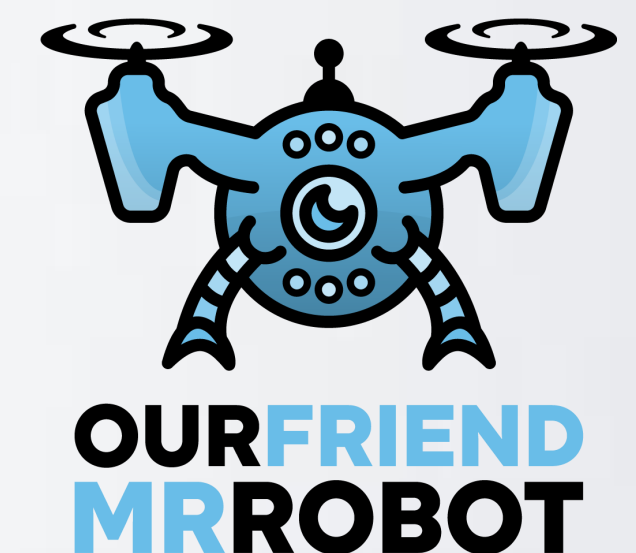
# mBot 2.0

A new generation  
educational robot

*Assembly  
instructions*



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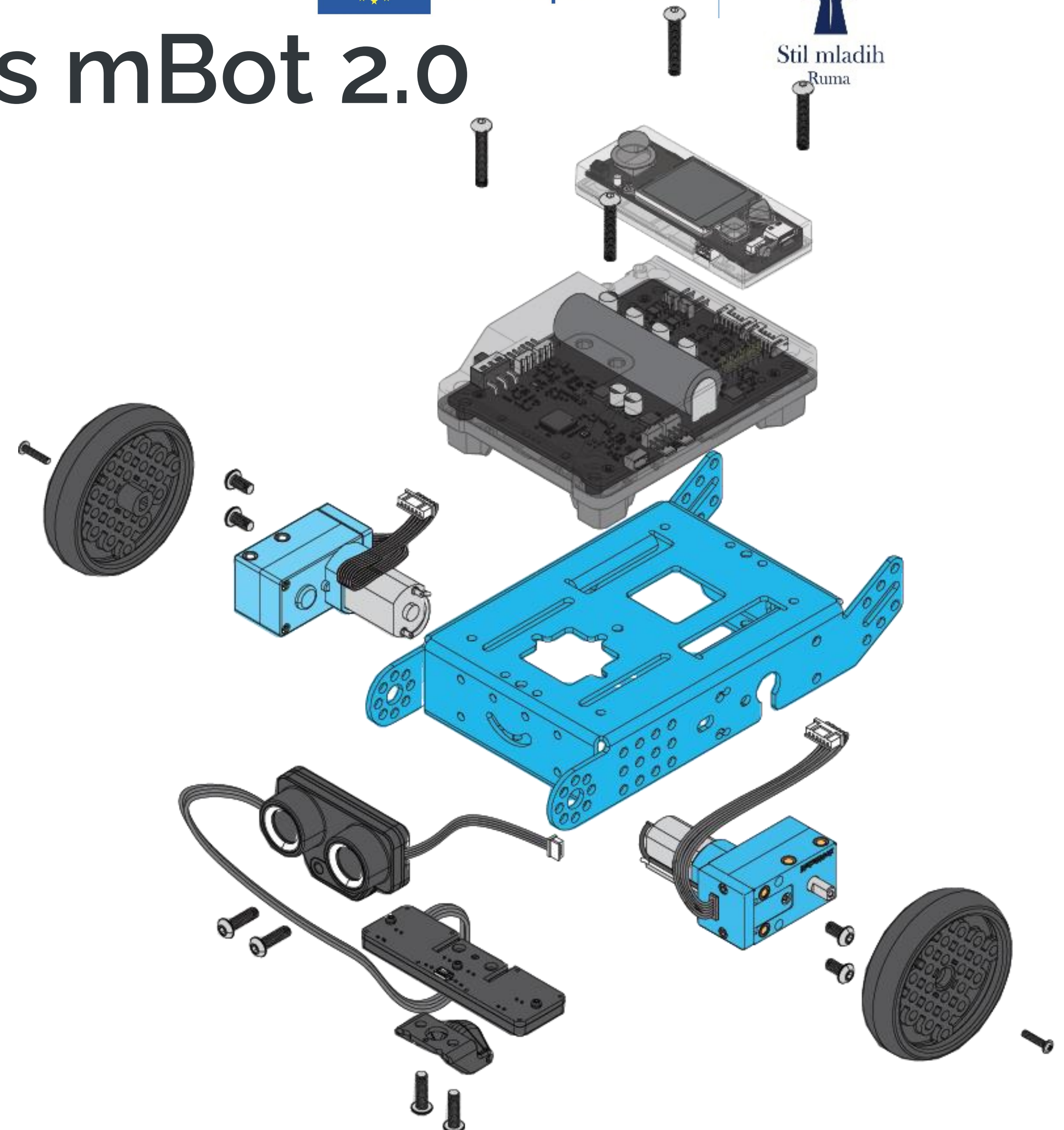
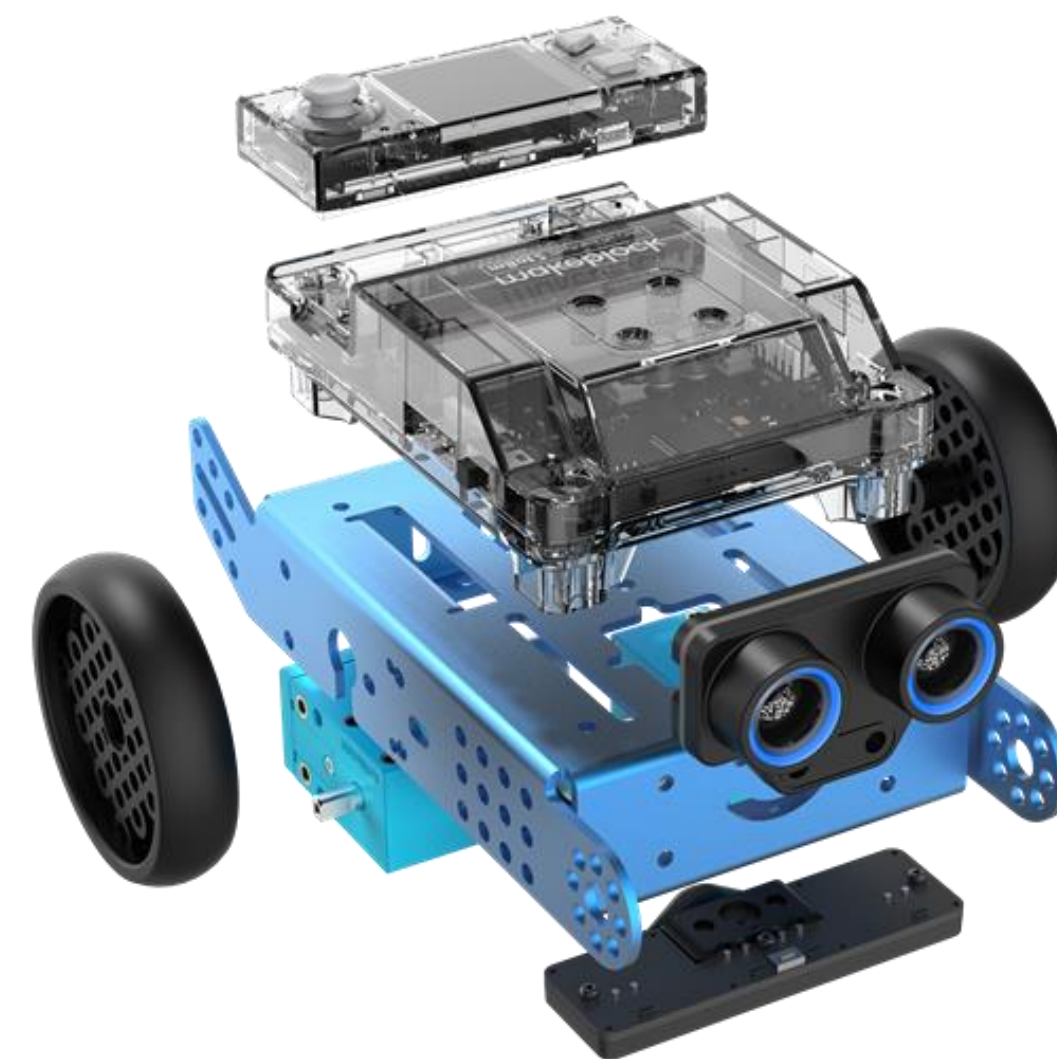
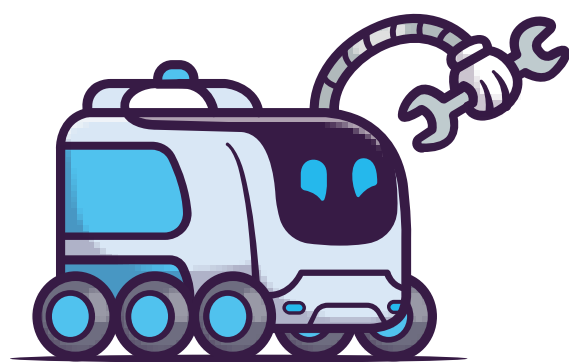


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Stil mladih  
Ruma

# Assembly instructions mBot 2.0

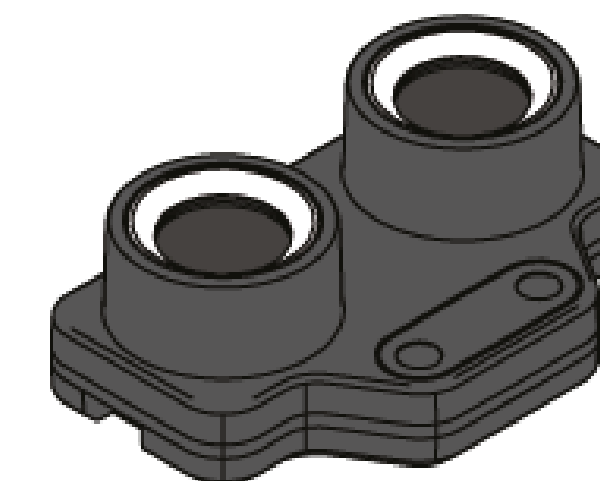
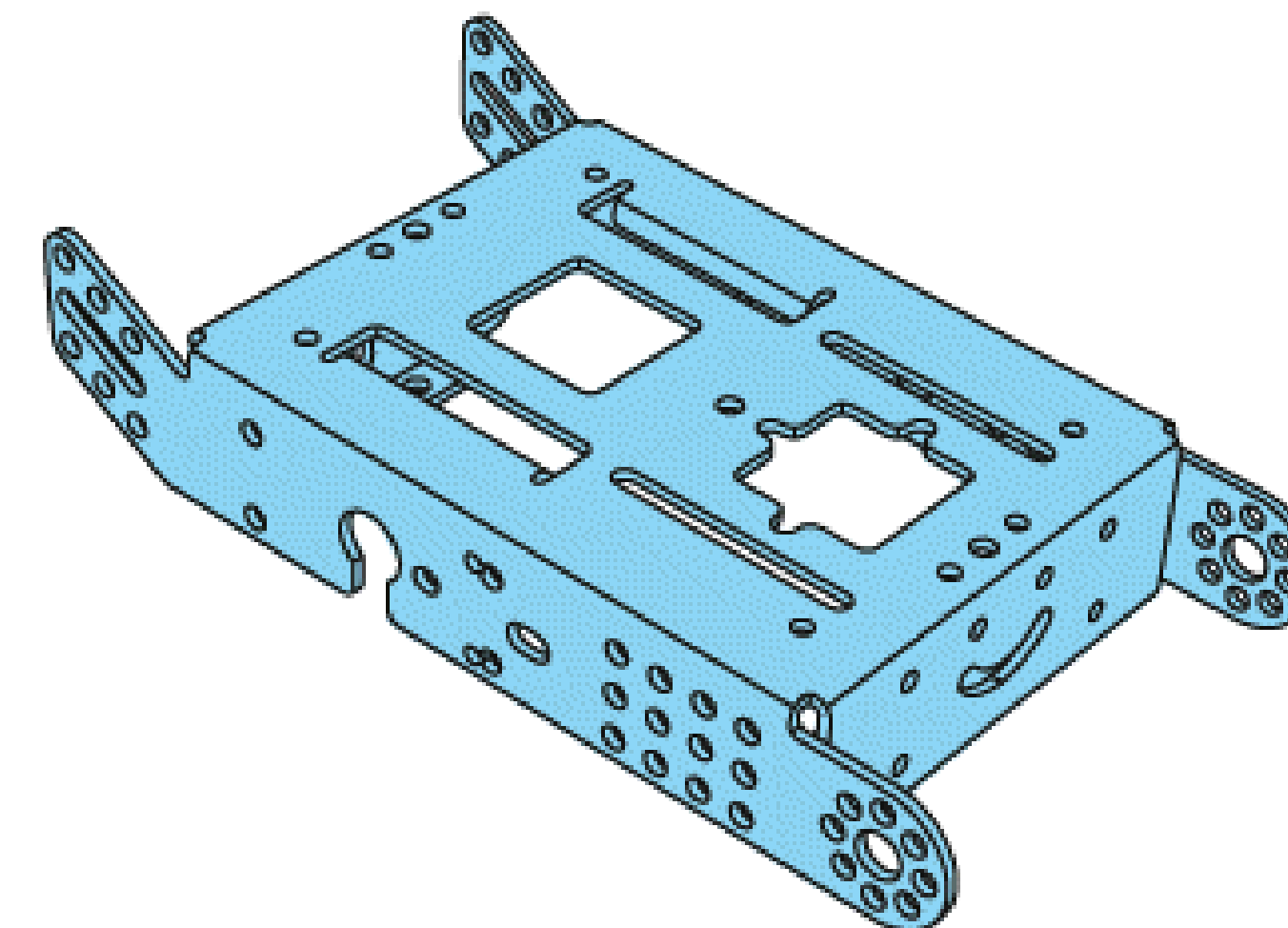
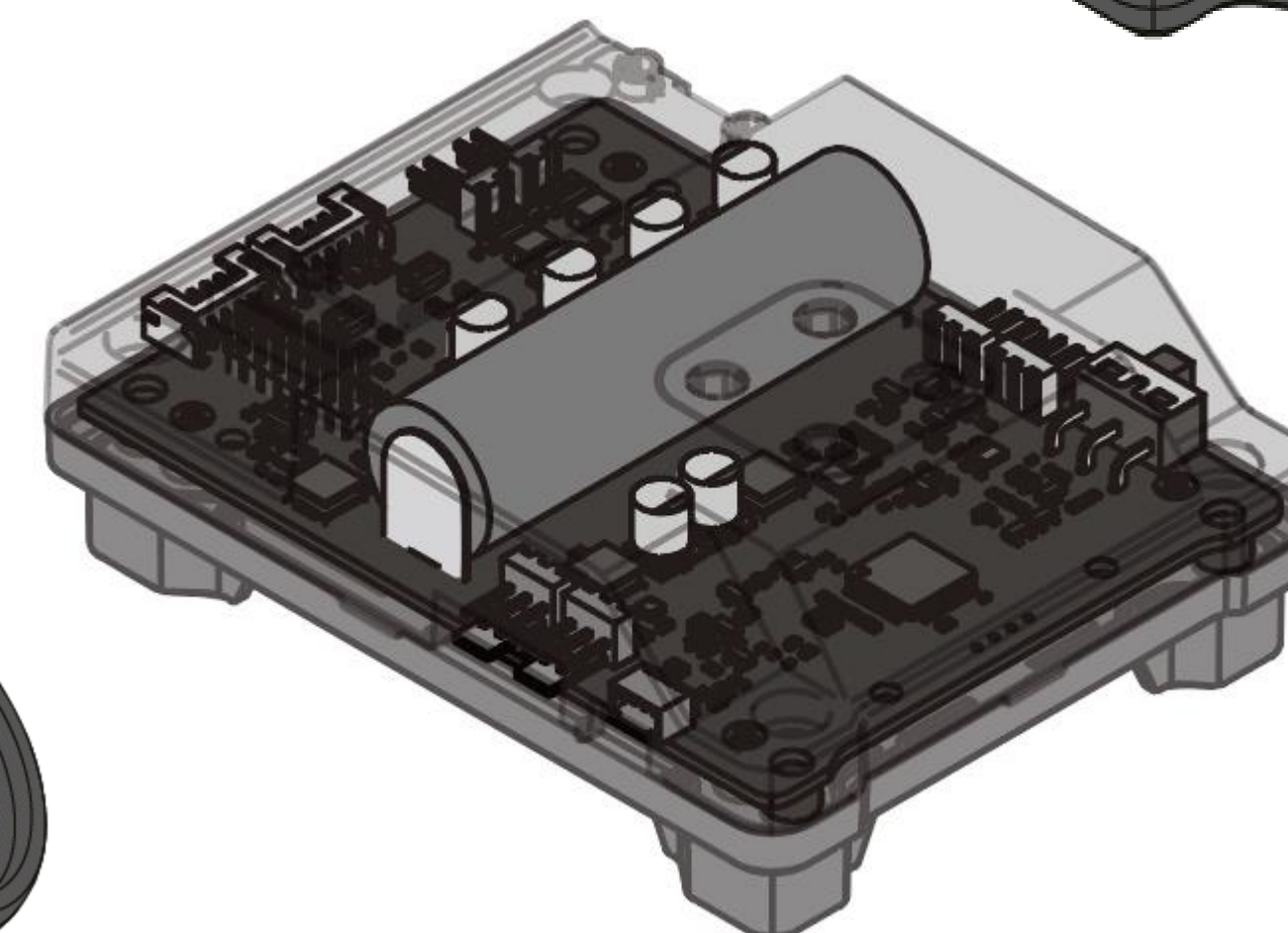
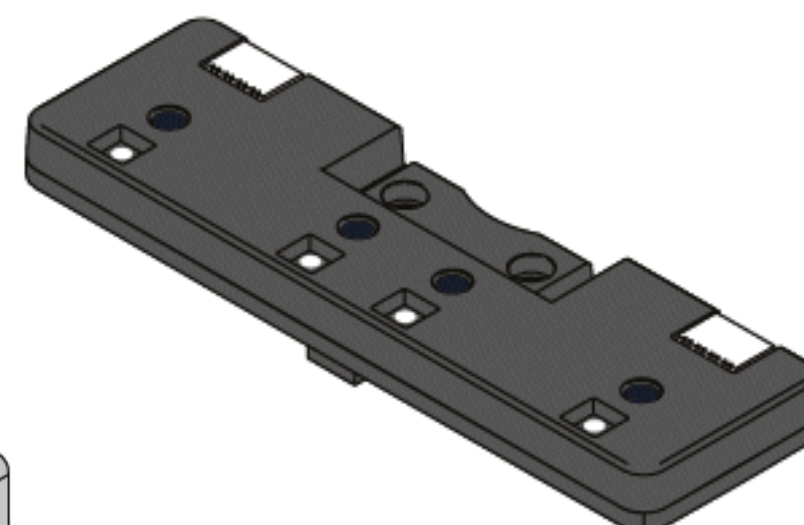
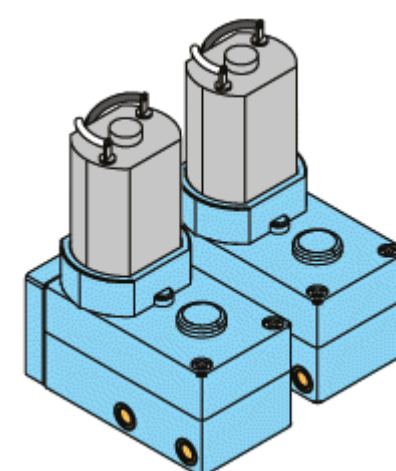




# Assembly instructions mBot 2.0

List of parts:

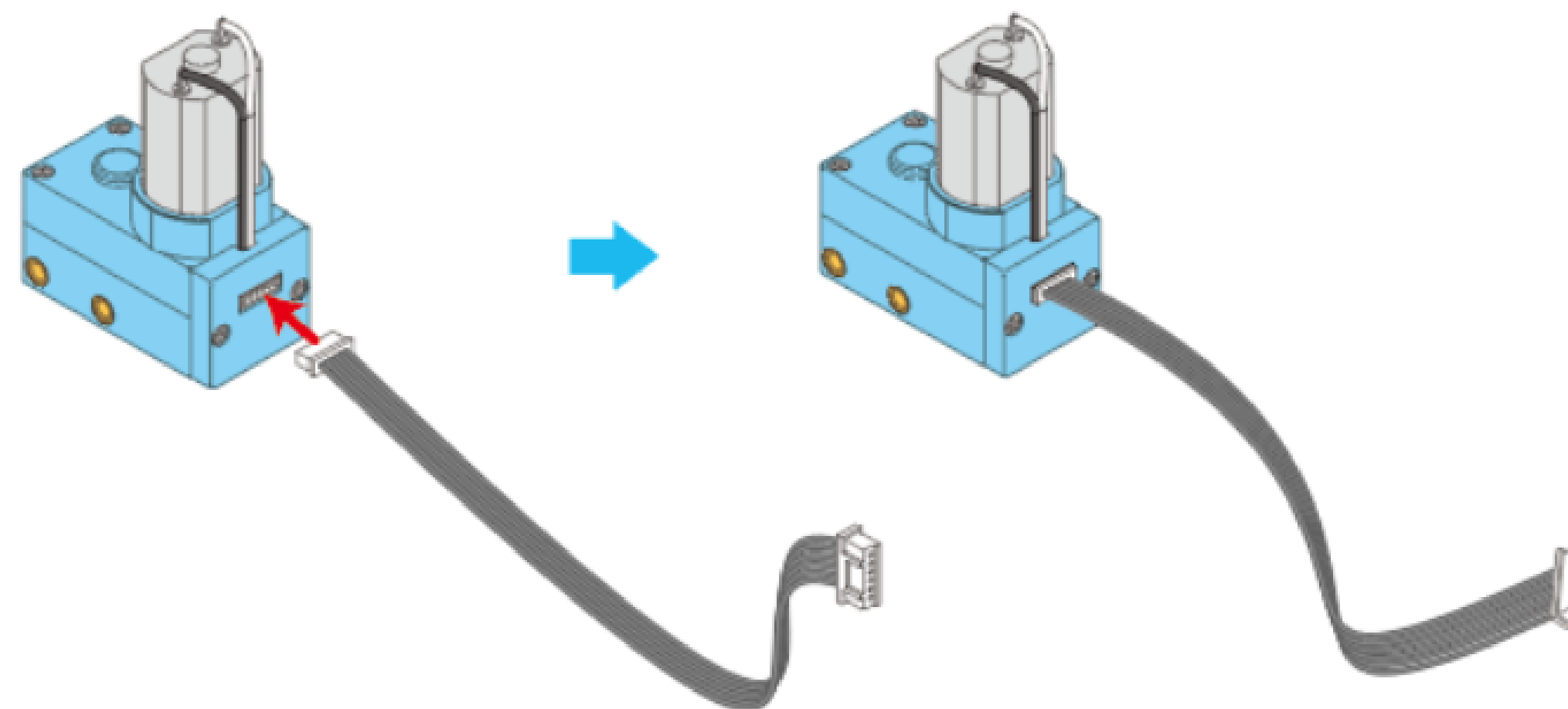
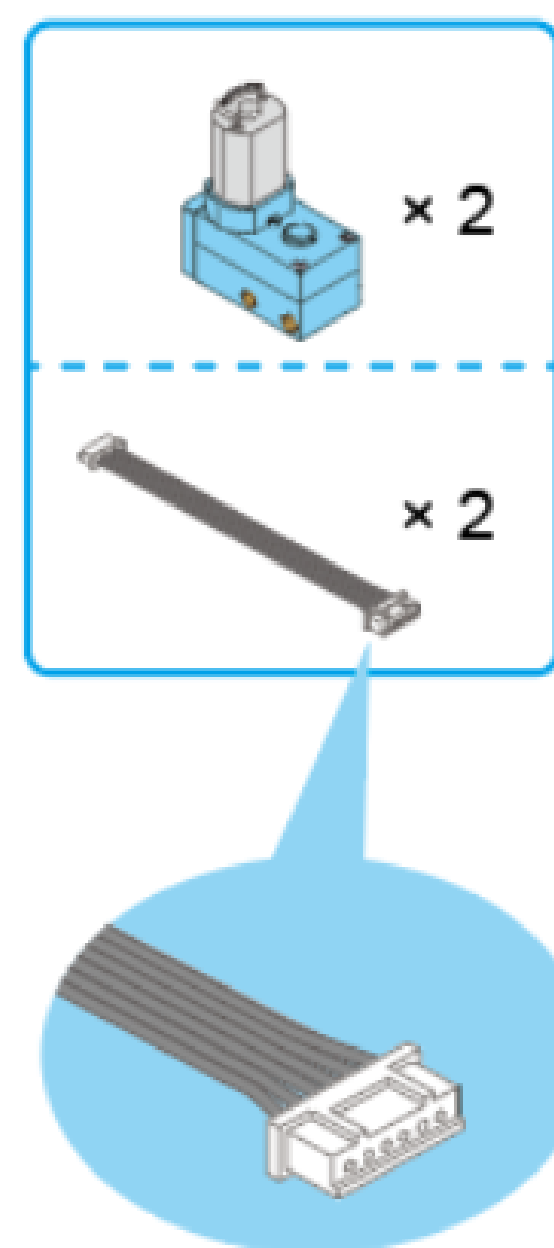
- CyberPi
- mBot2 Shield
- Ultrasonic sensor 2
- Quad RGB sensor
- Encoder motor
- Wheel hub
- Slick tyre
- Mini wheel
- Chassis
- USB cable
- Motor cable
- mBuild cable (10 cm)
- mBuild cable (20 cm)





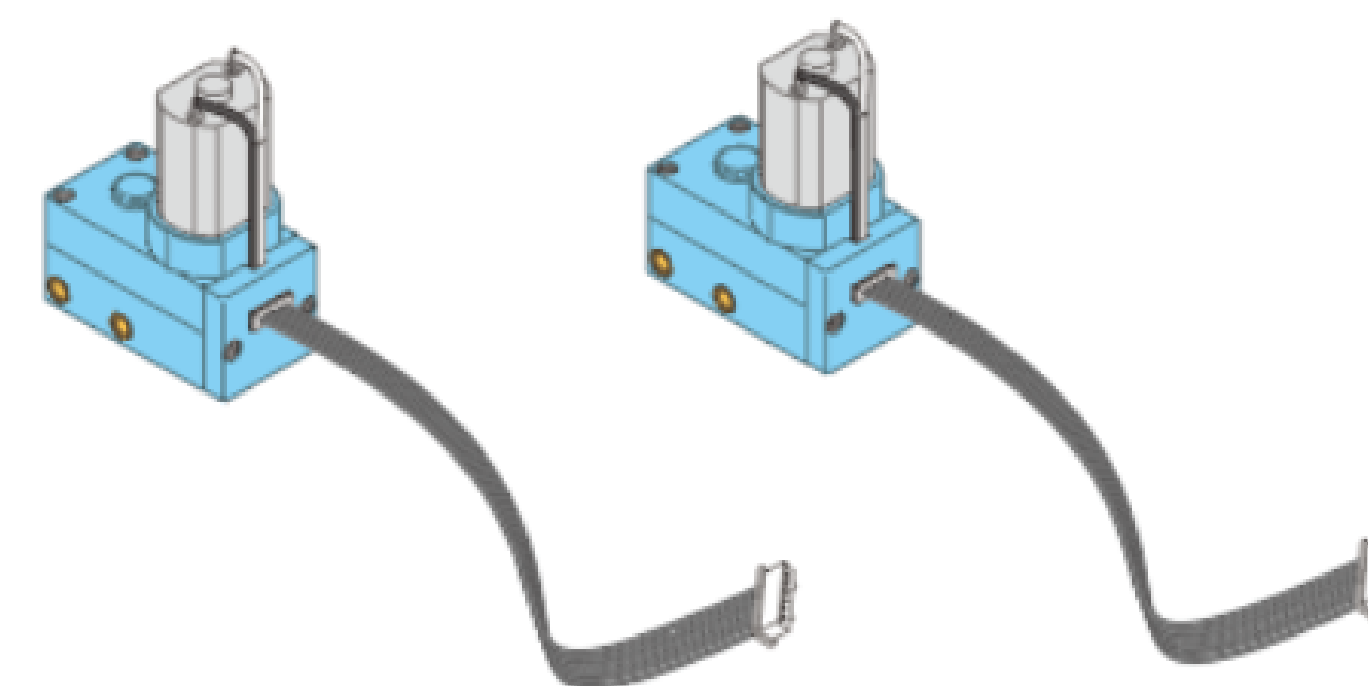
# Assembly instructions mBot 2.0

## Step 1.



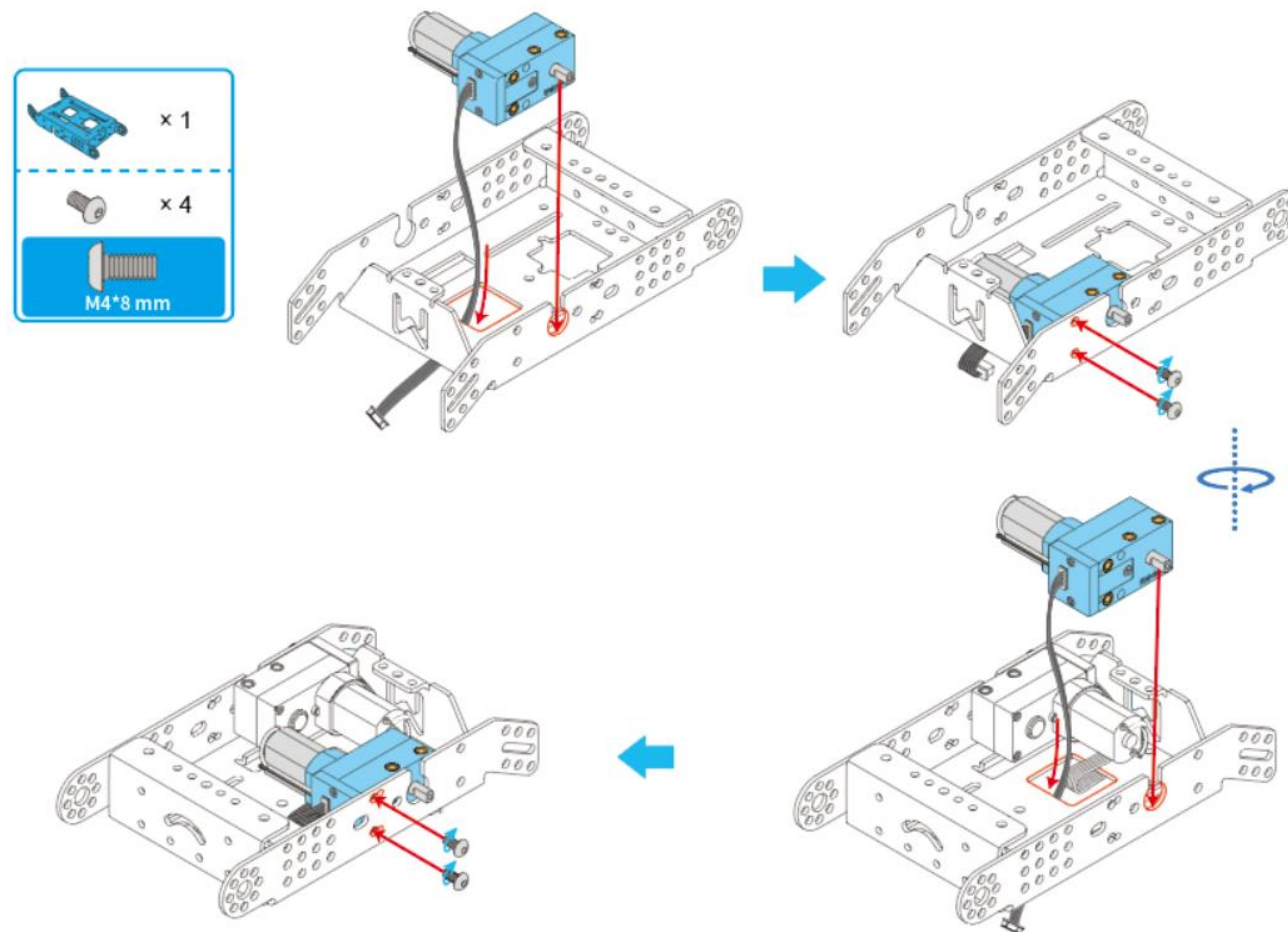
### Tips:

Insert the other motor cable to the other encoder motor.



# Assembly instructions mBot 2.0

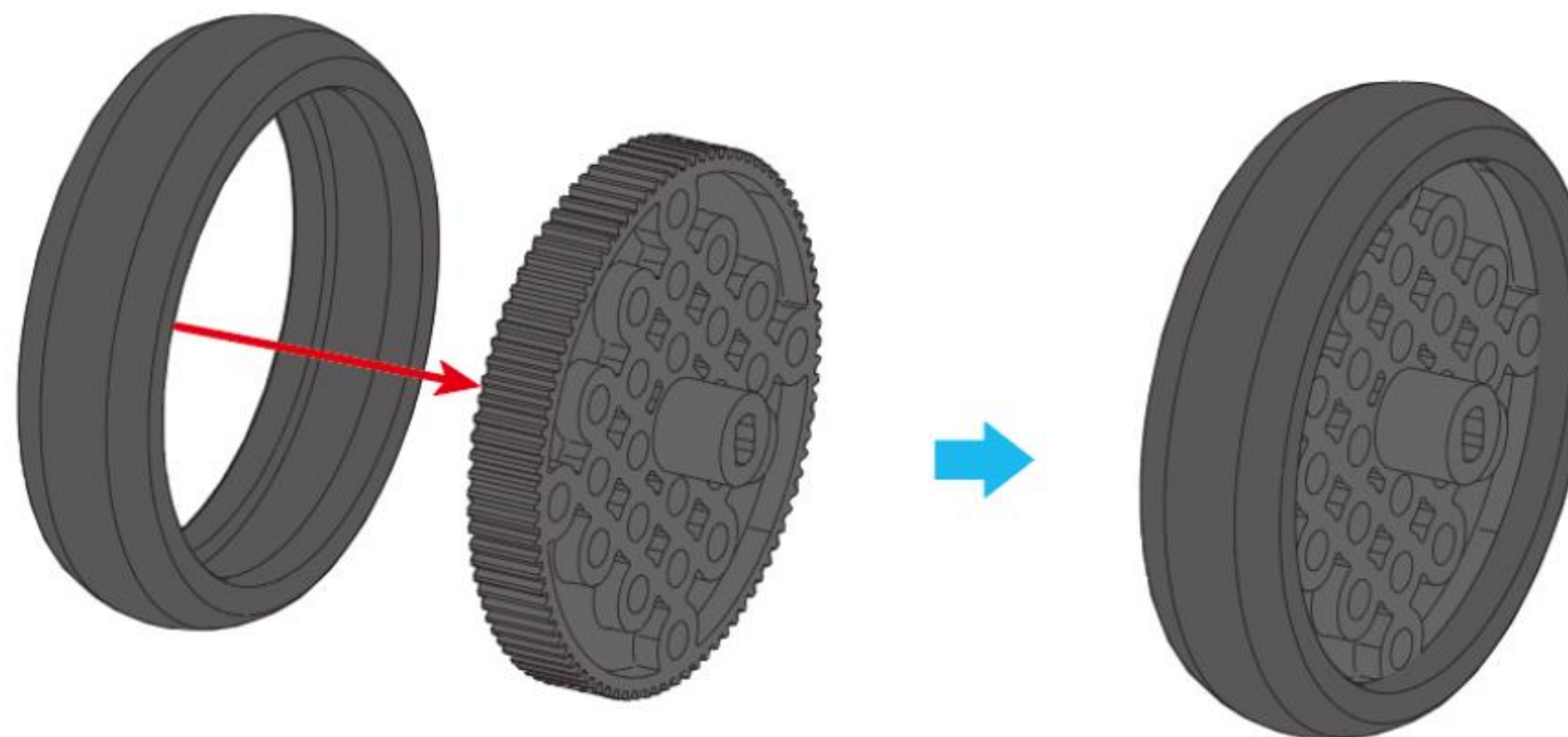
*Step 2.*





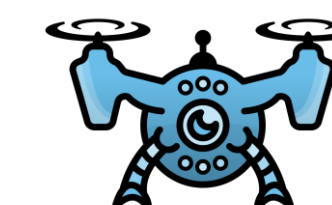
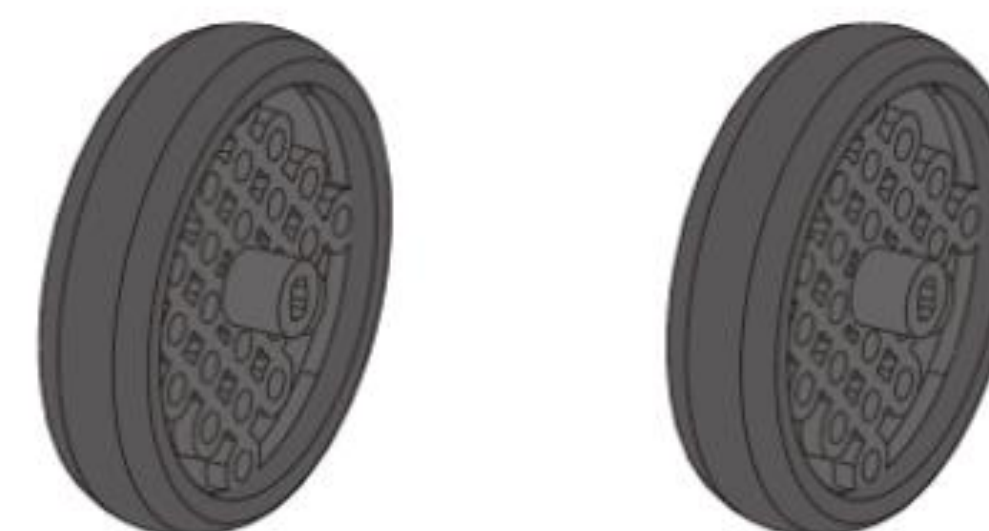
# Assembly instructions mBot 2.0

Step 3.



**Tips:**

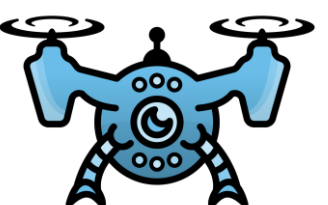
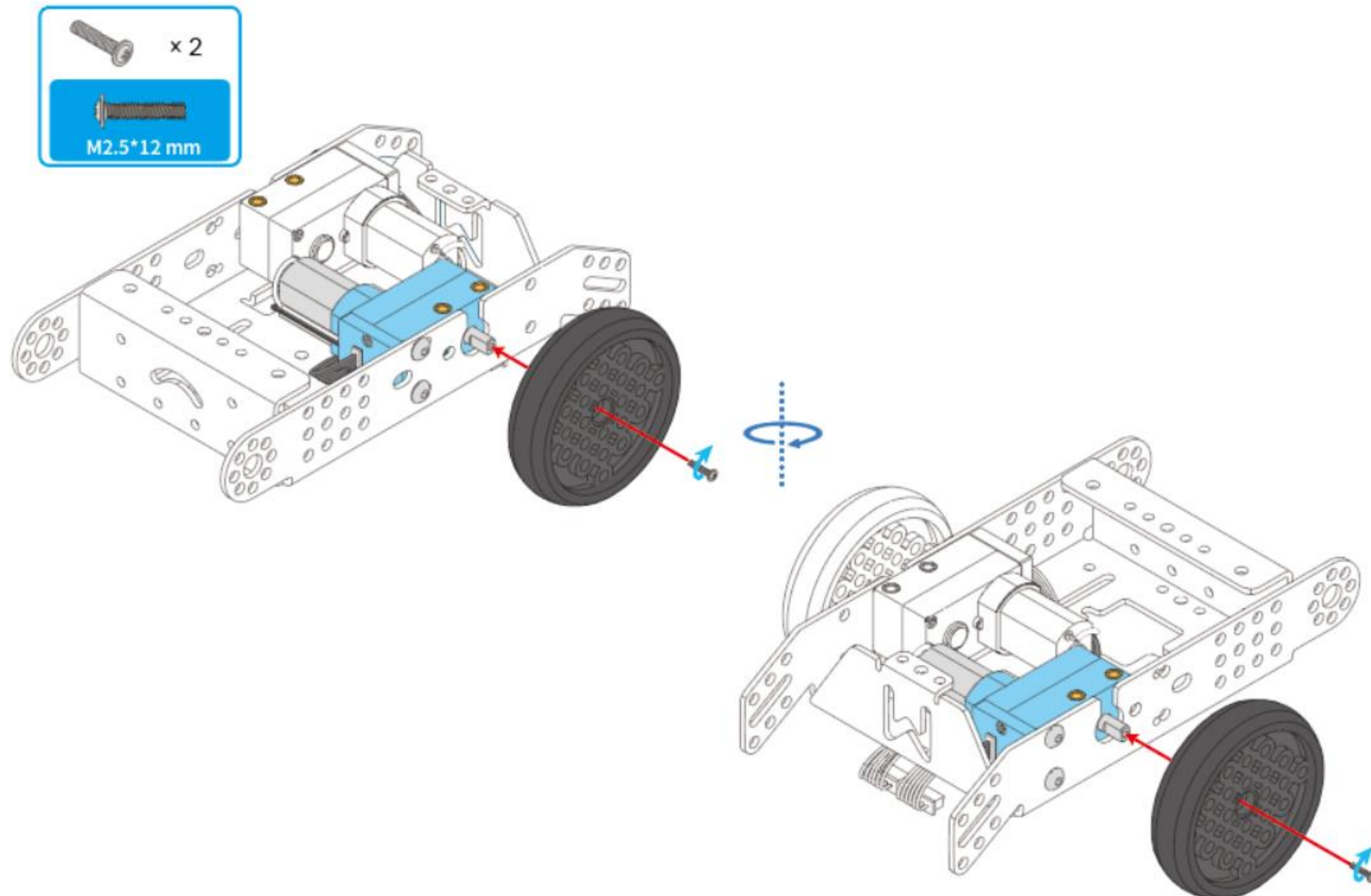
Assemble two wheels  
in the same way.





# Assembly instructions mBot 2.0

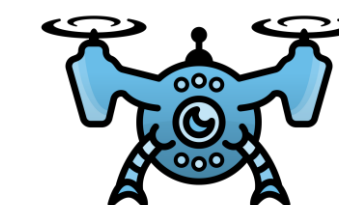
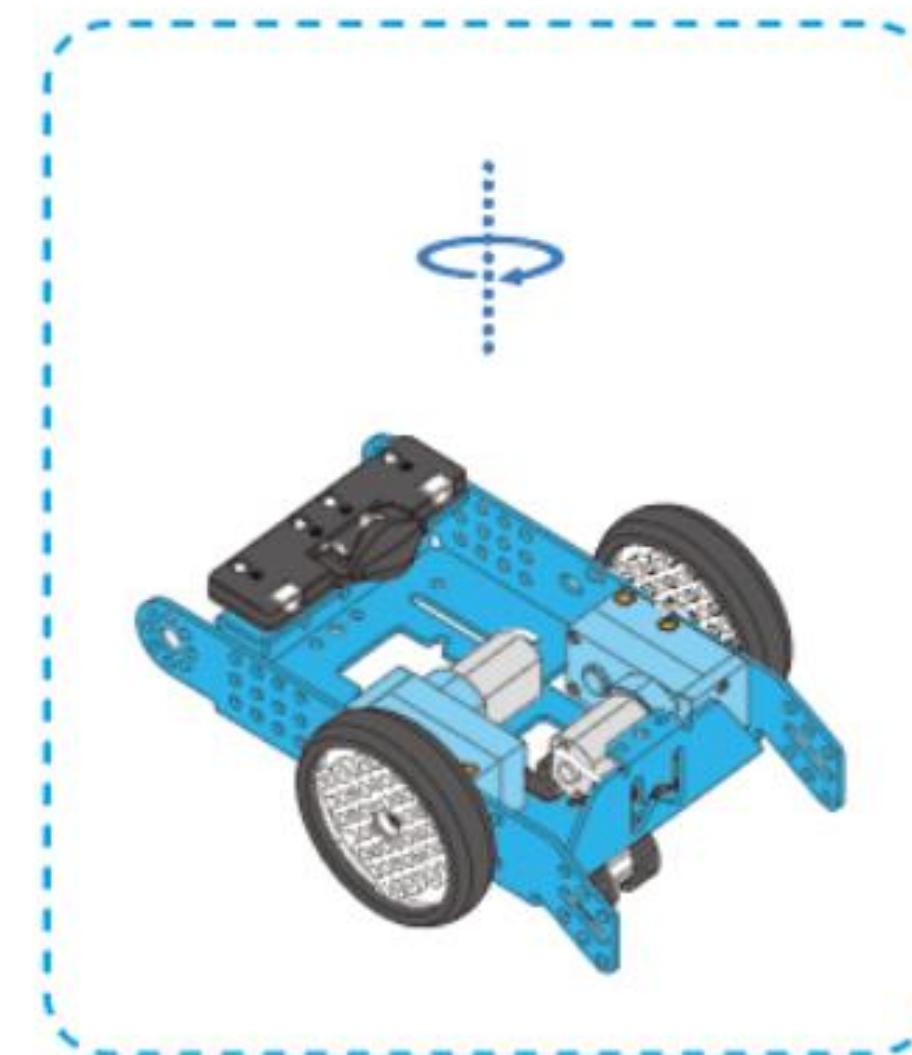
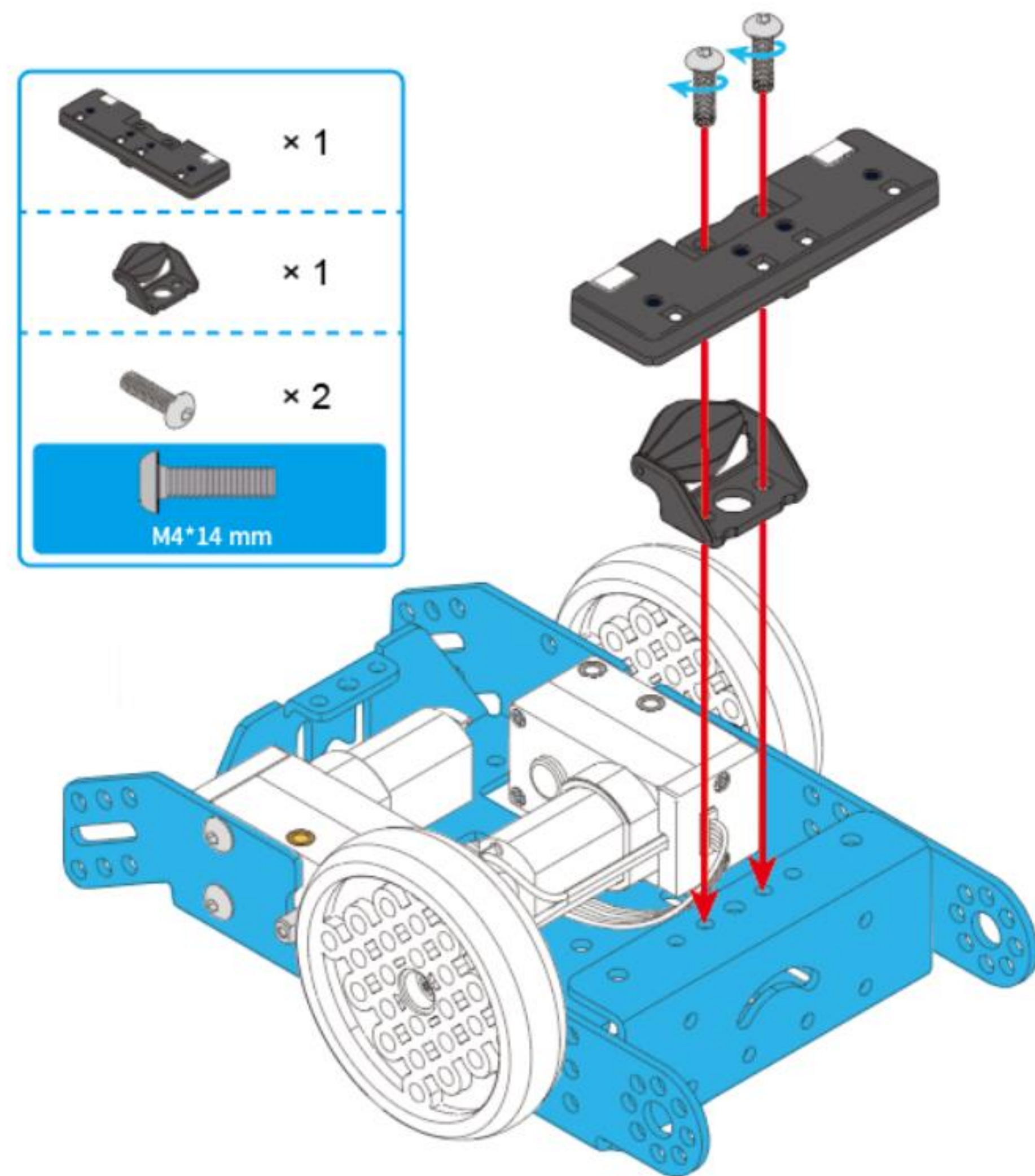
Step 4.





# Assembly instructions mBot 2.0

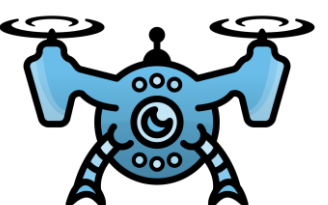
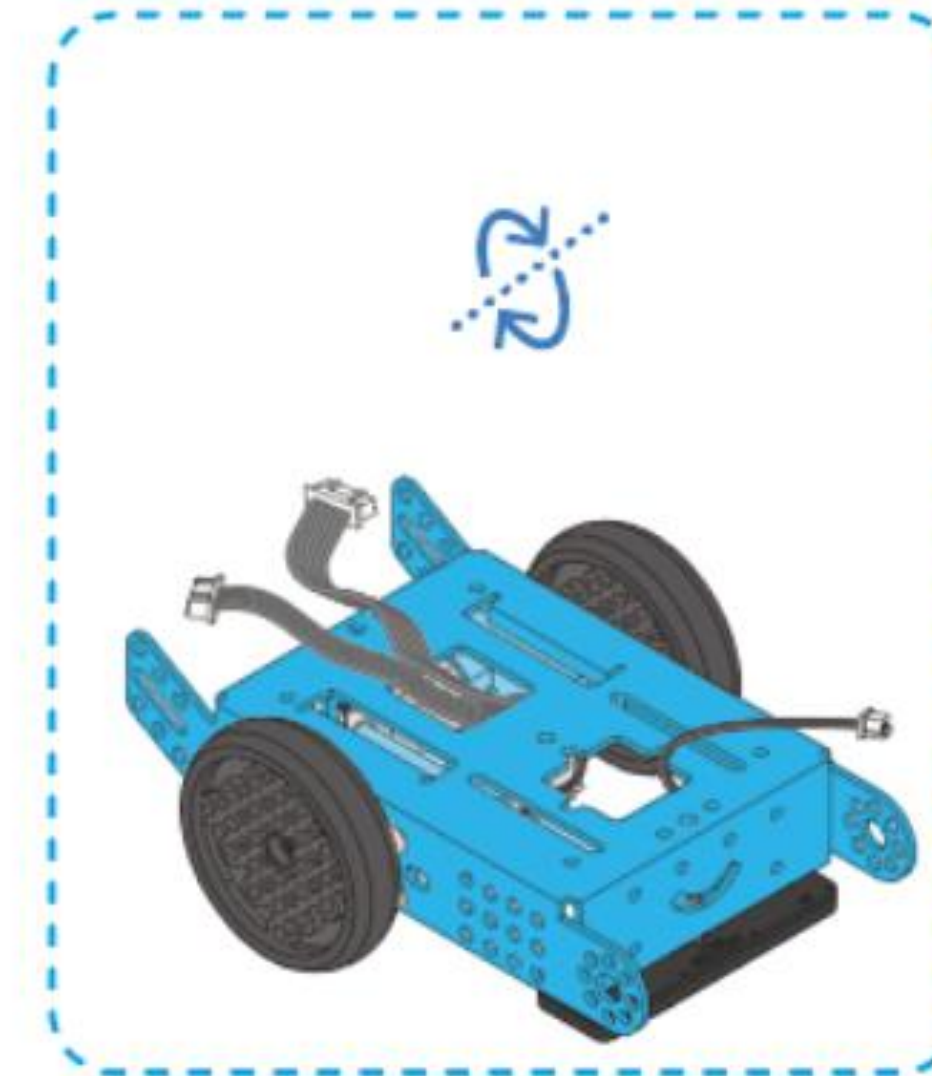
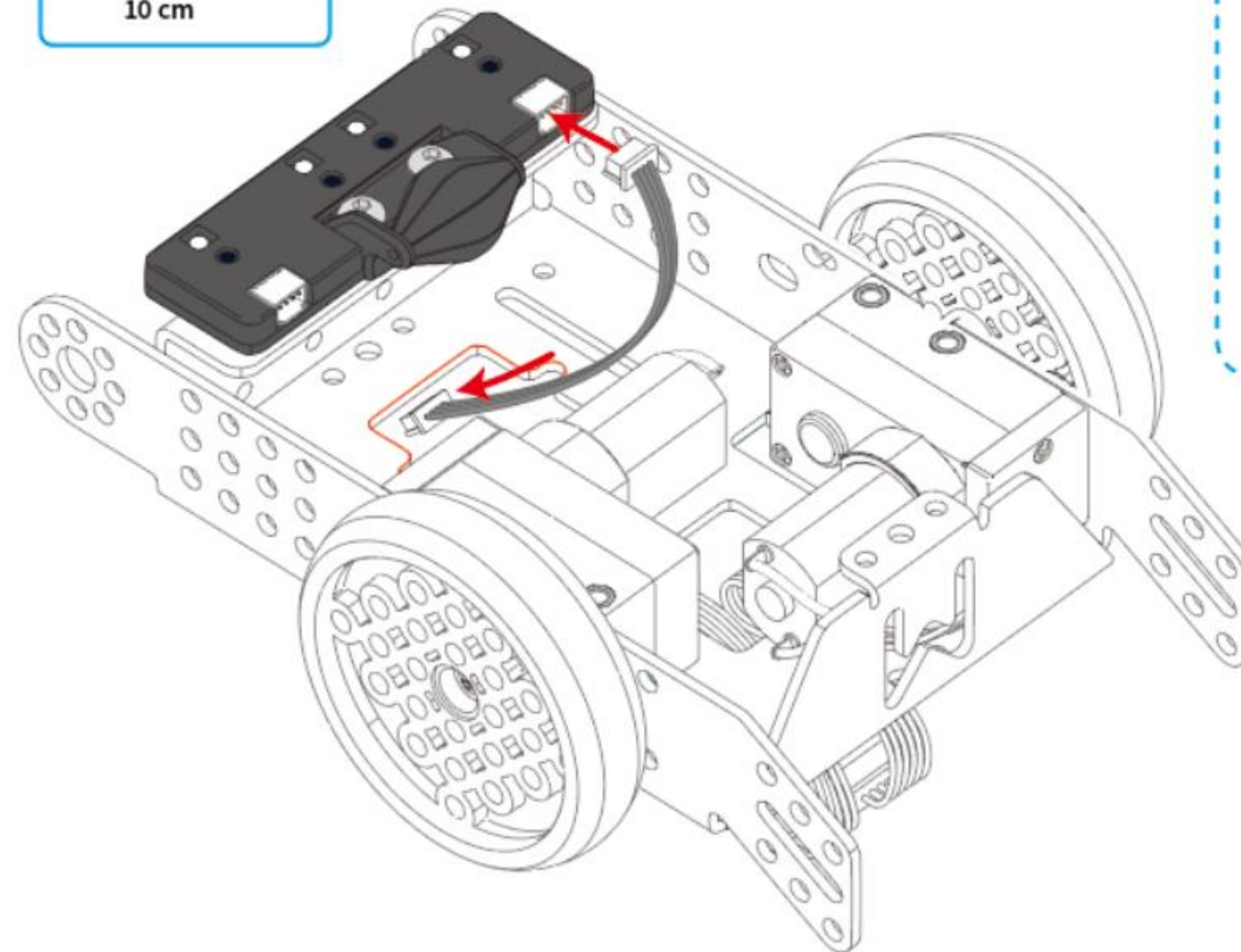
## Step 5.





# Assembly instructions mBot 2.0

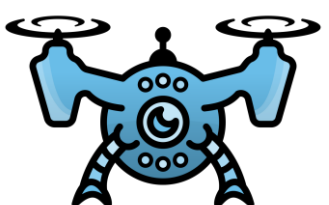
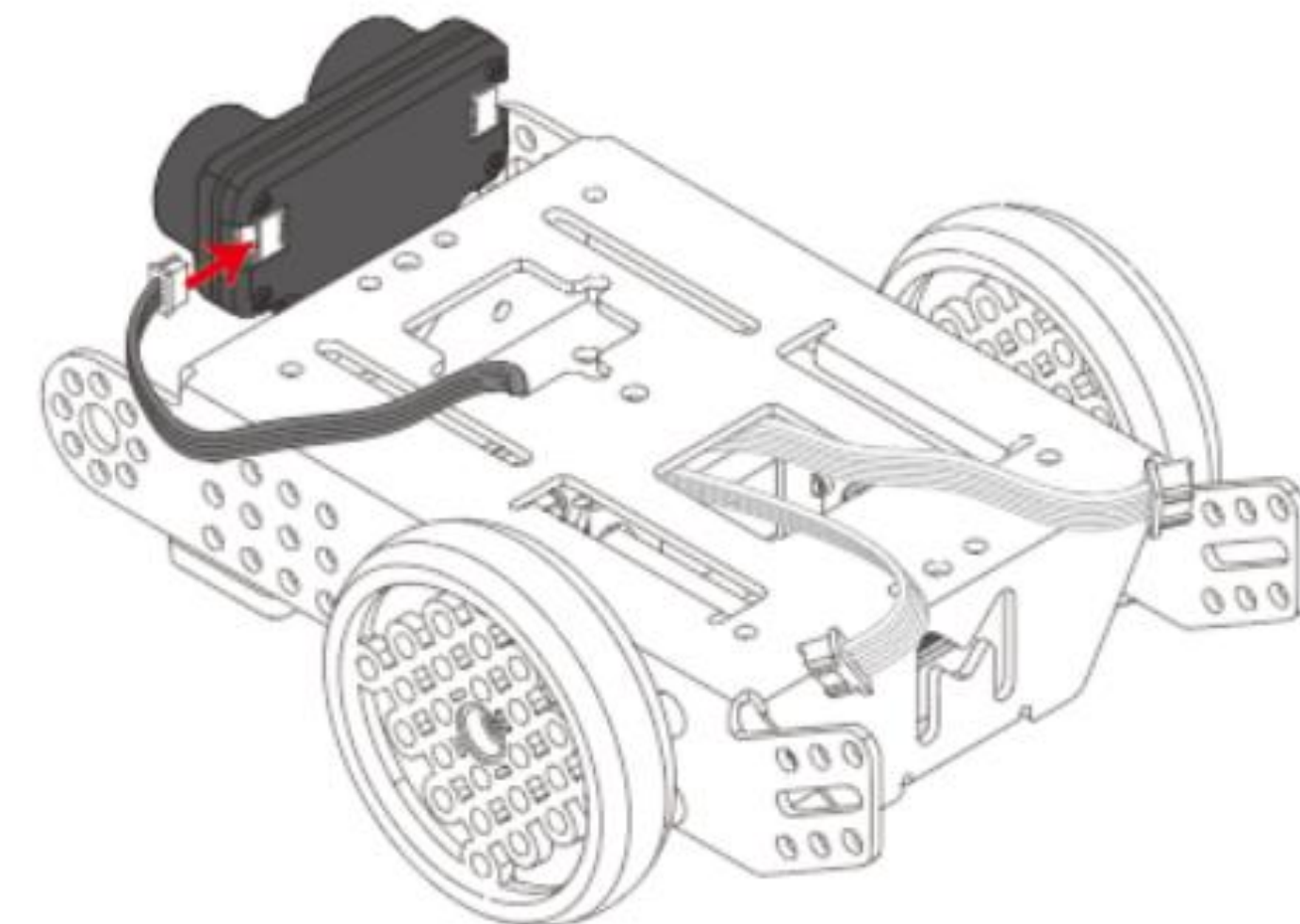
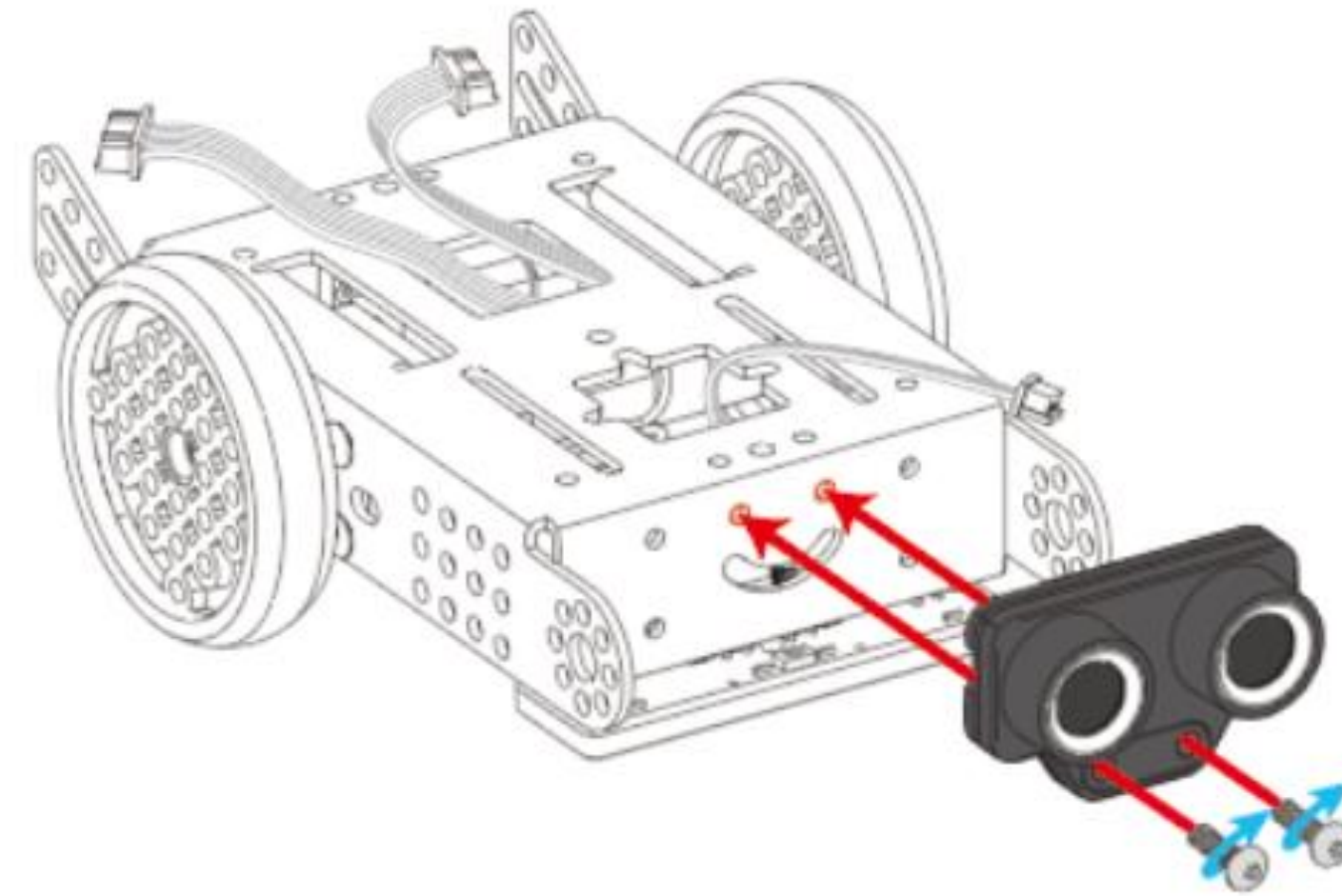
## Step 6.





# Assembly instructions mBot 2.0

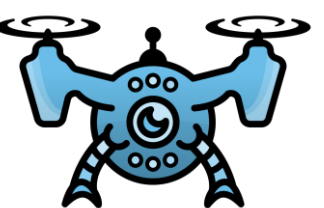
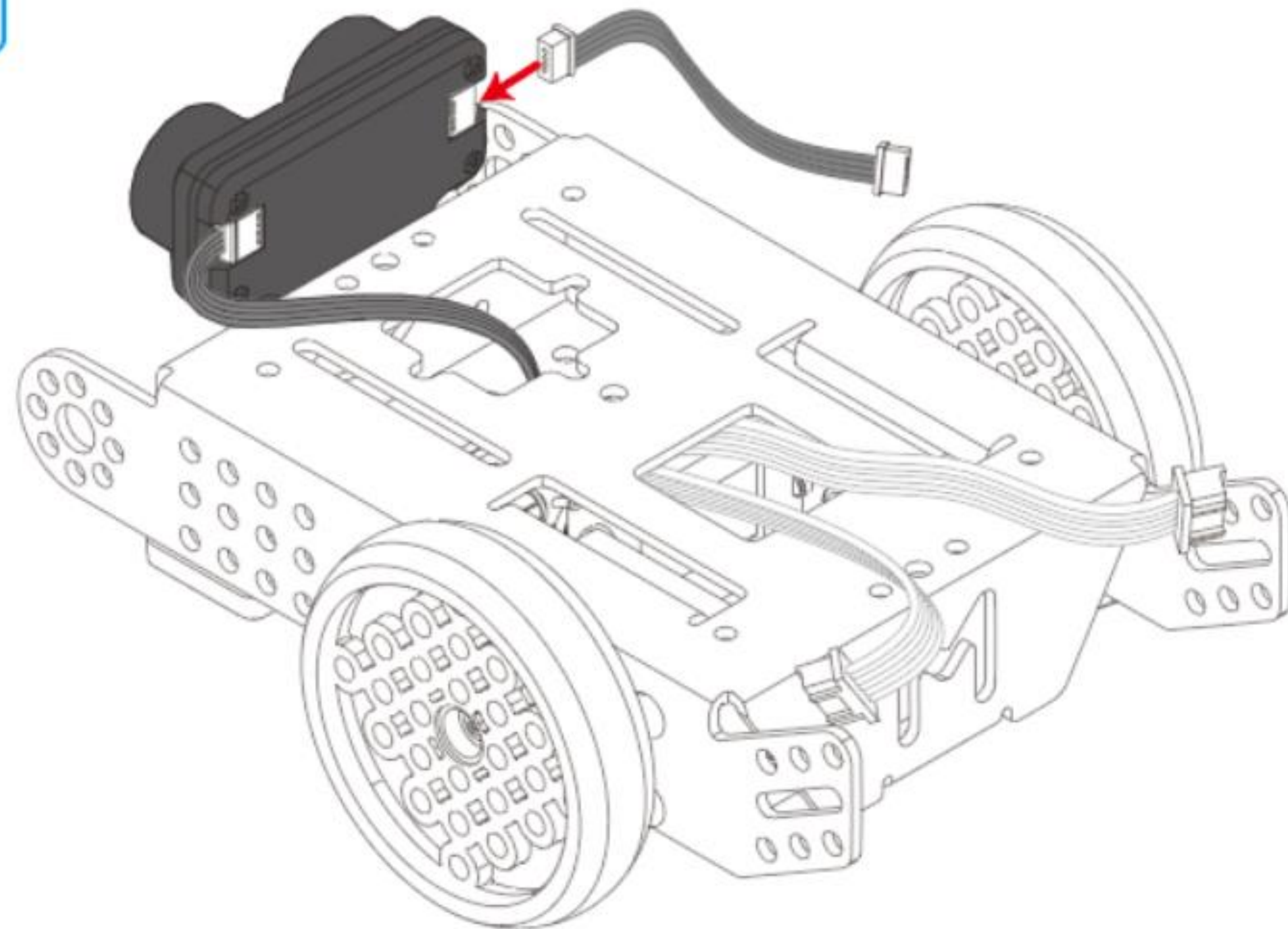
## Step 7.





# Assembly instructions mBot 2.0

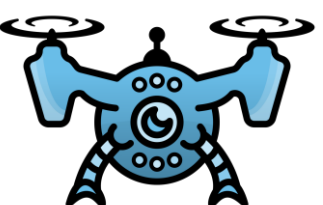
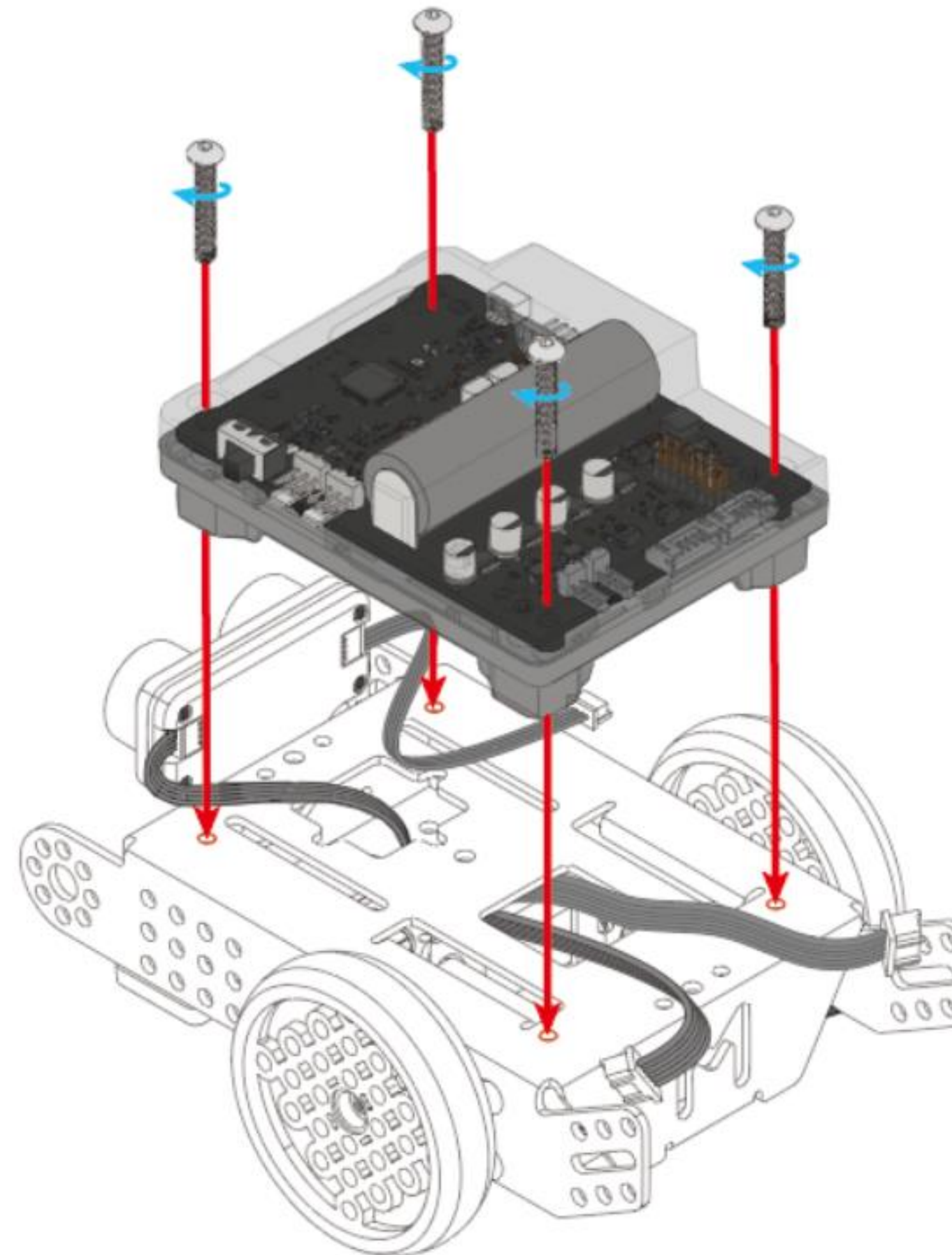
*Step 8.*





# Assembly instructions mBot 2.0

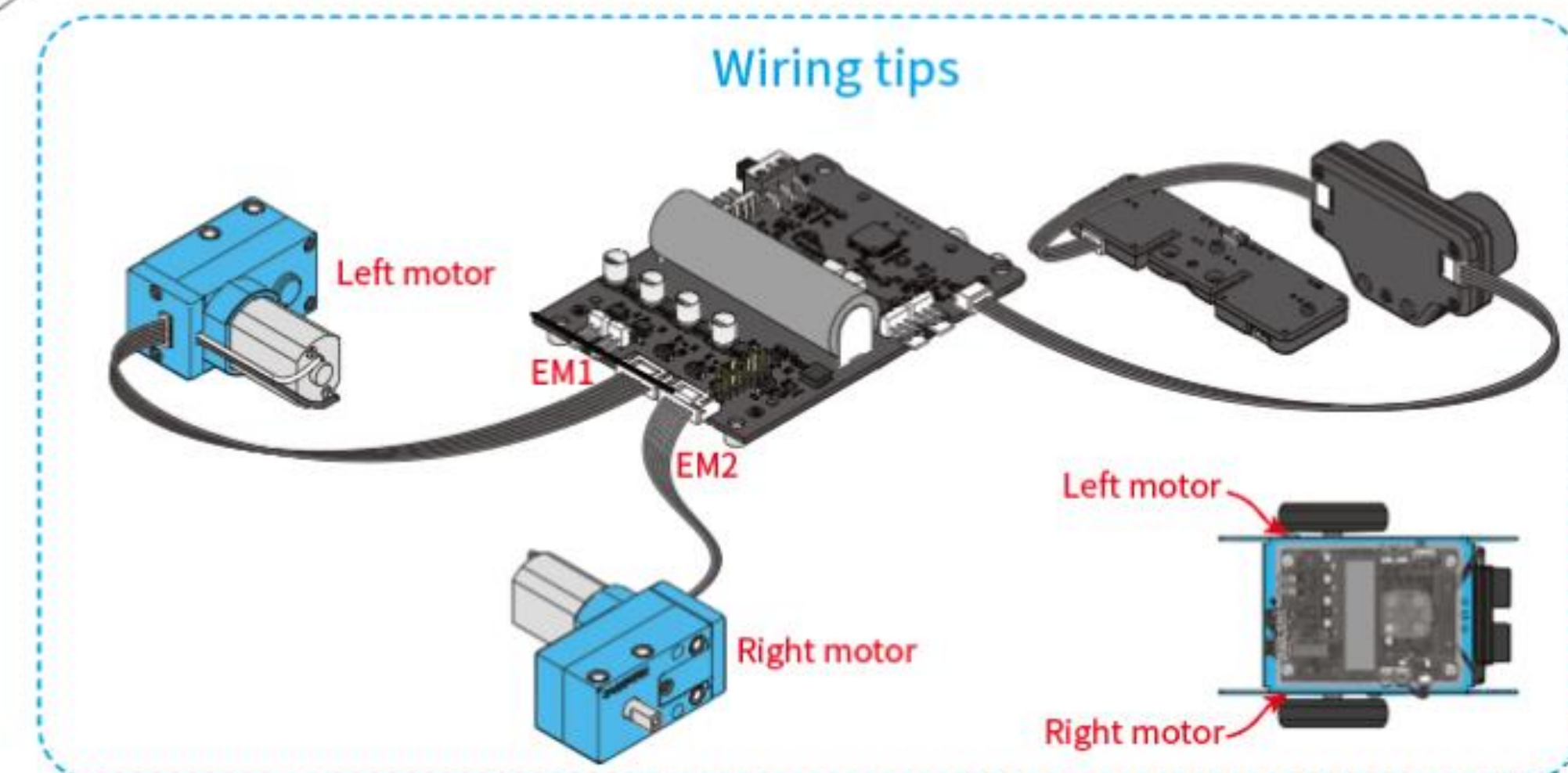
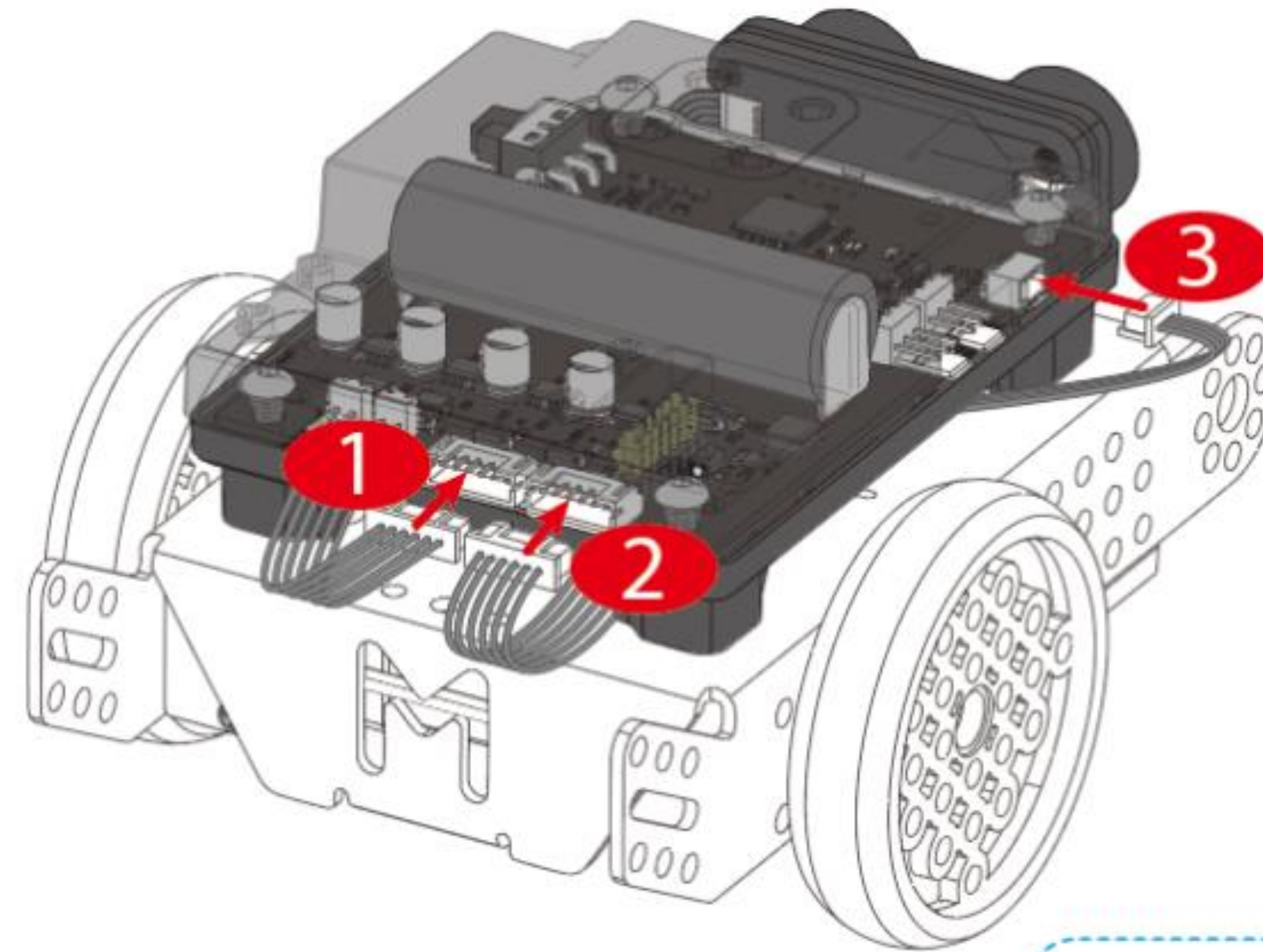
*Step 9.*





# Assembly instructions mBot 2.0

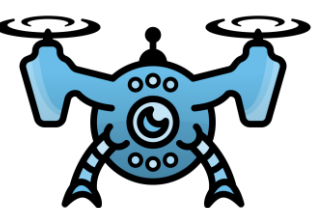
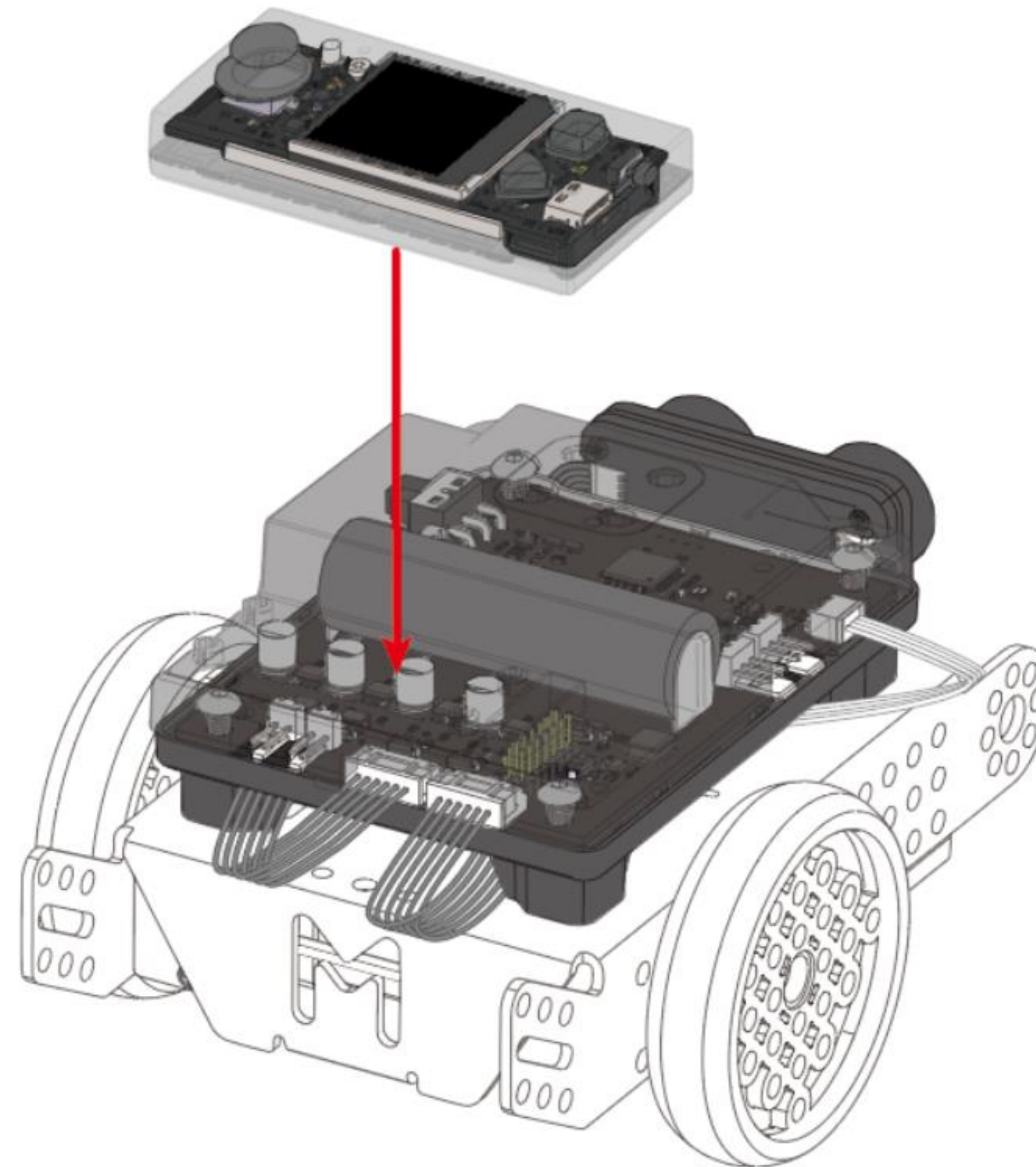
*Step 10.*





# Assembly instructions mBot 2.0

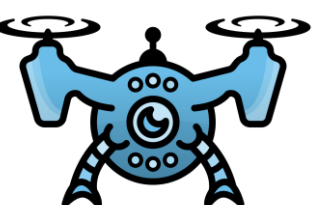
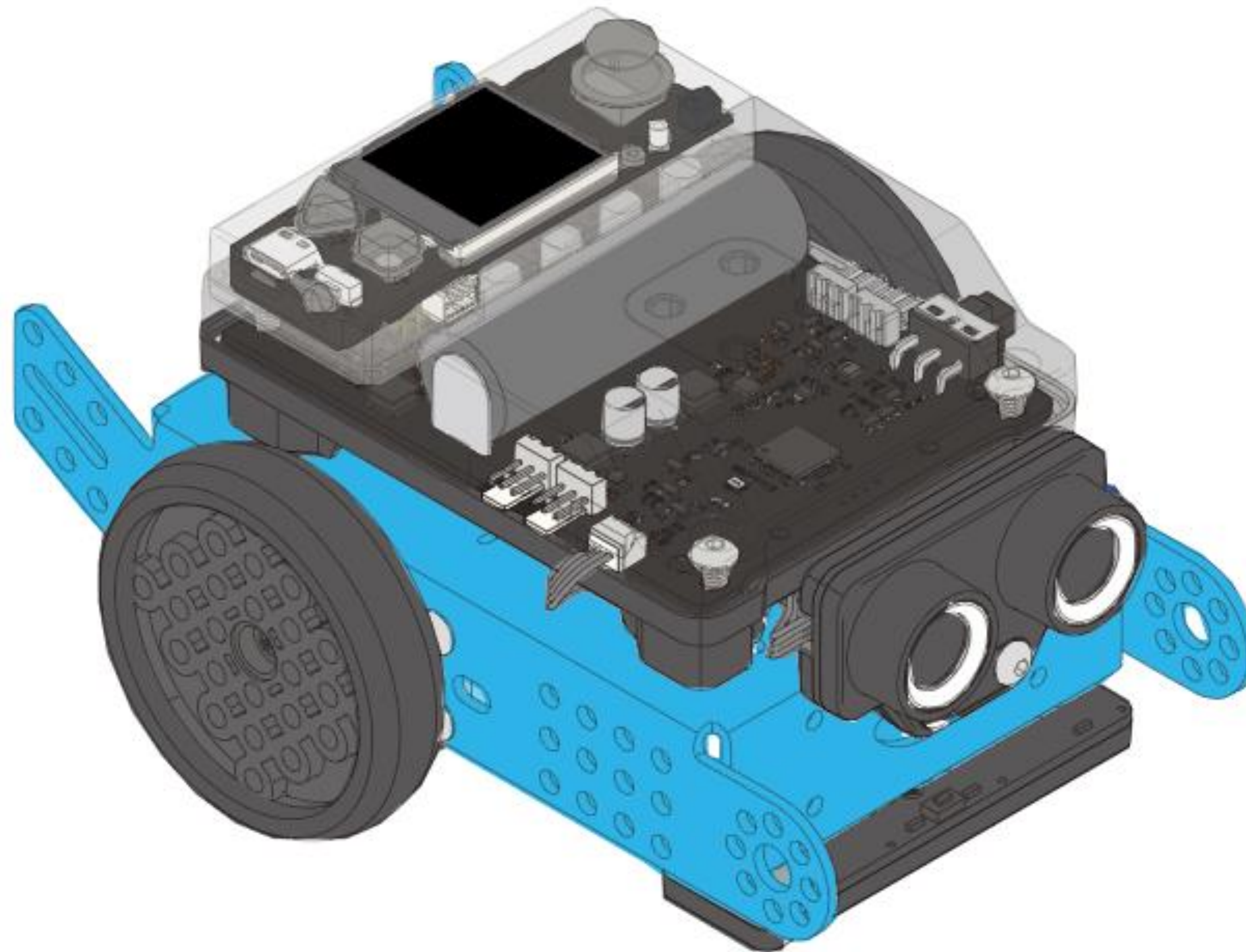
*Step 12.*





# Assembly instructions mBot 2.0

*Completed*



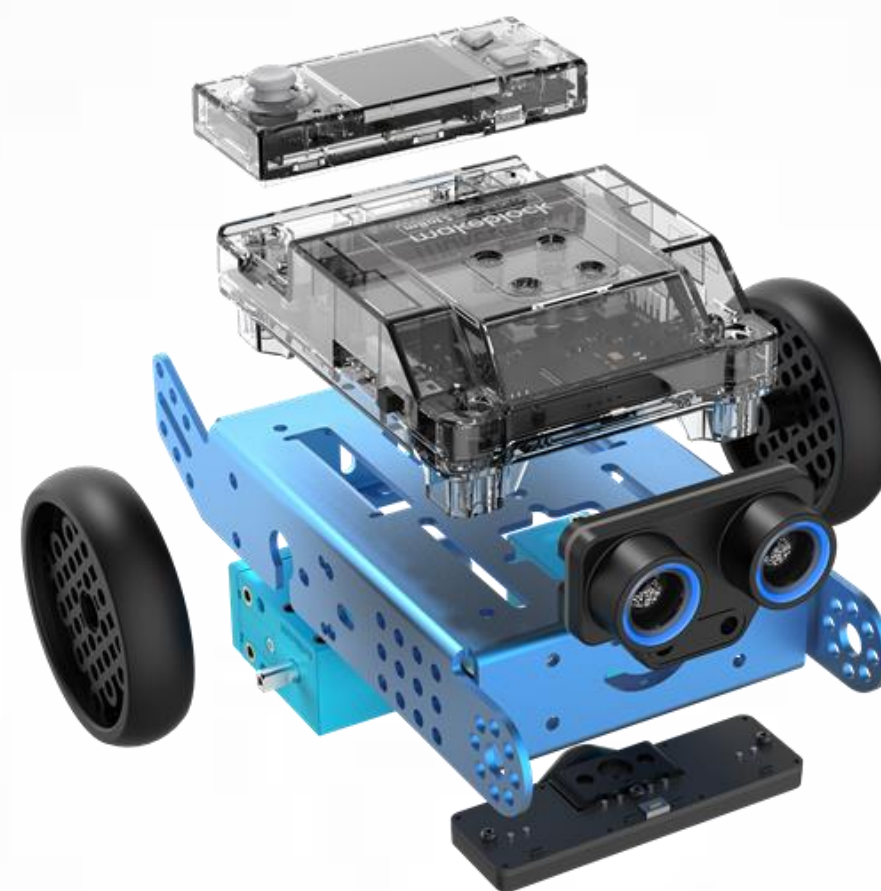




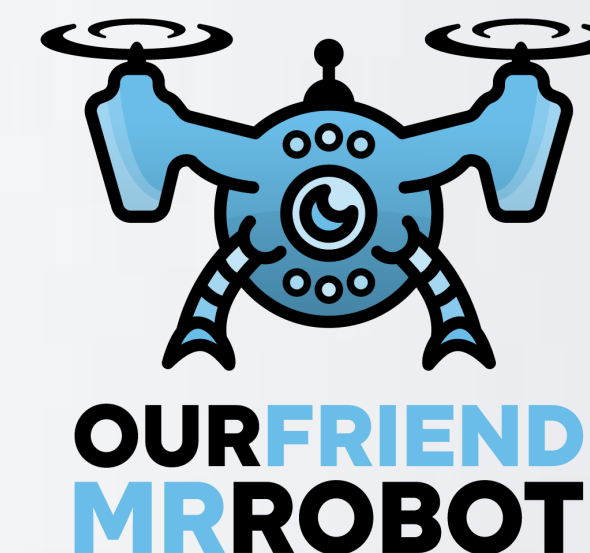
# mBot 2.0

A new generation  
educational robot

*Manual control -  
Makeblock app*



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# Makeblock app


Use your mobile device to scan the following QR code to download or update the Makeblock app.

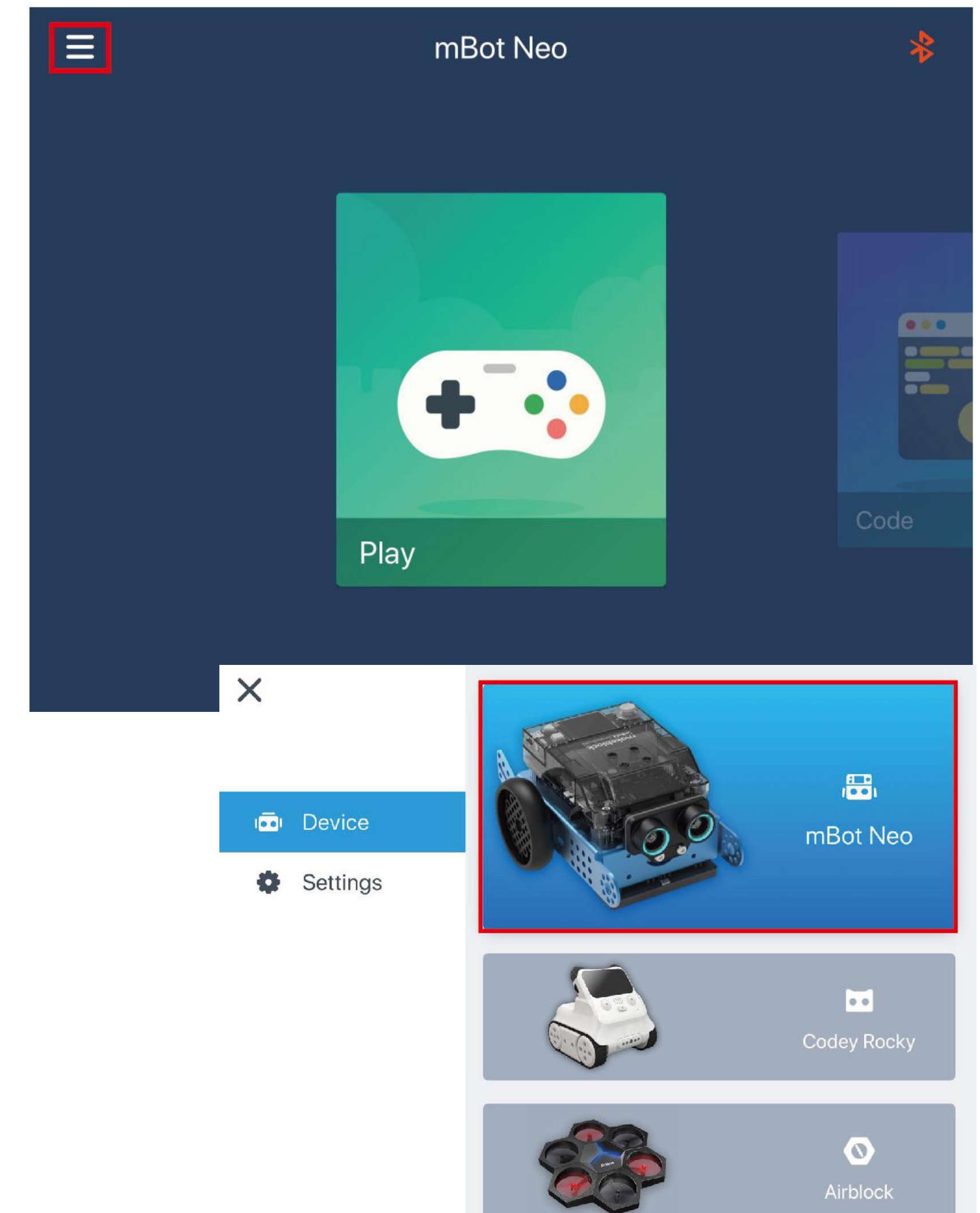
Alternatively, search for Makeblock in the app stores to download or update your Makeblock app.





# Connecting the device to the application

1. Turn on Bluetooth on your device
2. Turn on mBot 2.0
3. Open the Makeblock app, click on  and select the mBot 2.0 device
4. Click on the Bluetooth icon to the device connects to the Makeblock app
5. Place your smart device nearby Mbot 2.0







# Makeblock app

Makeblock provides three control functions

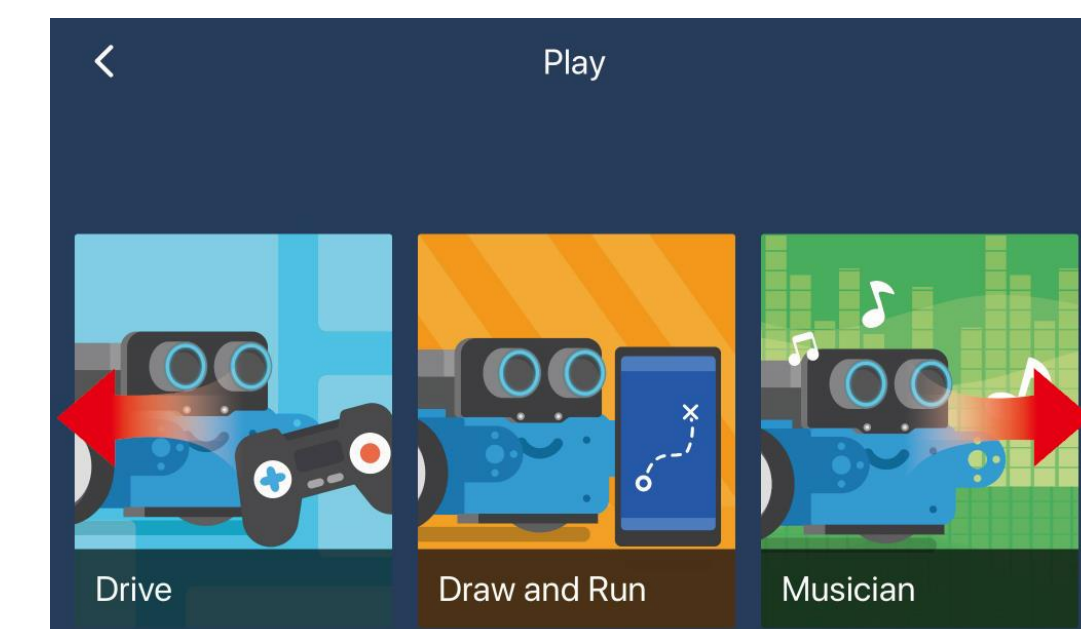
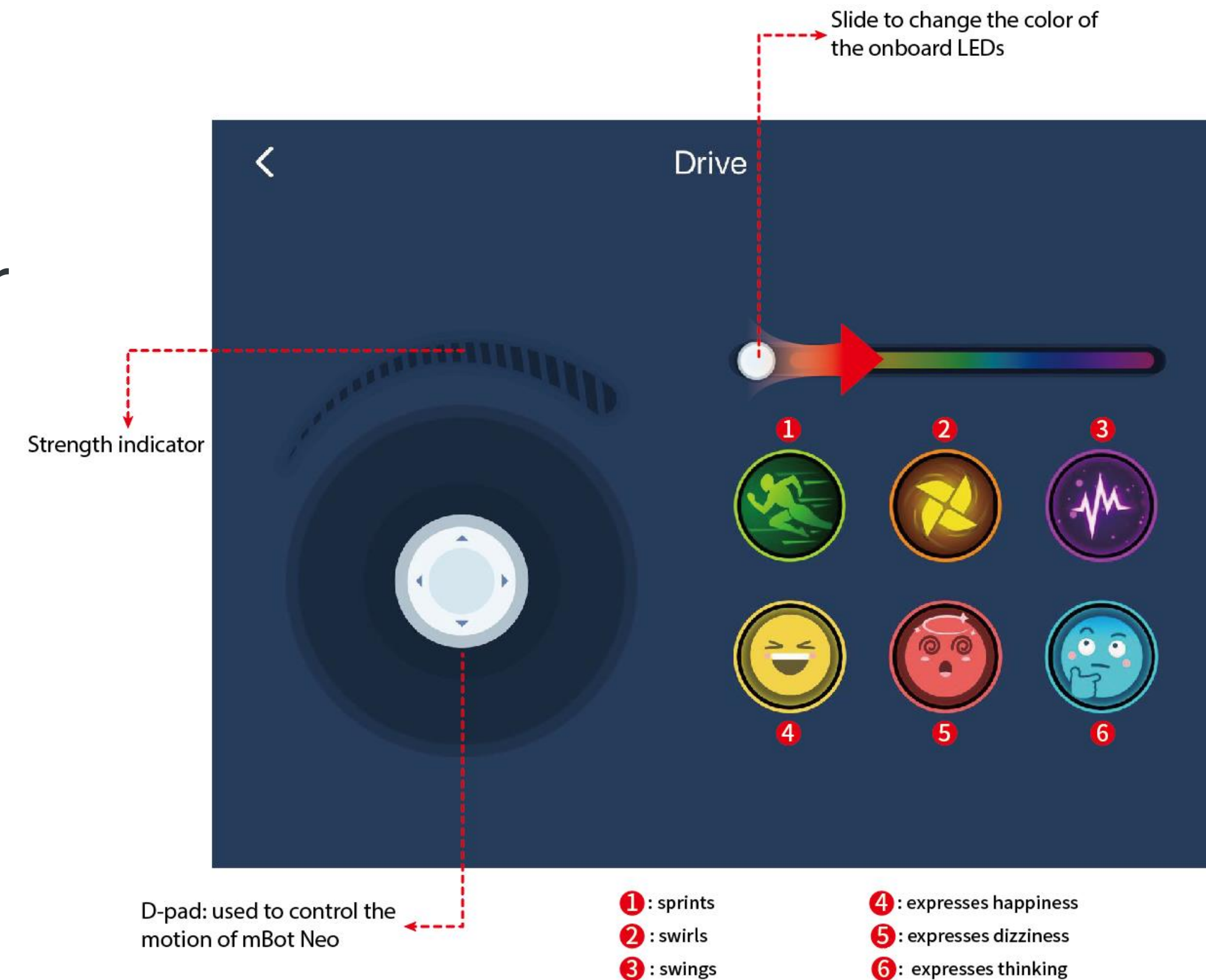
1. **Play:** allows controlling mBot 2.0 in four modes
2. **Code:** opens mBlock 5 for writing code
3. **Wi-Fi Guide:** Wi-Fi connection guide



# Play mode

Play mode provides four control modes, and you can swipe left or right to select one.

- **Drive:** motion control and display LEDs
- **Draw and Run:** movement of the device along the drawn path
- **Musician:** plays preset music and provides a keyboard
- **Voice Control:** executes the commands you speak

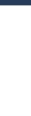
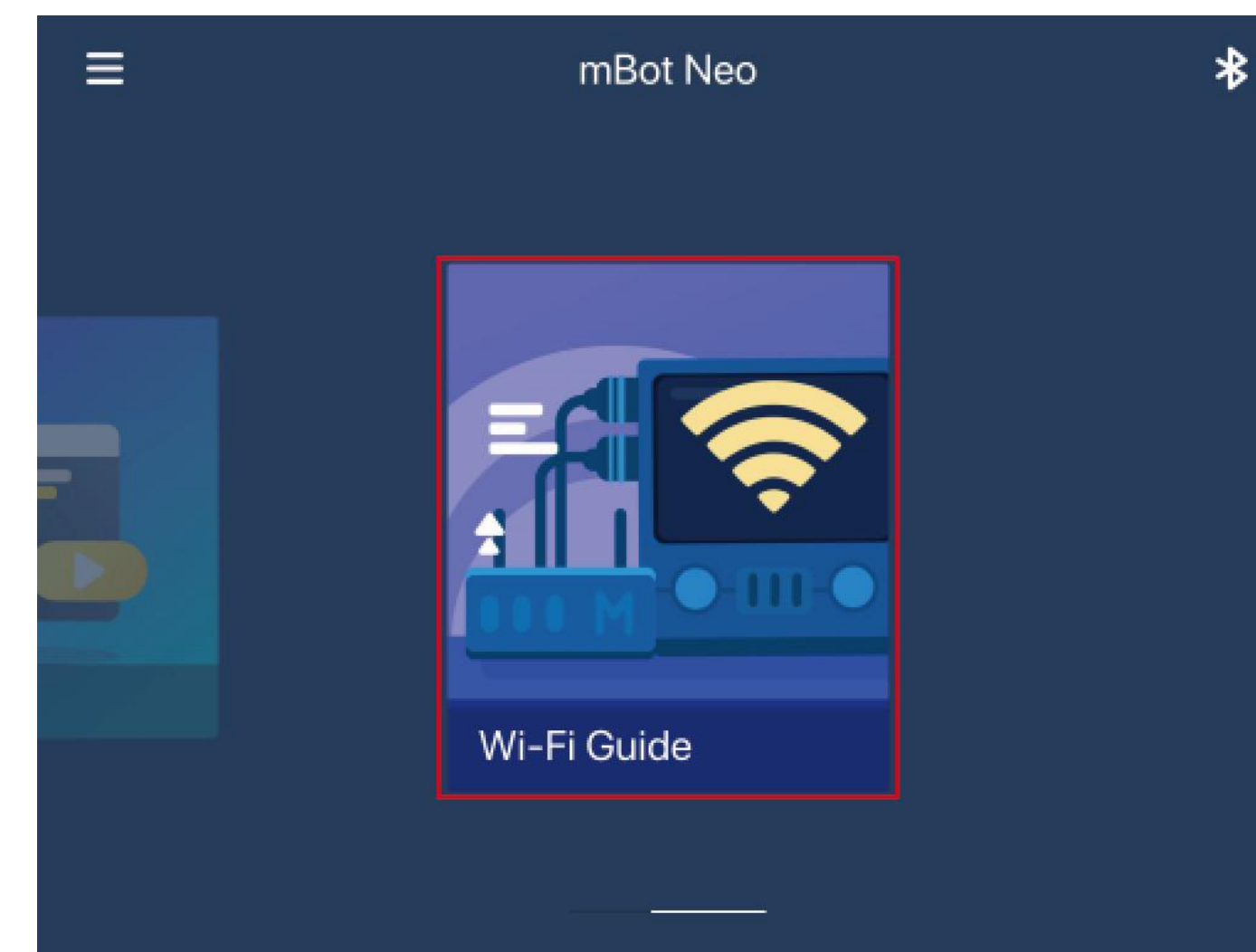




# Wi-Fi Guide

With the Wi-Fi Guide feature, you can set up a Wi-Fi connection for mBot 2.0.

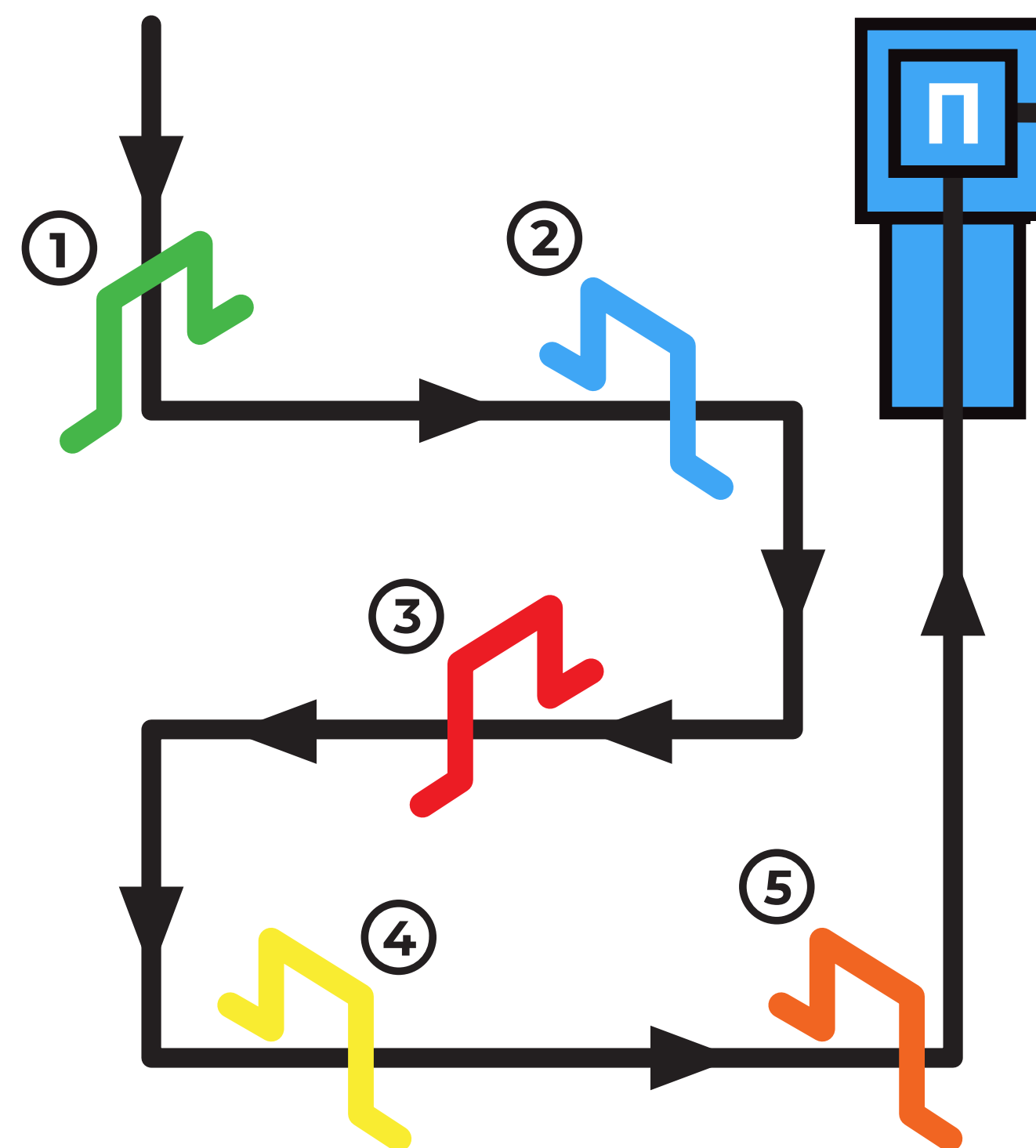
1. Click on **Wi-Fi Guide**, then on **Set Up**
2. Enter the Wi-Fi account and password that are available





# Mission 1.

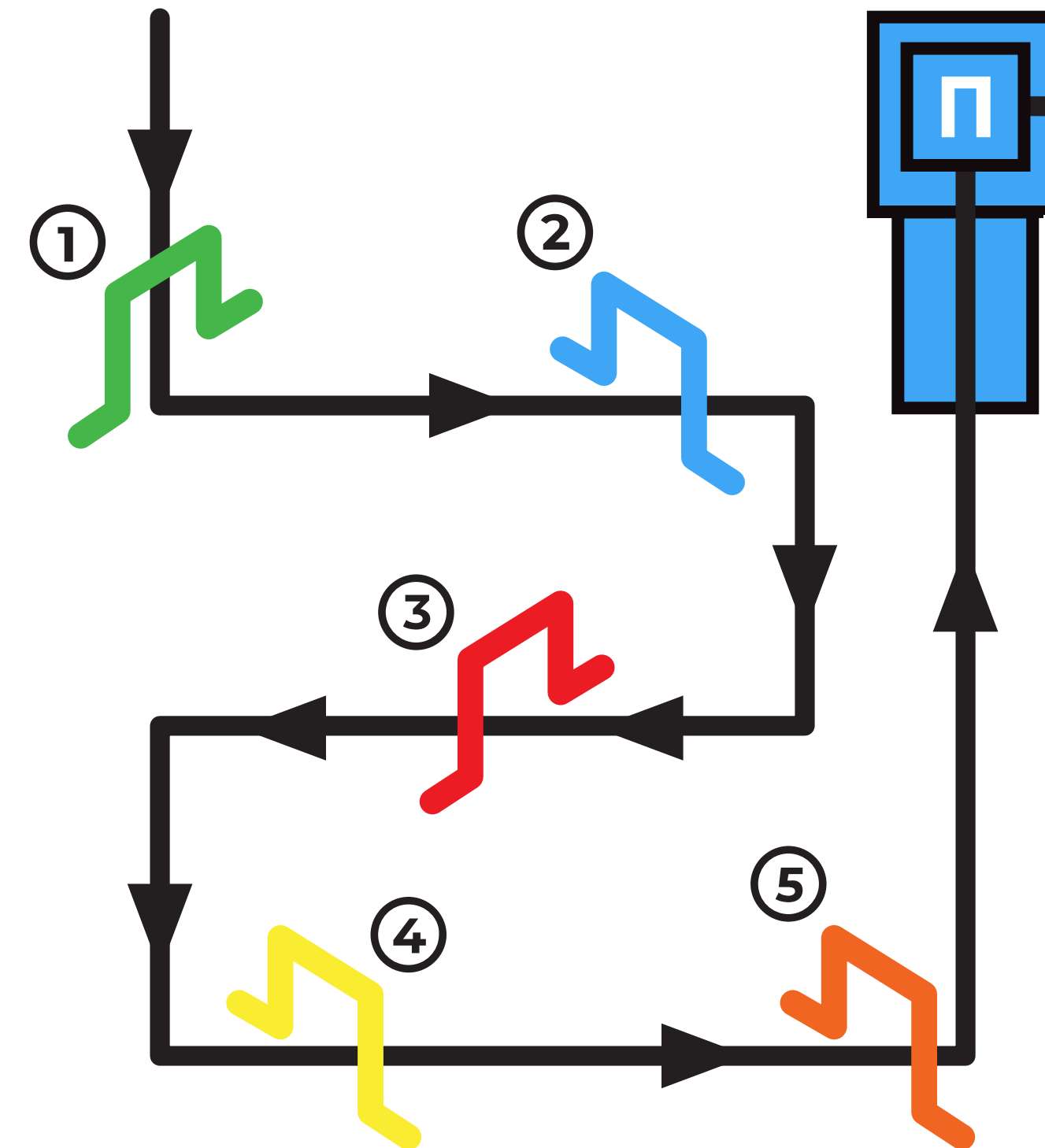
Control the robot using the “Makeblock app”, go through the given obstacles and climb the ramp.



# Mission 1.

**Scoring:** each obstacle is worth 5 points (if one of the obstacles falls over - the competitor continues on, and for a given obstacle he gets 0 points), when crossing the obstacle the **color of the LED display** should match the gate through which he passes - 5 points per obstacle.

**Time to cross the entire polygon:** first place 30 points, second place 20 points, third place 10 points.







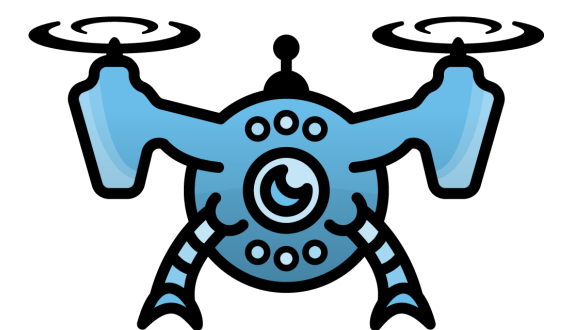
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Ruma



*mBlock V5*



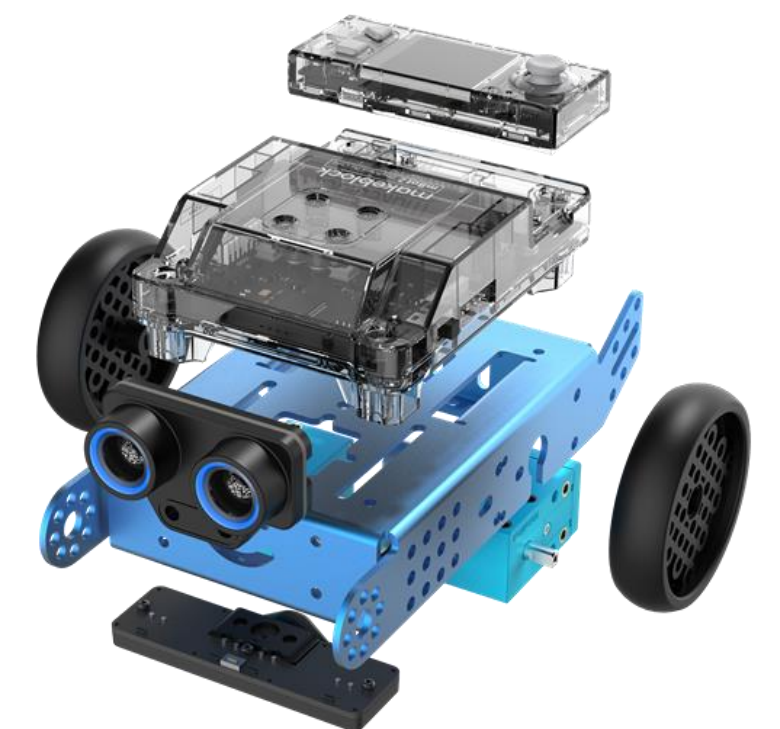
**OUR FRIEND  
MR ROBOT**

# mBlock 5 app

**mBlock** is a coding platform designed to provide an enhanced educational experience for every student. They can start with block-based **programming** and build their skills until they are able to master the **Python** language, all within the same platform.



Available for both **tablet** and **PC**, **mBlock** makes **STEAM** education more meaningful and engaging.







# mBlock 5 app download

You can download the application from the official website **makeblock**

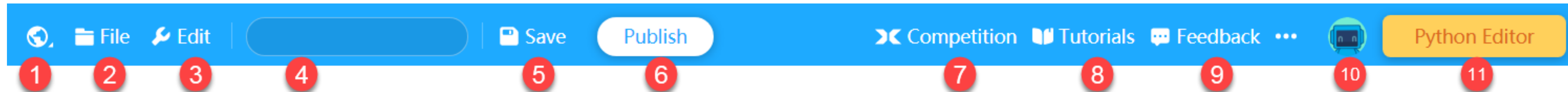
There are three options when downloading software:

- mBlock web version
- mBlock version for PC
- mBlock app for phone

The screenshot displays the Makeblock website's download section. At the top, a blue navigation bar includes links for 'makeblock | mBlock', 'Educator', 'Resources', 'Developer', 'Help', 'Download', and a 'Makeblock Store' button. Below the navigation bar, a light blue banner states: 'One-stop coding platform tailored to coding education, trusted by 15 million educators, and learners'. The main content area is divided into three sections, each featuring the mBlock panda logo and a gear icon.

- mBlock web version:** Includes the text 'Chrome browser recommended >>' and 'Support Windows/Mac/Linux/Chromebook'. It features two buttons: 'Code with blocks' and 'Code with Python'.
- mBlock PC version:** Lists 'Version: V5.4.3' and 'Released: 2023.11.01', with links for 'Released log >>' and 'Previous version >>'. It provides download links for 'Download for Windows' (noting 'Win7 or Win10 (64-bit system required)' and 'MSI File Download and Bulk Installation Solution') and 'Download for Mac' (noting 'macOS 10.12+' and 'Download For Apple M1/M2 Chips').
- mBlock mobile app:** Includes the text 'Learn coding in phones and tablets'. It features two QR codes: one for 'Android' (noting 'Android 6.0 + (ARM-based devices only, X86 Android not supported)') and one for 'iOS' (noting 'iOS 10.0 +').

# mBlock 5 app interface

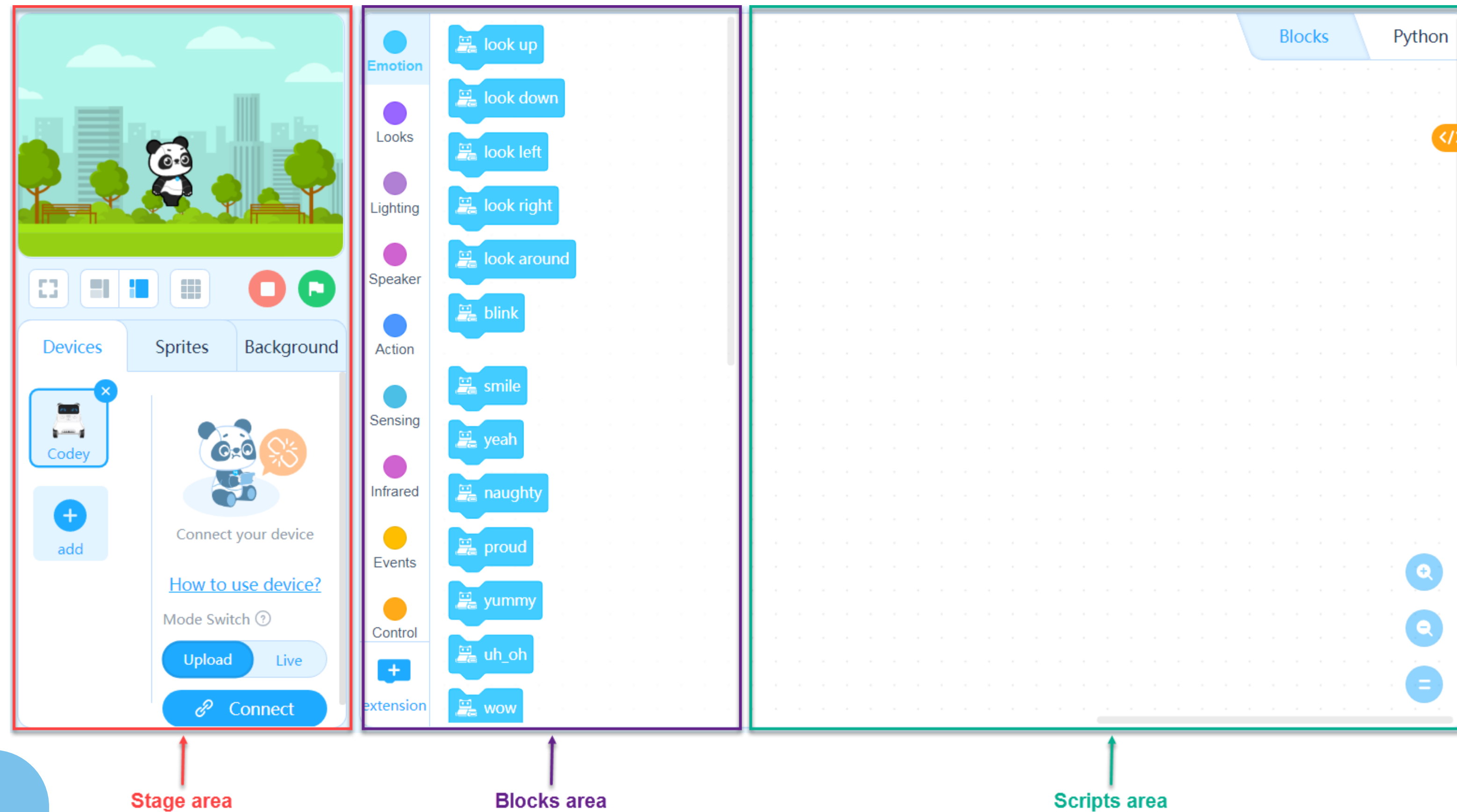


On the working line of the program there are the following options:

1. Language selection
2. File: create, open, save project, import/export project
3. Edit:
4. Setting the project title
5. Saving the project
6. Publish: posting the project to the mBlock community
7. Competition
8. Tutorials and Help option
9. Feedback: possibility to post your feedback
10. Sign up/Sign in - when you log in you can see your projects
11. Python Editor: the ability to write/view code in the Python programming language



# mBlock 5 app interface



**Stage area:** Here you can present your work, connect devices and set your avatar and background images.

**Block area:** Here you can find the blocks you need by category and color

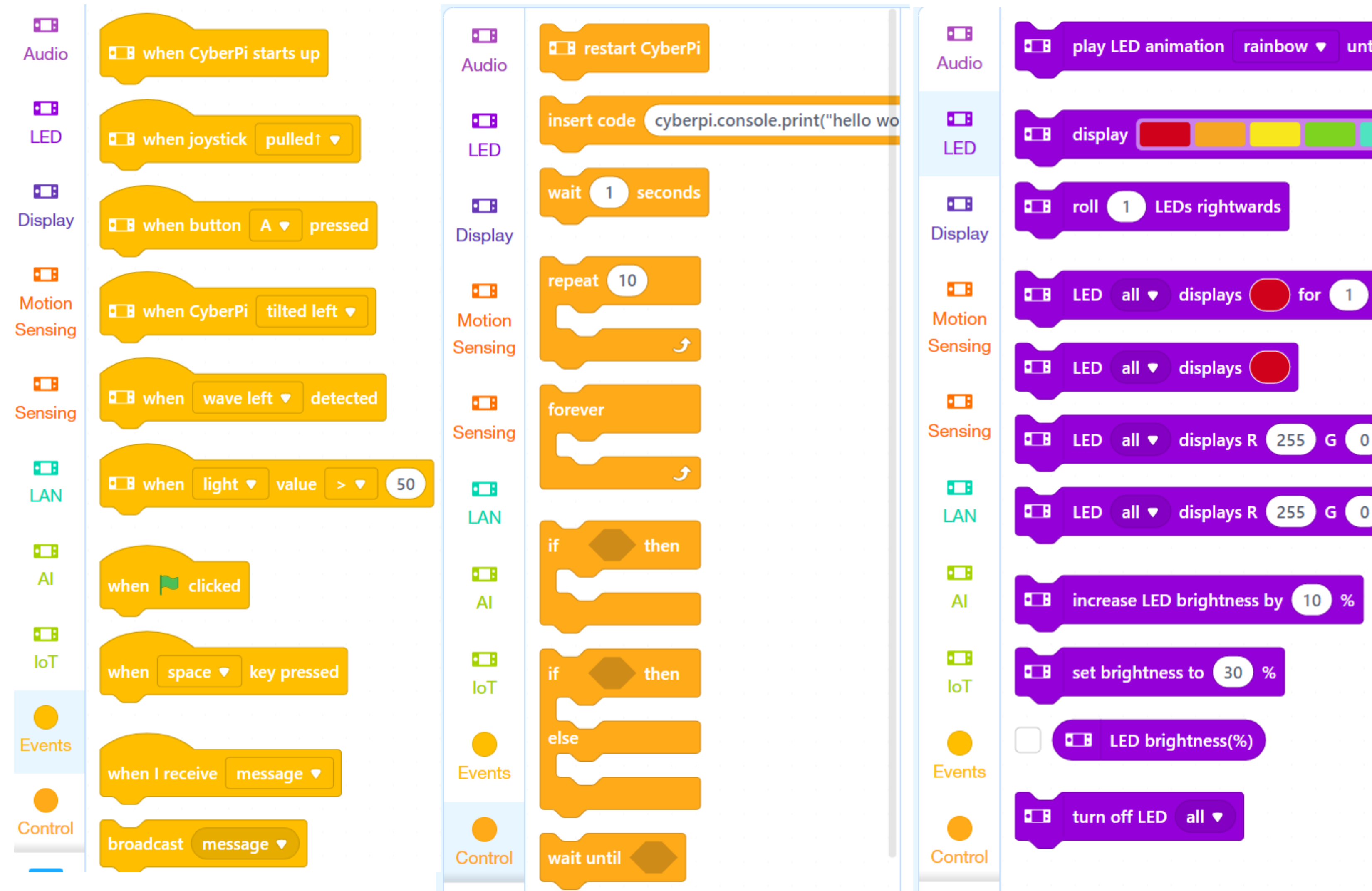
**Script area:** You can compile your program by dragging blocks into this area

# mBlock 5 app interface - Blocks

Each group of cards has special blocks with the help of which you can control your robot in a specific way.

The picture shows only some of the most commonly used card groups.

Each group of blocks is defined by a specific color.

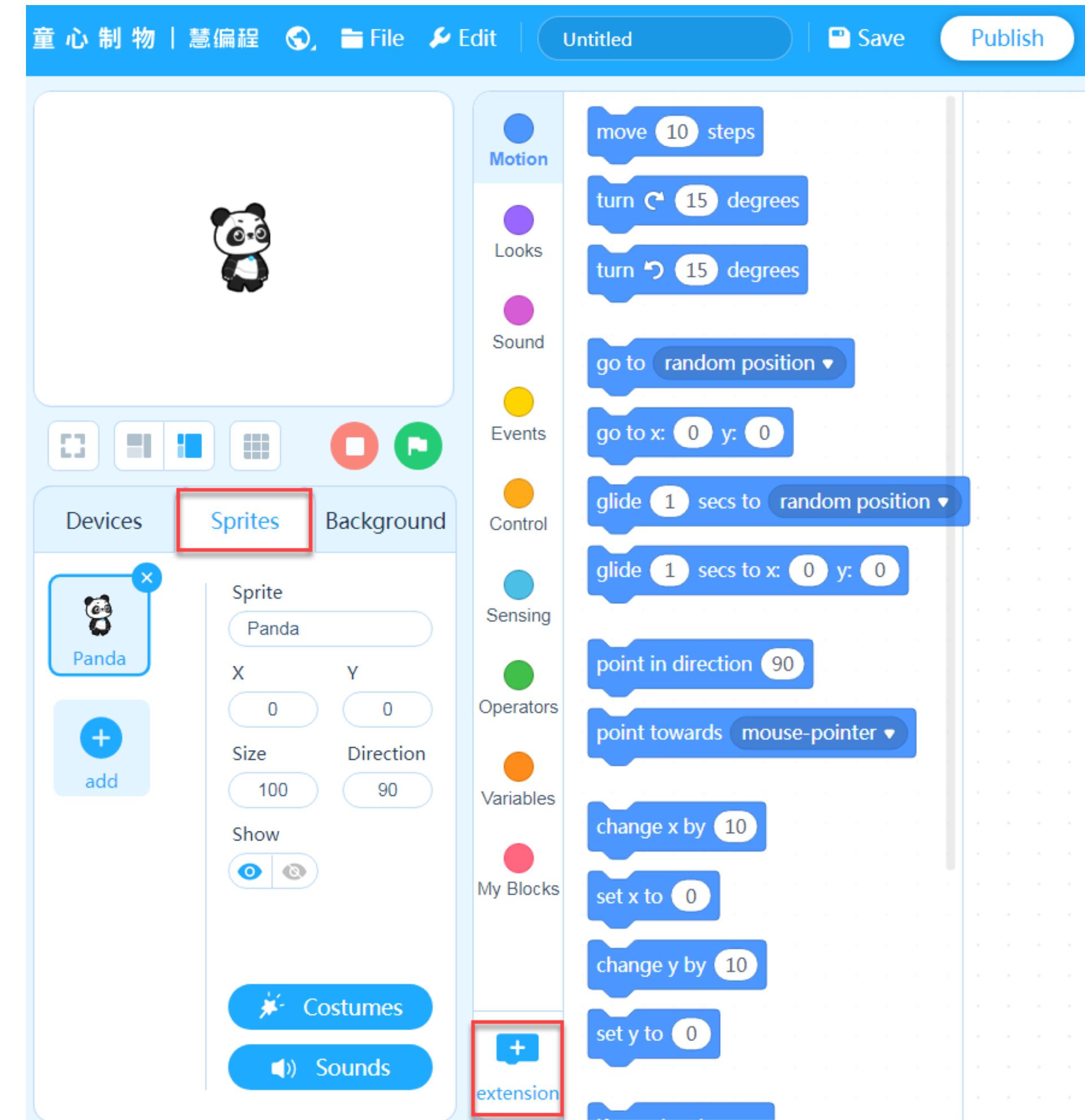
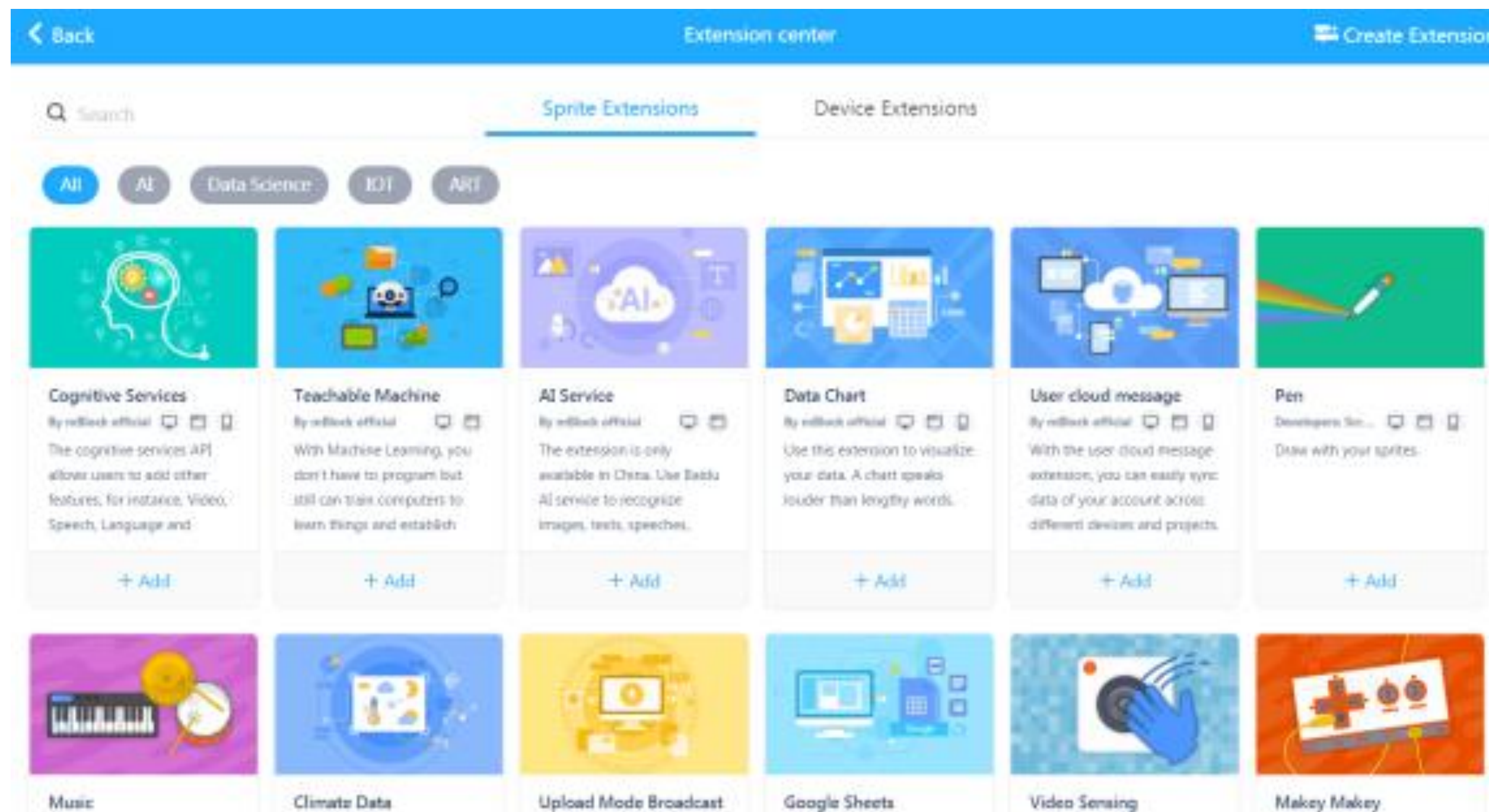






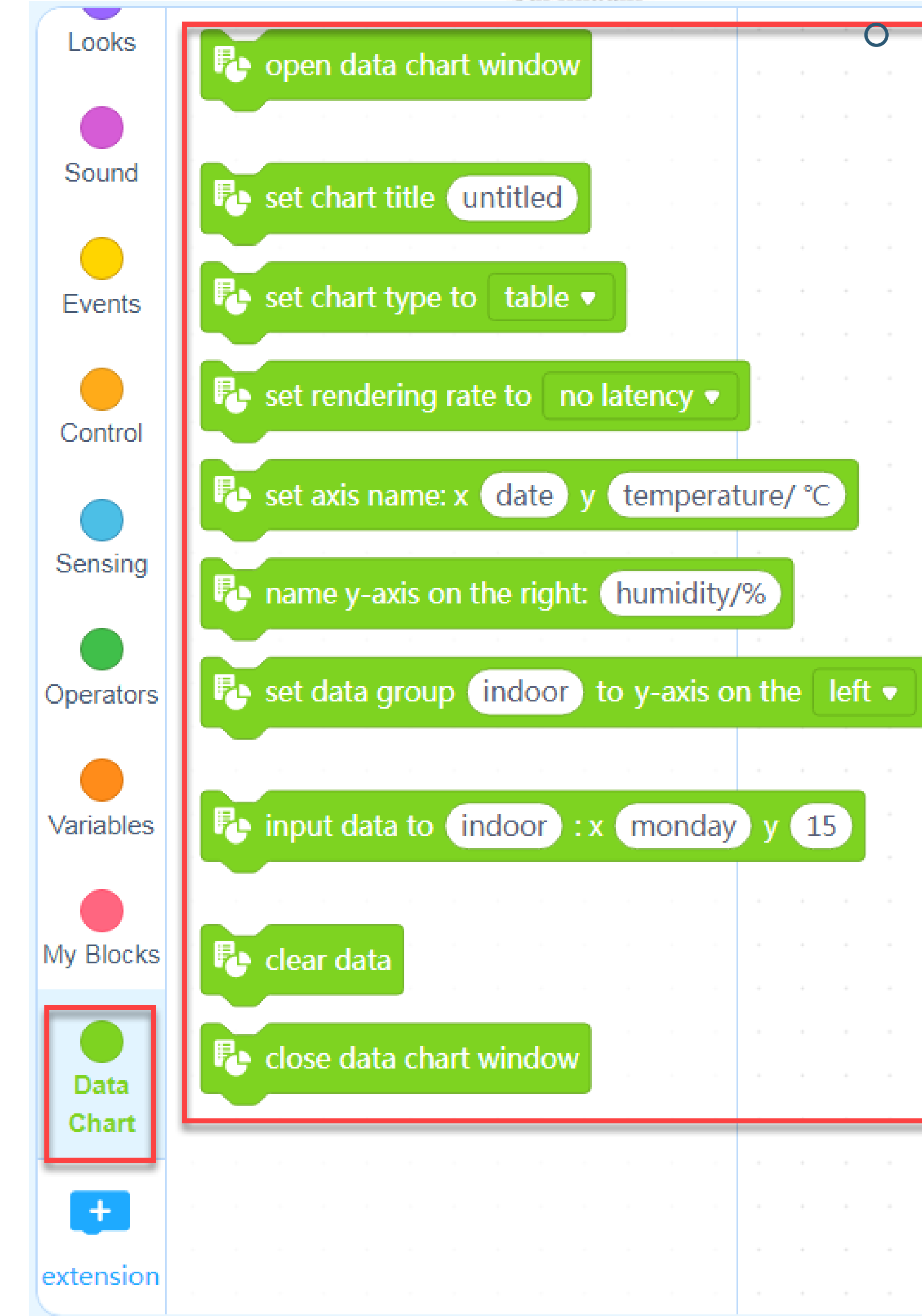
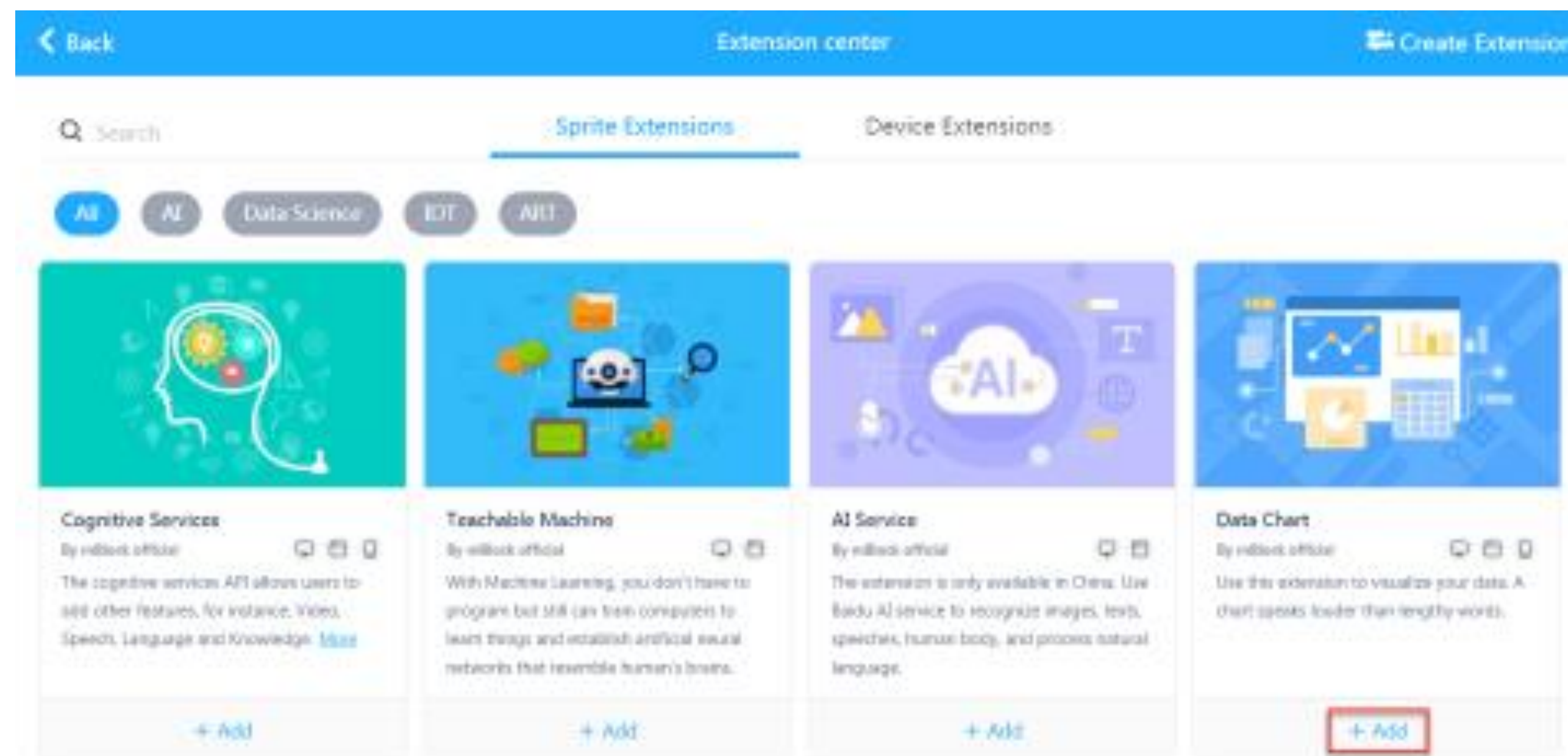
# mBlock 5 app extensions

You activate the **extensions** by the **Extension center** window opens click on the avatar tab, then on the **+extension** button.



# mBlock 5 app extensions

After adding the extension, you get the possibility to use the blocks found in the selected extension.

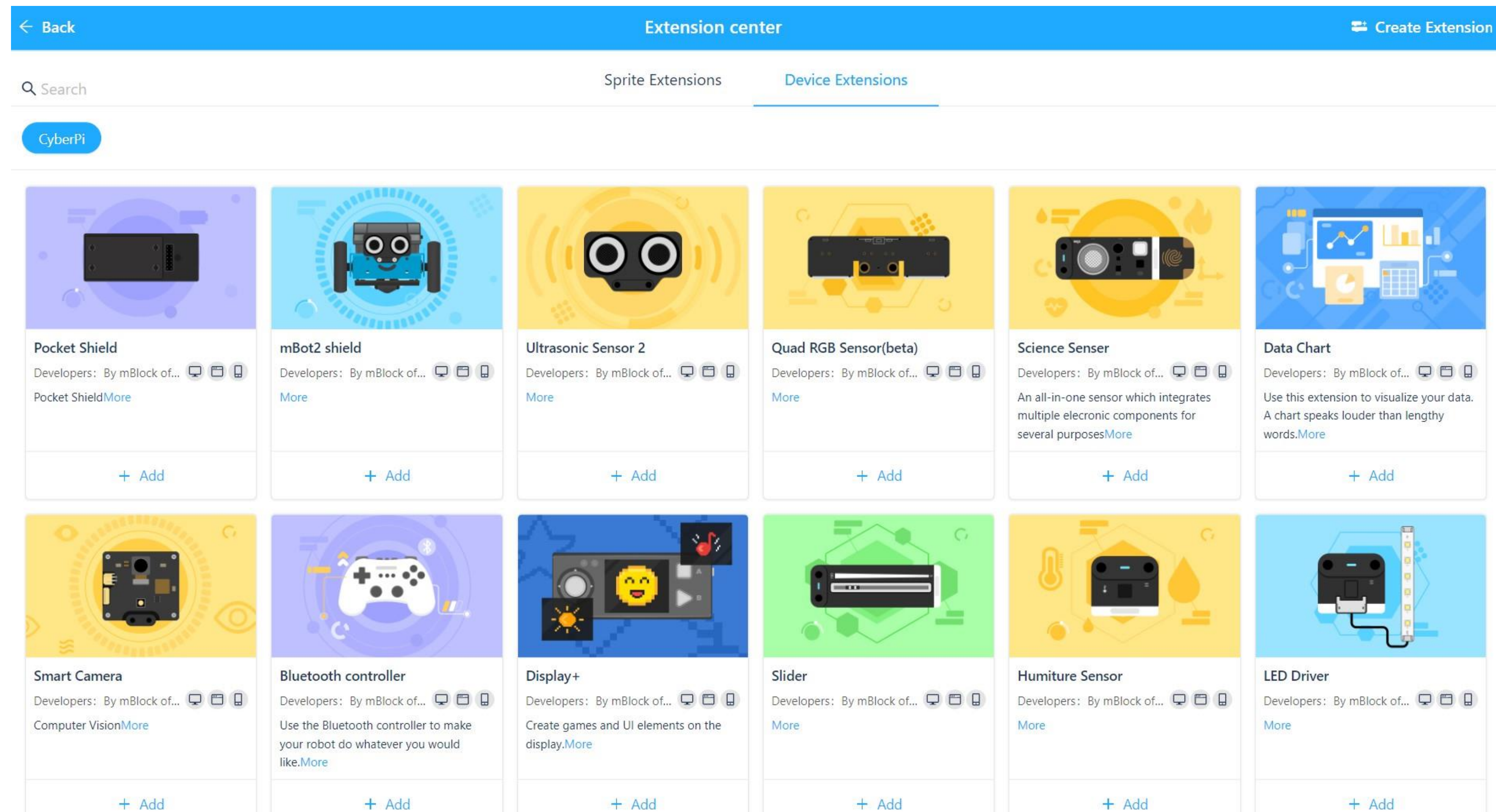




# mBlock 5 app extensions

To get started, we'll add the following extensions:

- mBot2 shield
- Ultrasonic Sensor 2
- Quad RGB Sensor





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Stil mladih  
Ruma



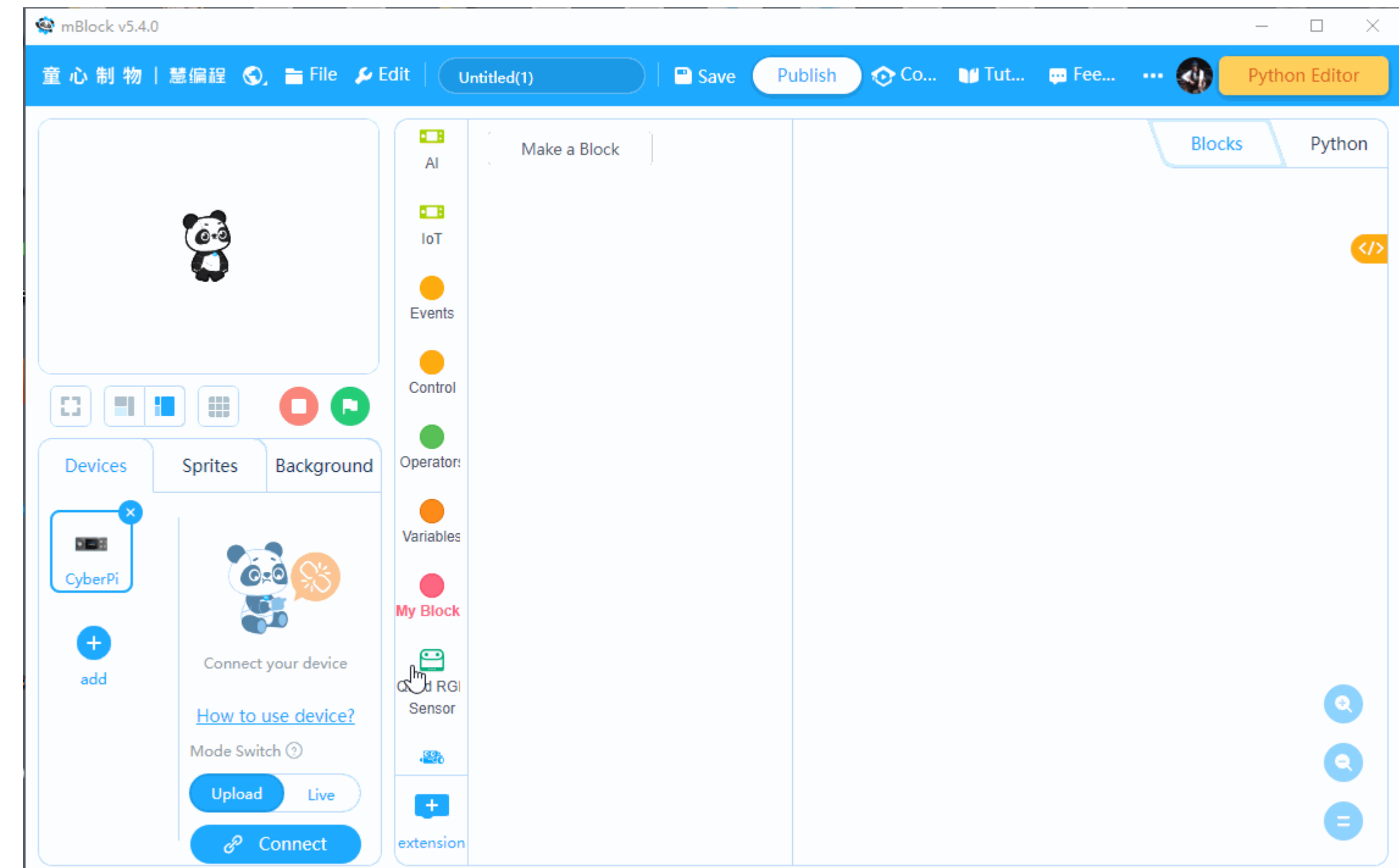
***mBlock V5 - tasks***



# 1. Hello world

The task of the program is to print the message "Hello World" on the CyberPi display.

Connect the CyberPi to the computer with a cable, open mBlock 5, connect the CyberPi and select Upload mode.



# 1. Hello world

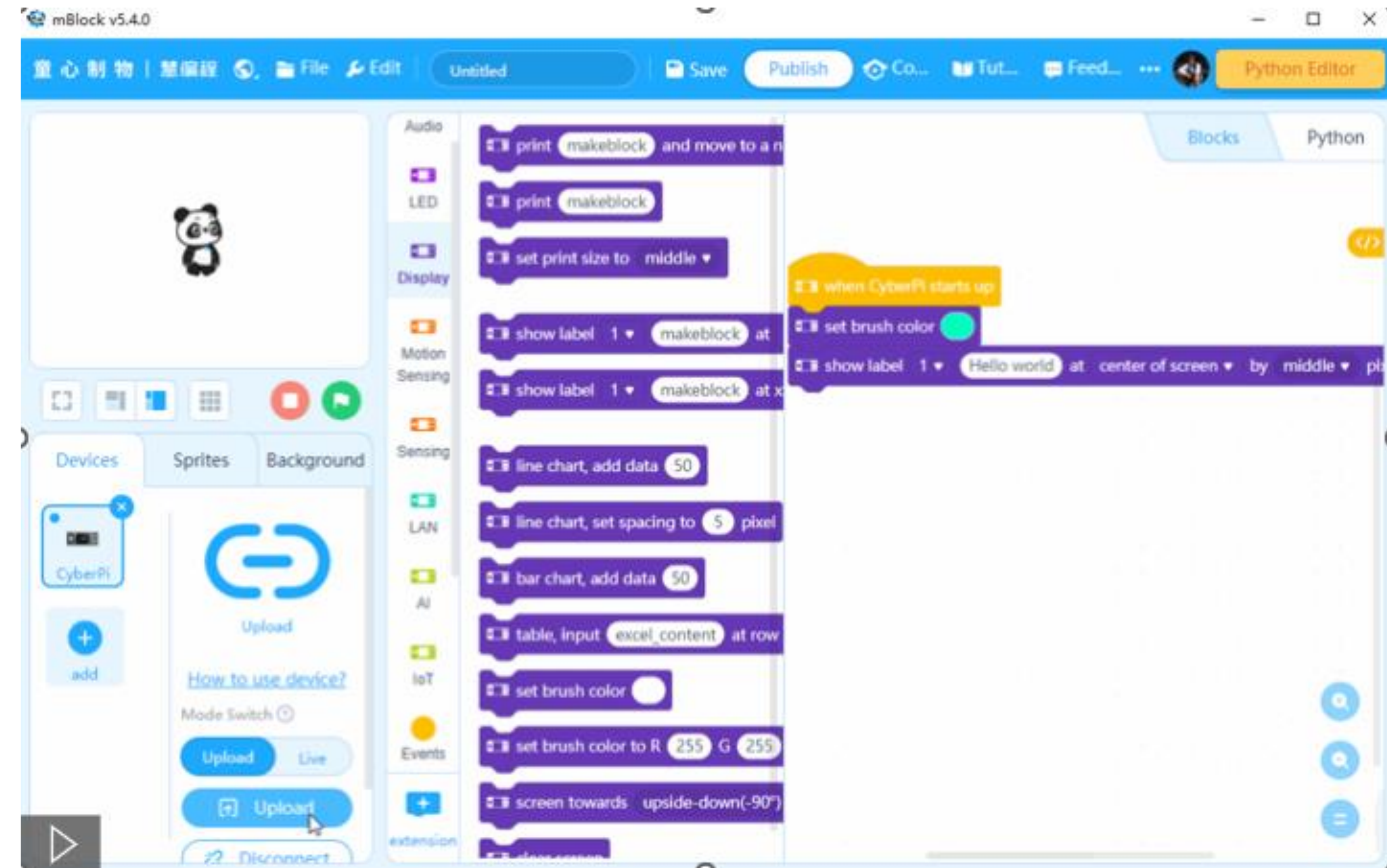
Write a program like the one in the picture that will display the text "Hello World".

## Exercise

Try changing the color and size of the text.

Try Show label blocks. Can you find the differences between them?

Try line graphs, bar graphs, and tables.

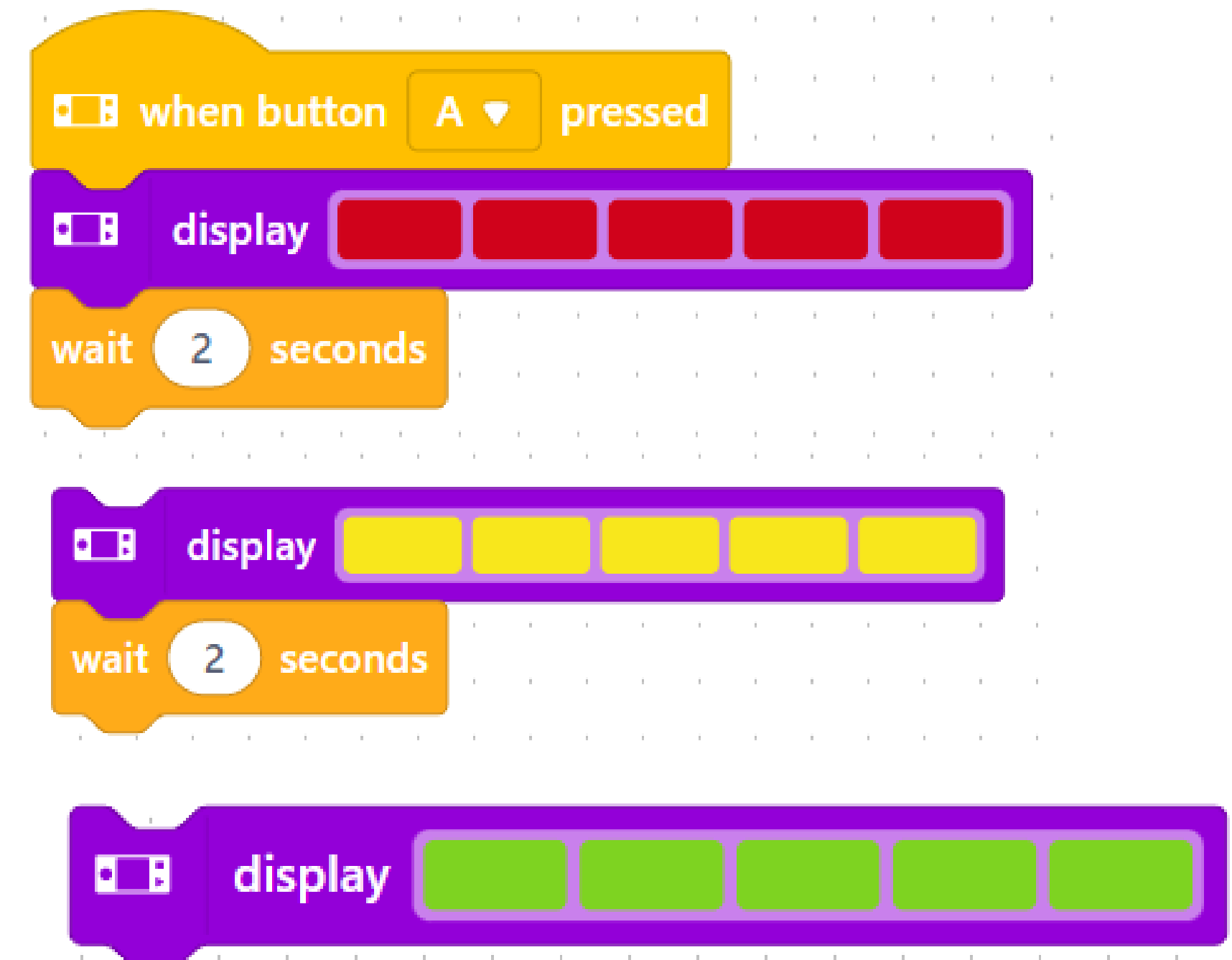




## 2. Led display control - traffic light

After you upload the program, the RGB LEDs should first flash green for two seconds, then yellow and finally red.

*What is the **wait** block for?  
What if we didn't have that block?*





## 2.1 LED display control

After you upload the program, the RGB LEDs blink and light up one by one, changing their order.

Connect the CyberPi to the computer with a cable, open mBlock 5, connect the CyberPi and select Upload mode.



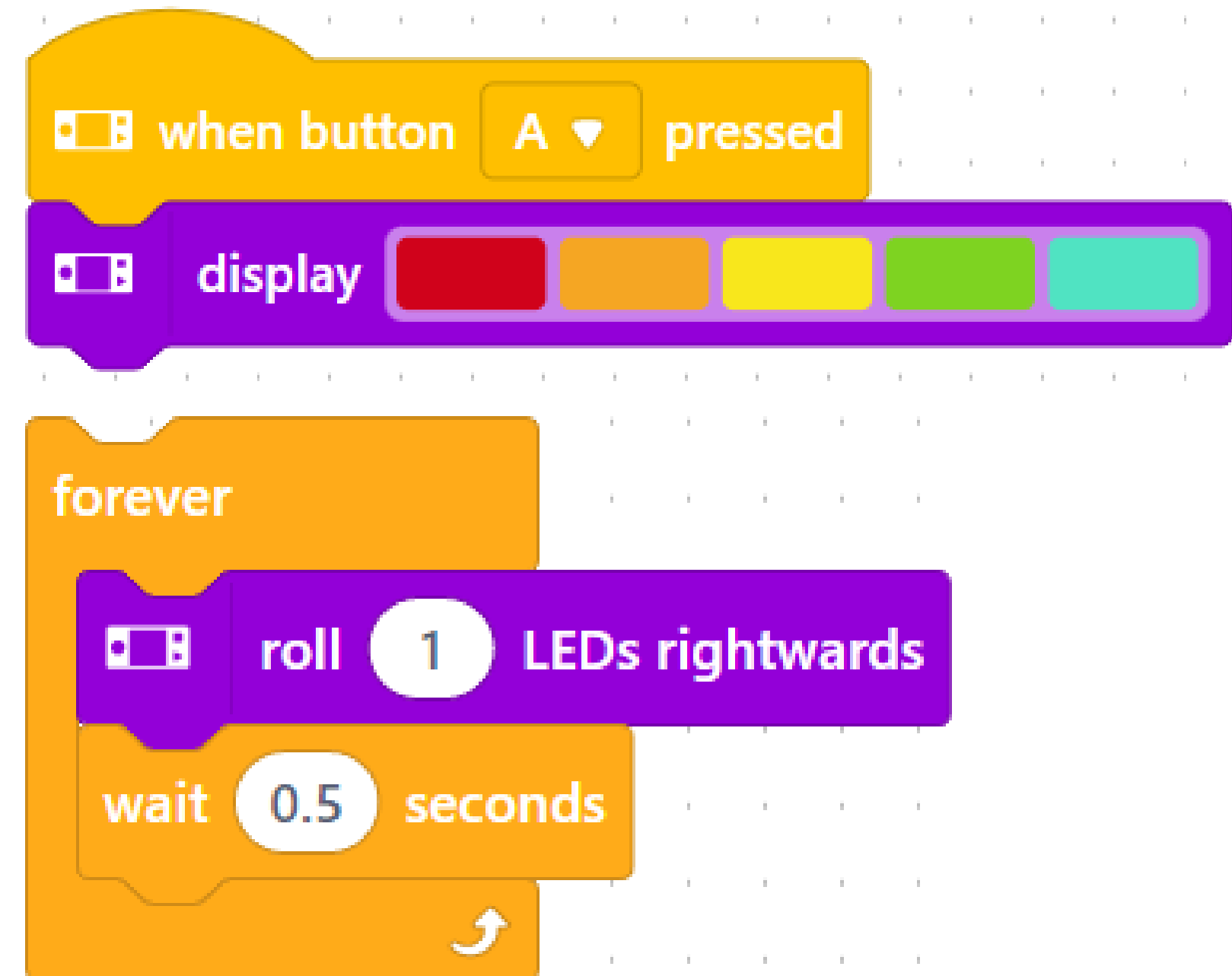


## 2.1 LED display control

### Exercise :

Try changing the color of the LEDs.

Try changing the blinking frequency of the LEDs.



*We're going to insert a loop here.*

*A loop is a list of pieces that need to be done until a certain condition is met.*

*There are different types of loops - here we use an infinite loop.*



### 3. Button control

After you upload the program, you can press the A button and the B button to control the RGB LEDs on the CyberPi.



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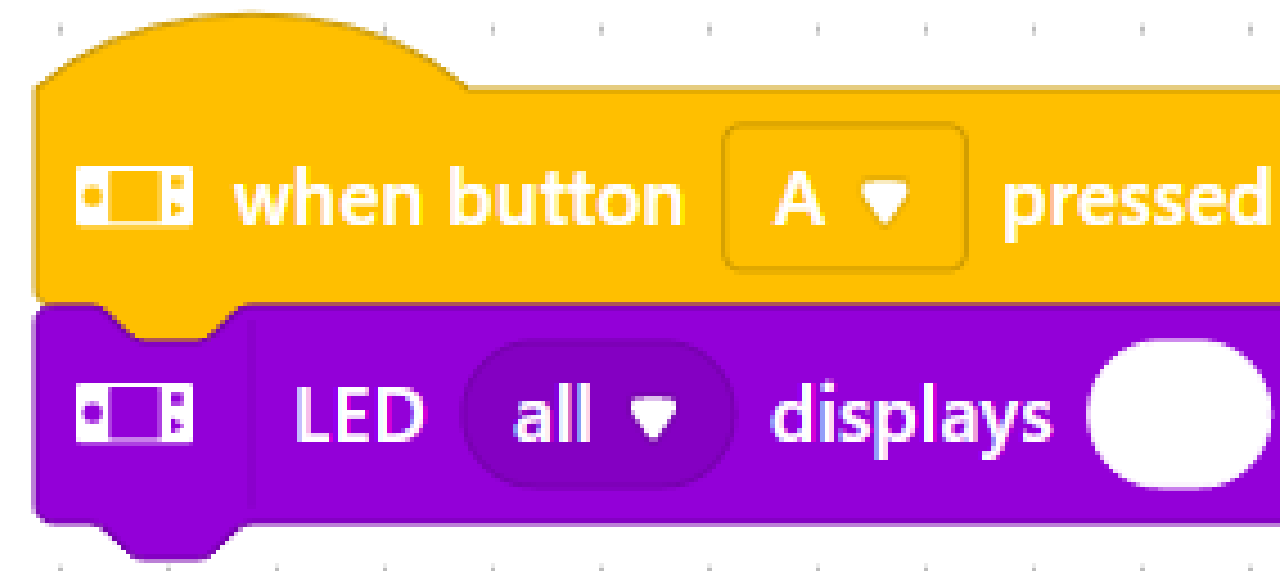




# 3. Button control

## Exercise :

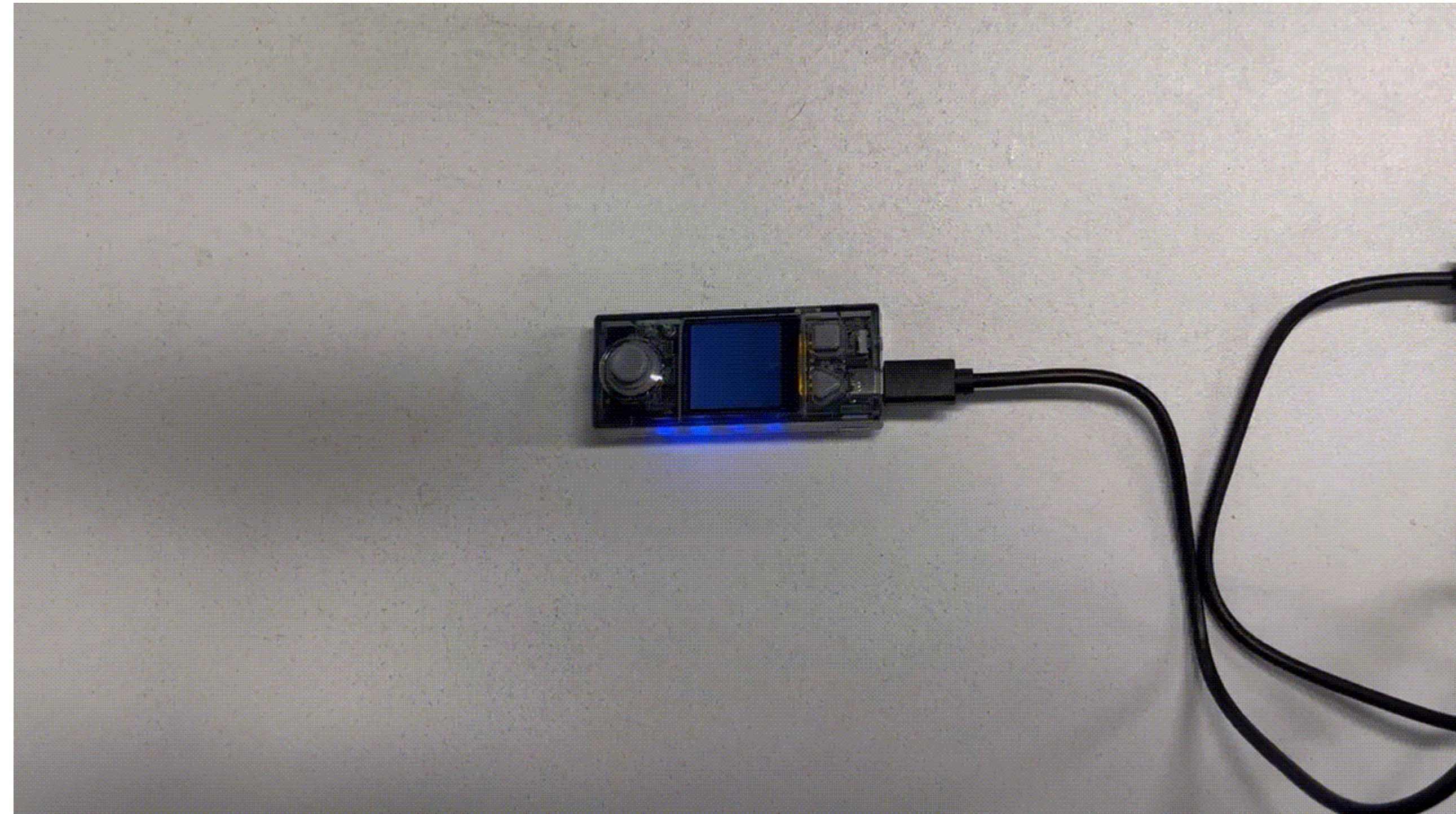
Besides RGB LEDs, what else can you control with buttons?





## 4. Control the joystick

After uploading the program, you can control the brightness of the RGB LEDs using the joystick.



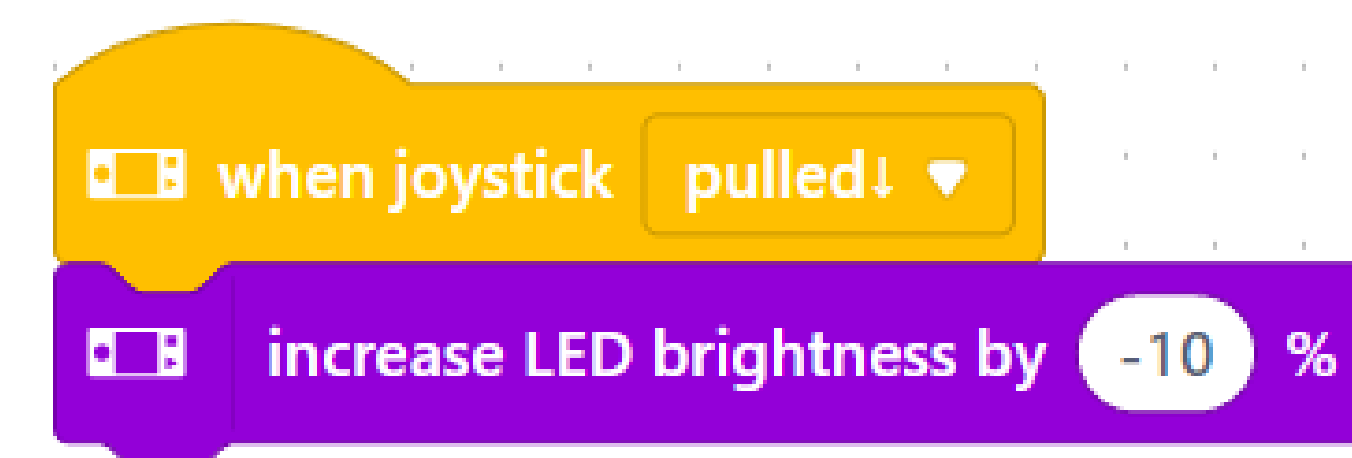
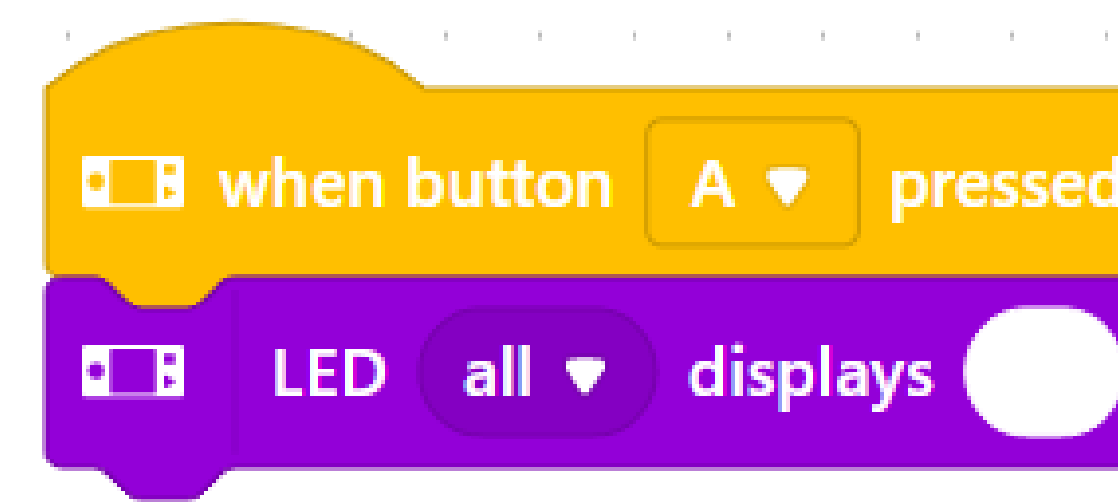


## 4. Control the joystick

Move the joystick up and down to control the brightness of the RGB LEDs.

### Exercise

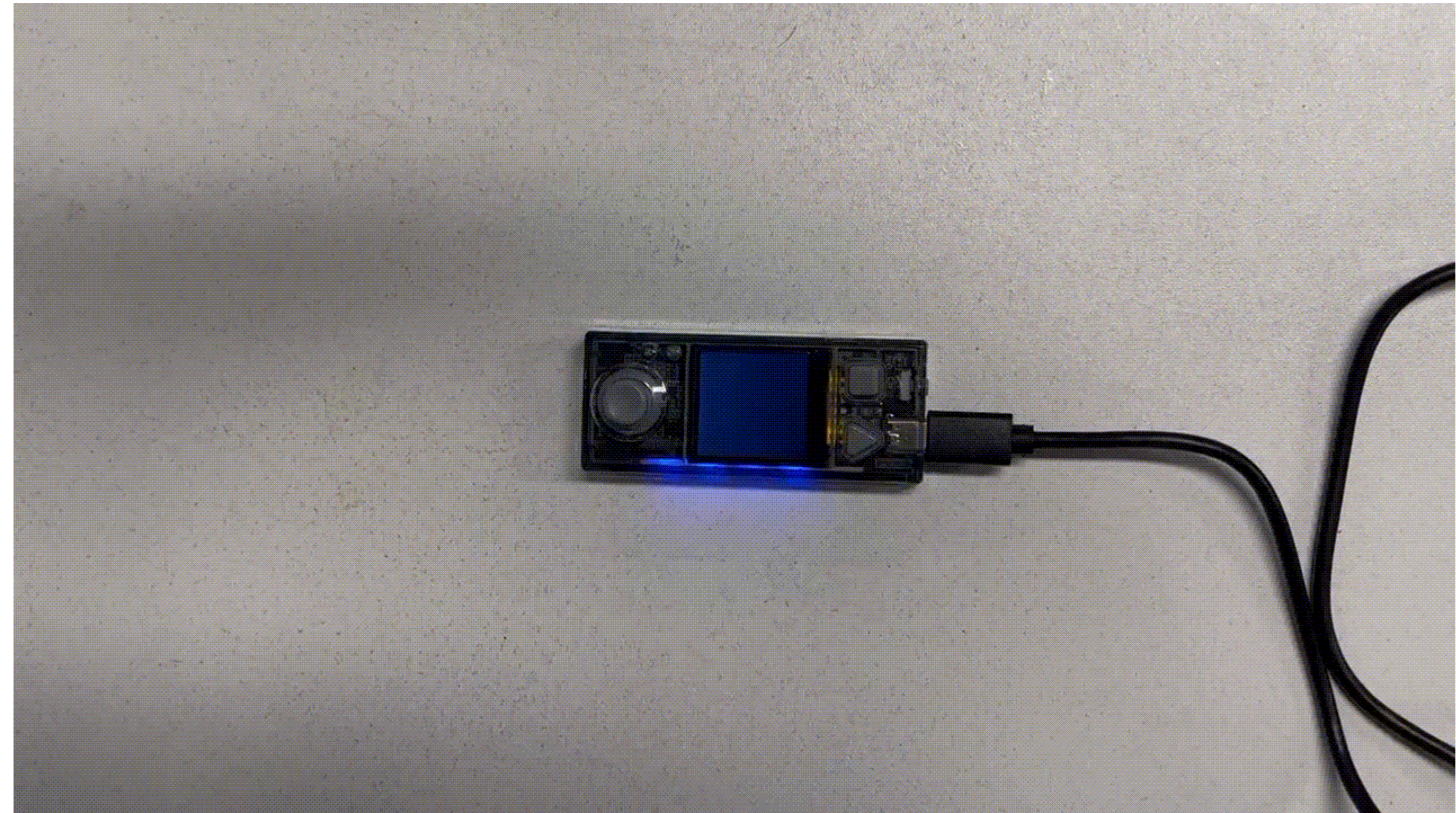
Besides RGB LEDs, what else can you control with a joystick?





## 5. Change the color of the LEDs

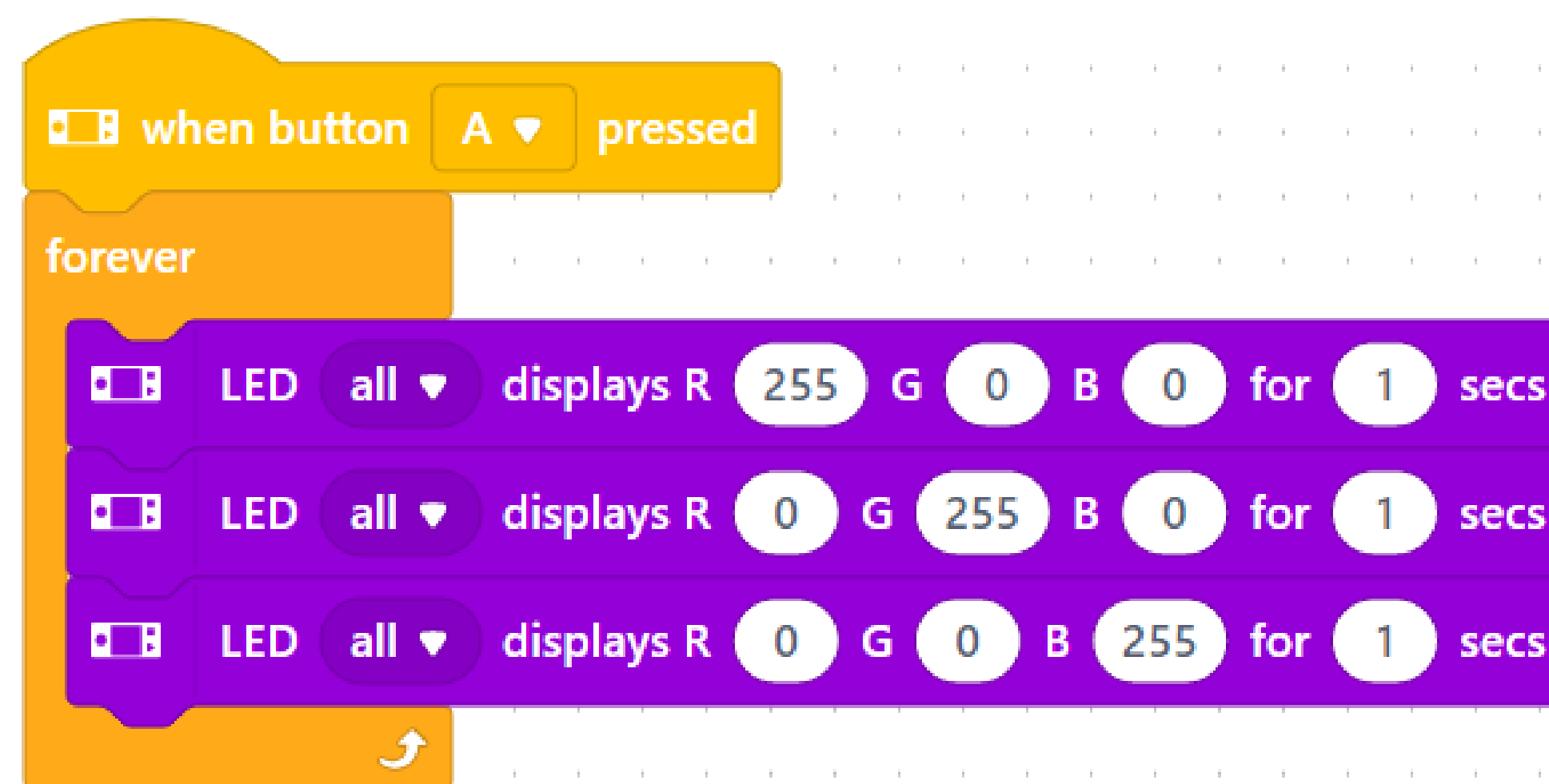
After you upload the program, the color of the RGB LEDs on the CyberPi changes from red to green, from green to blue, then from blue to red, and this process repeats itself over and over.





# 5. Change the color of the LEDs

**Exercise** The color of the RGB LED light on the CyberPi changes from red to green and then from green to blue and what happens, and this process is repeated over and over again at the specified intervals. Change the speed of the color change.



# Mission 2.

Create a program using mBlock where the robot will follow the positions 2-1-4-3.

The area of a rectangle with sides  $2X$  and  $3X$  is  $0.96\text{m}^2$ .

