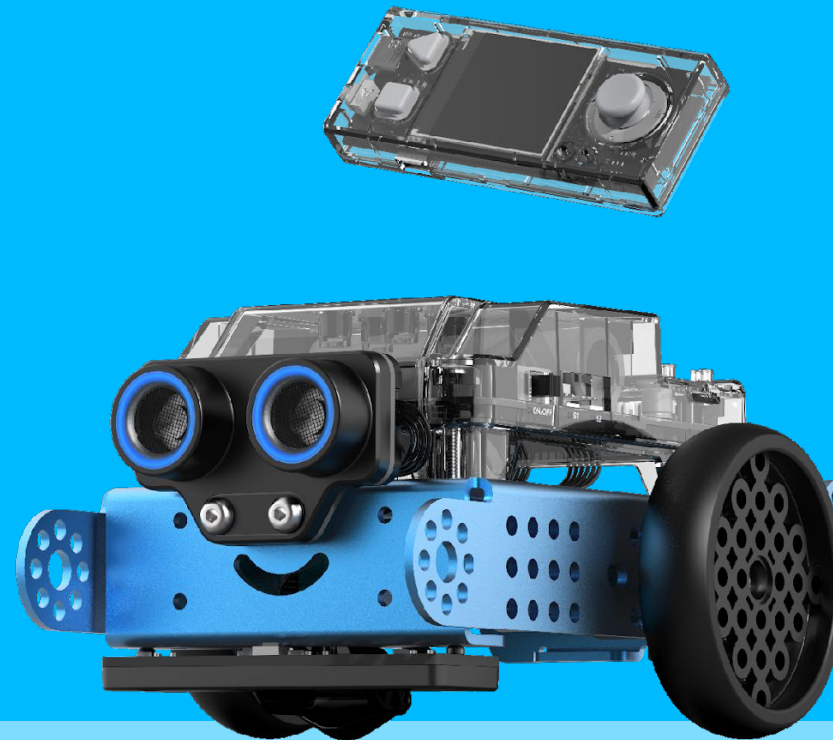


mBot2

Networkable robot for
education



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Overview

What is mBot2?

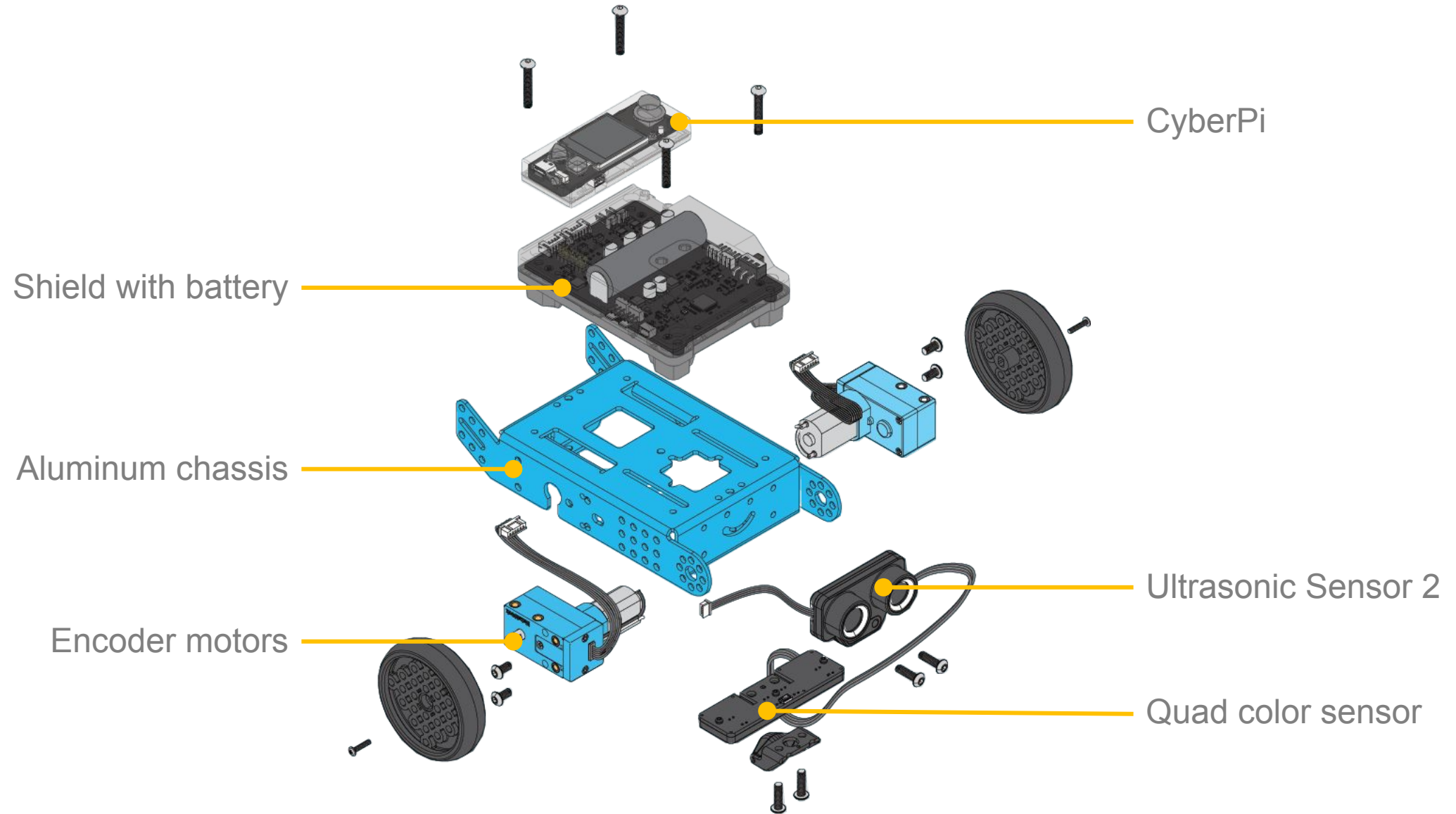
mBot2 is an entry-level robot for Computer Science and STEAM education.

It has network capabilities thanks to its advanced microcontroller, CyberPi. With this, educators can carry out very interactive and smart lessons, where multiple devices can communicate with each other.

By measuring rotation and speeds, it can perform accurate movements, which allows for very objective and didactic activities.

The possibilities can easily expand with the addition of mBuild modules and Makeblock structural parts.

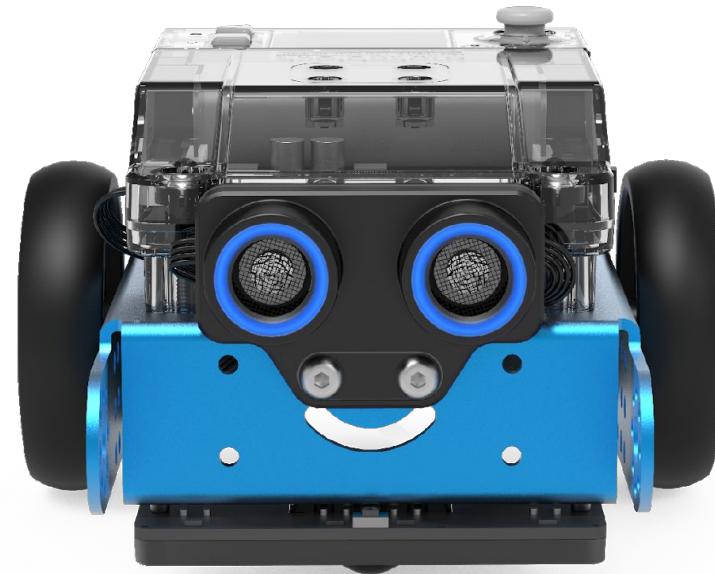




Why mBot2?

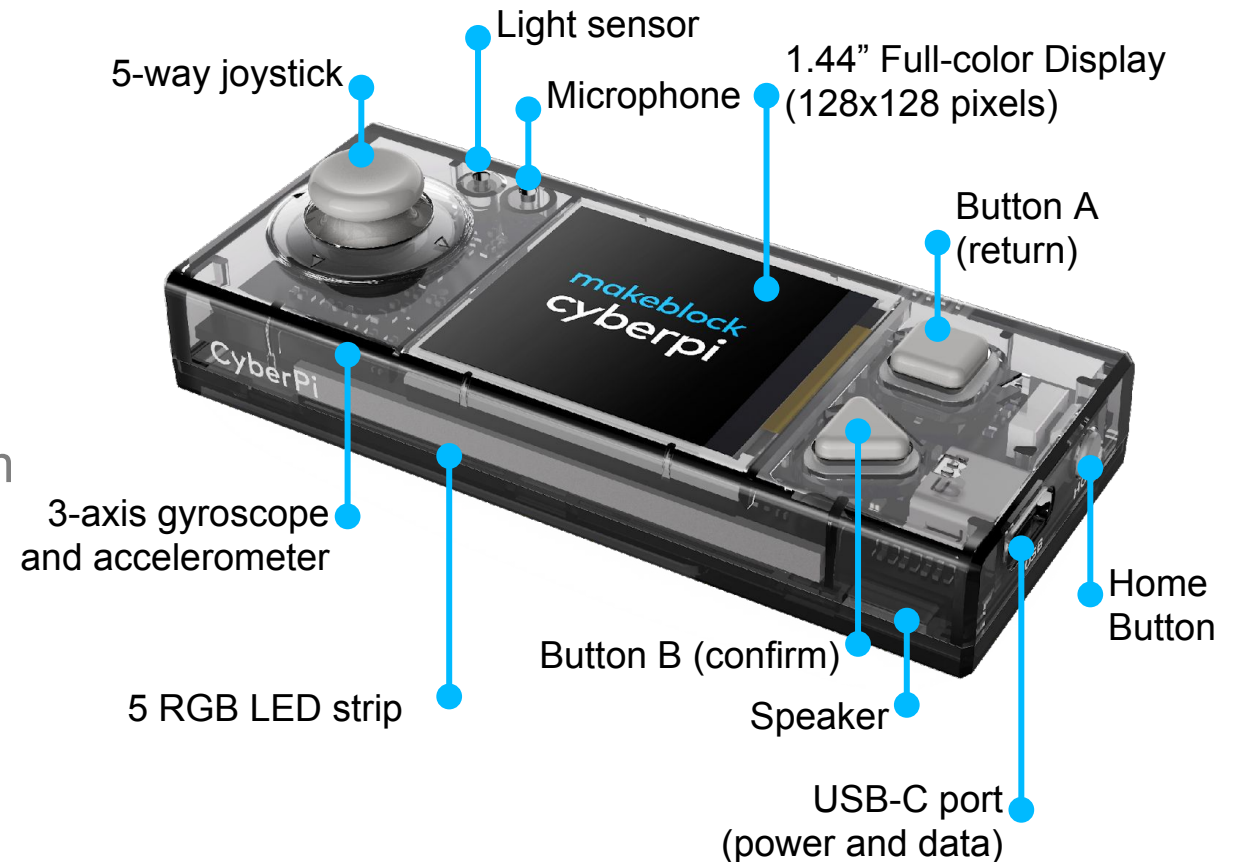
Value proposition

- Powered by CyberPi
- mBlock, the powerful coding platform
- Easy step into CS & Technology learning
- Built-in long-lasting battery
- Next generation sensors
- Expandable with mBuild modules and Makeblock structural parts
- Precision in movement control
- Safe and easy to use



Powered by CyberPi

- Rich color screen to display data, images and other information.
- Multiple built-in sensors give great capabilities to the microcontroller to explore different topics.
- Integrated memory and Operating System allows to store and manage up to 8 programs in the controller.
- Certified in 2020 by the Open-Source Hardware Association.



Powered by CyberPi



- It is a versatile microcontroller that can have various applications, not only as the “brain” of a robot, but also as a handheld device such as a game controller, a monitoring device, and more.
- Built-in WIFI module allows for wireless communication, enabling AI and IoT applications.
- Educators can build really interactive and smart activities for the class.

Powered by CyberPi

- Connect multiple mBots to create a local network of robots that communicate between themselves, share information, and perform tasks.
- Use a standalone CyberPi as a smart device to communicate with mBot2, creating a smart ecosystem or a fun remote controller.
- When connected to the Internet, mBot2 can perform advanced features such as speech recognition, communicate with the cloud, and get information such as weather updates at the destination, so it can prepare for that.



mBlock, the powerful coding platform

- The coding platform for mBot2.
- Available for PC, Tablet and Browser.
- Compatible with Windows, MacOS, Linux, and Chromebook*.
- Teachers can remotely manage their activities in mBlock with Google Classroom.



*Chromebook only compatible with the browser version

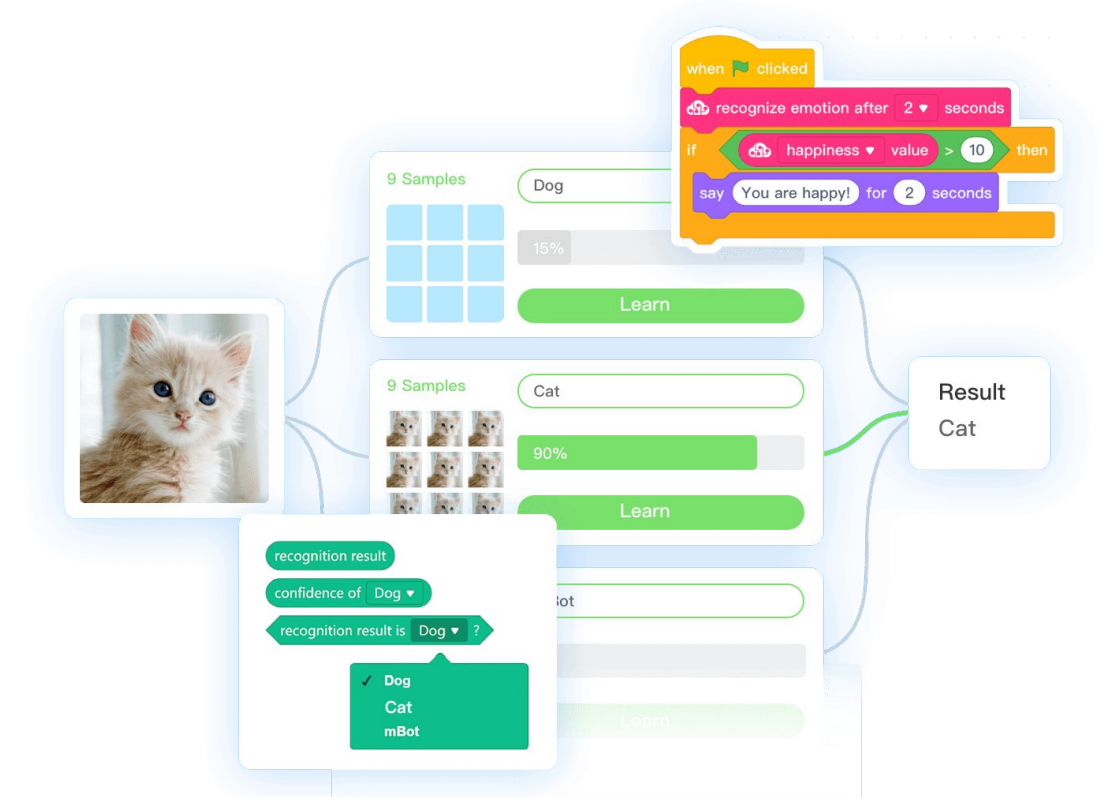
Easy step into CS & Technology learning

- Students can begin with block-based coding, and as they develop their skills, they can move into Python coding, all within the mBlock 5 platform.
- Both sprites and devices can be programmed in mBlock.



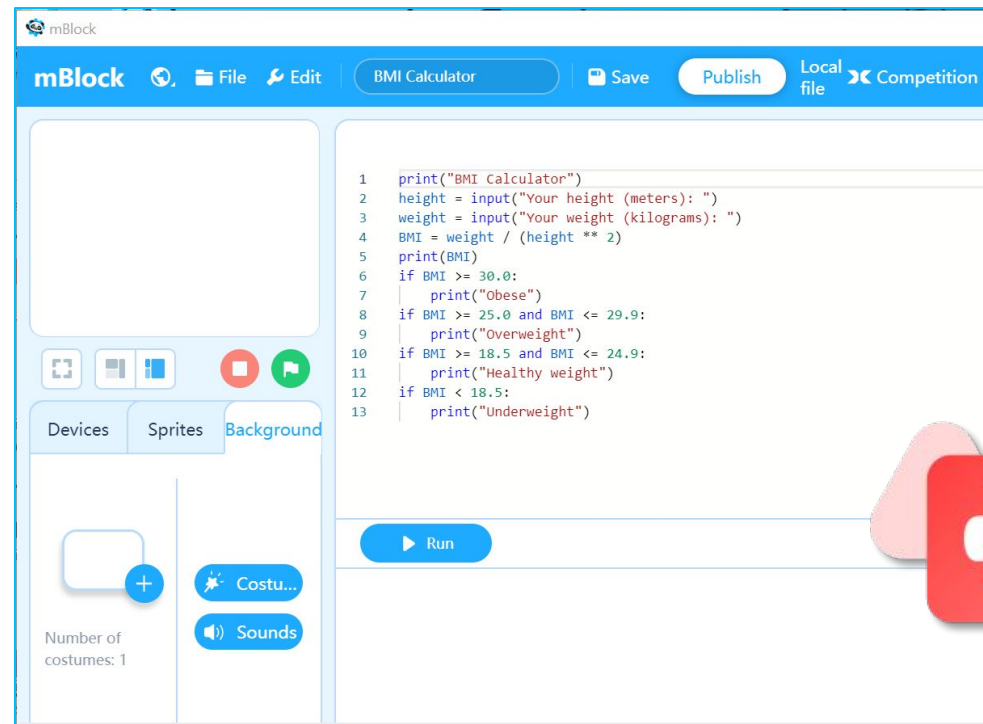
Easy step into CS & Technology learning

- Expand the power of block-based coding with the Extensions in mBlock.
- Control the speed of mBot2 based on facial expressions, by applying AI image recognition.
- Create a Machine Learning model and use it, for instance, to recognize traffic signs hand-painted by students.
- When connect to a network, you can collect, visualize and process data from different devices, and even upload them to the cloud.



Easy step into CS & Technology learning

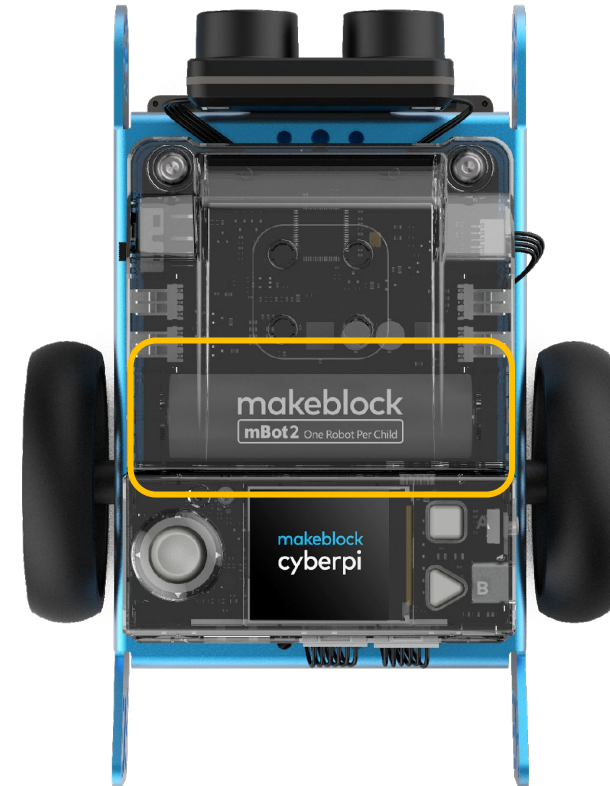
- The Python editor is based on Python3, and it can incorporate the full power of all the libraries available, covering Math, Data Visualization, AI, and more.
- It assists the programmer with smart auto-completion, syntax highlighting and auto indent.



Built-in long-lasting battery

- Integrated in the shield, no need to install or exchange an external battery.

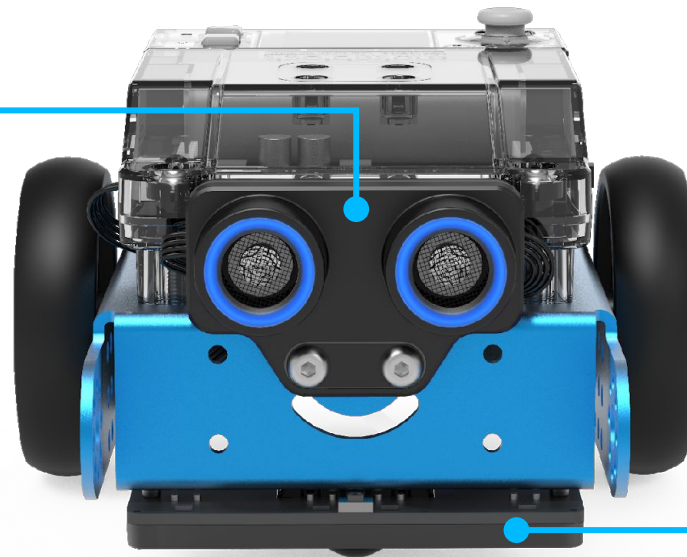
Product	LEGO EV3	LEGO SPIKE	mBot1.1	mBot2
Battery Capacity	2,050 mAh	2,000 mAh	1,800 mAh	2,500 mAh



Next generation sensors

Ultrasonic sensor

- Equipped with LEDs to enhance the visual communication.
- Improved consistency of measurements.



Quad color sensor

- Dual function, line following & color sensing.
- Ambient light calibration for better performance.

Expandable with mBuild modules and Makeblock structural parts

- Expand the scope of activities with more than 60 different modules.
- Micro-Controller Unit (MCU) built in every module, allows to connect them without having to separate or arrange them in a specific order.
- Connect in series up to 10 different sensors, motors, LEDs or other components at a time*.
- Makeblock structural parts are made of aluminum which makes them robust.
- Uses standard M4 screws for assembling.



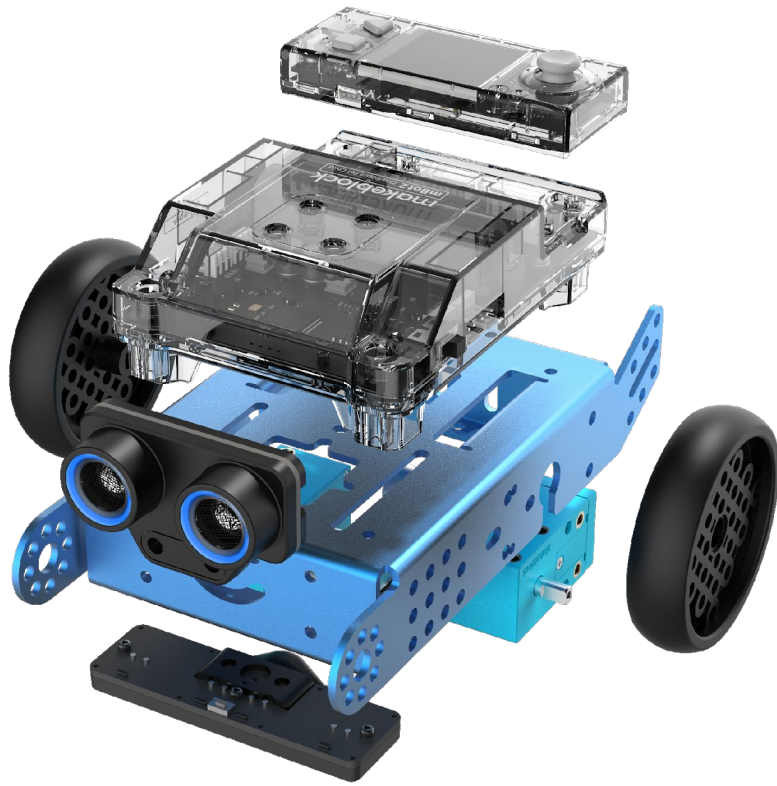
*More than 10 modules connected slow the processing speed

Precision in movement control



- mBot2 integrates the CyberPi 3-axis gyroscope and accelerometer + high-accuracy encoder motors.
- Students can precisely control the rotation, speed and position of the wheels and the robot.
- Lessons can be more realistic and didactic in comparison with robots that have less control of their motors.
- The motors can also be used as servos, and even knobs to feedback data to the system.

Safe and easy-to-use robot



- Students enjoy and learn from the building process.
- They also gain awareness of robotics and mechanics while building.
- The assembly process is guided by simple visual instructions.
- Easy to put together with only one screwdriver.
- Sturdy construction thanks to its aluminum chassis and encased components.

Curriculum

In progress

Getting Started Activities

- Interdisciplinary lessons, integrating Computer Science with Math, Physics and other subjects.
- Covering themes such as distance travelled, speed calculation, rotation, etc.
- Easy-to-follow for educators and students.
- Explore the possibilities of the software and hardware together.

The screenshot displays the 'makeblock education' website interface. At the top, the logo is on the left, and a blue progress bar with vertical lines is on the right. Below the logo, the word 'Activities' is written in red. A blue header box contains the text 'Section 1 – Engage [5-10 minutes]'. Underneath, the 'Objective:' section lists a bullet point: 'Before students design plant monitoring devices, help them learn about plants and the purpose of the houseplant care project.' The 'Procedures:' section follows, with 'Step 1' highlighted in blue. It lists three sub-points: 'Introduce the topic of this lesson.', 'Say: Plants can clean air, relax our minds and eyes, and add color to the environment. All life needs water. We need water, so do plants.', and 'Play a video demonstration to help students learn more about plants.' The text for the third point is partially cut off at the bottom of the image.

makeblock education

Activities

Section 1 – Engage
[5-10 minutes]

Objective:

- Before students design plant monitoring devices, help them learn about plants and the purpose of the houseplant care project.

Procedures:

Step 1

- Introduce the topic of this lesson.
 - Say: Plants can clean air, relax our minds and eyes, and add color to the environment. All life needs water. We need water, so do plants.
 - Play a video demonstration to help students learn more about plants.
 - Summarize: Water is essential in plant's healthy growth, photosynthesis, and

Specifications

Comparison with mBot V1.1

Control board

Specification	mBot 1.1	mBot2
Main Control	mCore	CyberPi
Processor	ATmage328/P	ESP32-WROVER-B
Clock speed	20MHz	240MHz
ROM	1KB	448KB
SRAM	2KB	520KB
SPI Flash	/	8MB
PSRAM	/	8MB
Wireless communication	Bluetooth or 2.4G (depends on version) IR broadcast	Bluetooth + Wi-Fi Wi-Fi LAN

Specification	mBot 1.1	mBot2
Input	Button Reset button	5-way joystick Button × 2 Reset button
Onboard Sensors	Light sensor	Light sensor Microphone (record and detect sounds) Gyroscope Accelerometer
Output	Buzzer RGB LED × 2	1.44" full color display Speaker RGB LED × 5

Control board

Feature	mBot 1.1	mBot2
Main Control	mCore	CyberPi
Switch mode	Firmware update required	No firmware update required
Support multithreading	No	Yes
How many programs can be stored	1	8 +
Support Python coding	No	micro-python + Python3

Expansion capabilities and battery

Specification	mBot 1.1	mBot2
Encoder motor interface	0	2
DC motor interface	2	2
Digital servo interface	0	4
LED strip-compatible interface	0	2 (integrated with the servo interface)
Arduino-compatible interface	0	2 (integrated with the servo interface)
Expandable electronic modules	4 RJ25 Ports, one sensor each port.	10+chain up with 1 mbuild port (use CyberPi's mBuild interface)

Specification	mBot 1.1	mBot2
Type of battery	LiPo rechargeable	LiPo rechargeable
Placement	External	Internal
Capacity	1800mAh	2500mAh
Discharge rate	1CC	3CC

Motors

Specification	mBot 1.1	mBot2
Motor type	DC	Encoder
Rotating speed	47~118RPM±10%	1~207RPM
Precision of rotation	/	≤5°
Sensitivity	/	1°
Stall torque	/	
Rated torque	≥672g·cm	800g·cm
Output shaft material	Plastic	Metal

Feature	mBot 1.1	mBot2
Turn corners		Accurate turning
Move straight forward	Only the command "move forward for xx secs" is available	≤2% deviation The command "move forward xx mm" is available
Serve as a smart servo	No	Yes Allowing angle control of ≤5°
Serve as a knob	No	Yes Allowing a sensitivity of 1°

Electronic components

Feature	mBot 1.1	mBot2
Quad color sensor		
Plastic casing improves durability and quality	Not included	Included
Line-following sensor	2	4
Color sensor	Not included	4 (integrated with the line-following sensor)
Ambient light calibration significantly reduces interference of ambient lights in mBot2's line-following performance	Not included	Included

Feature	mBot 1.1	mBot2
Ultrasonic sensor		
Plastic casing improves durability and quality	Not included	Included
Built-in chip comes with greater consistency in readings	Not included	Included
Atmosphere LED lights provide additional light display	Not included	8

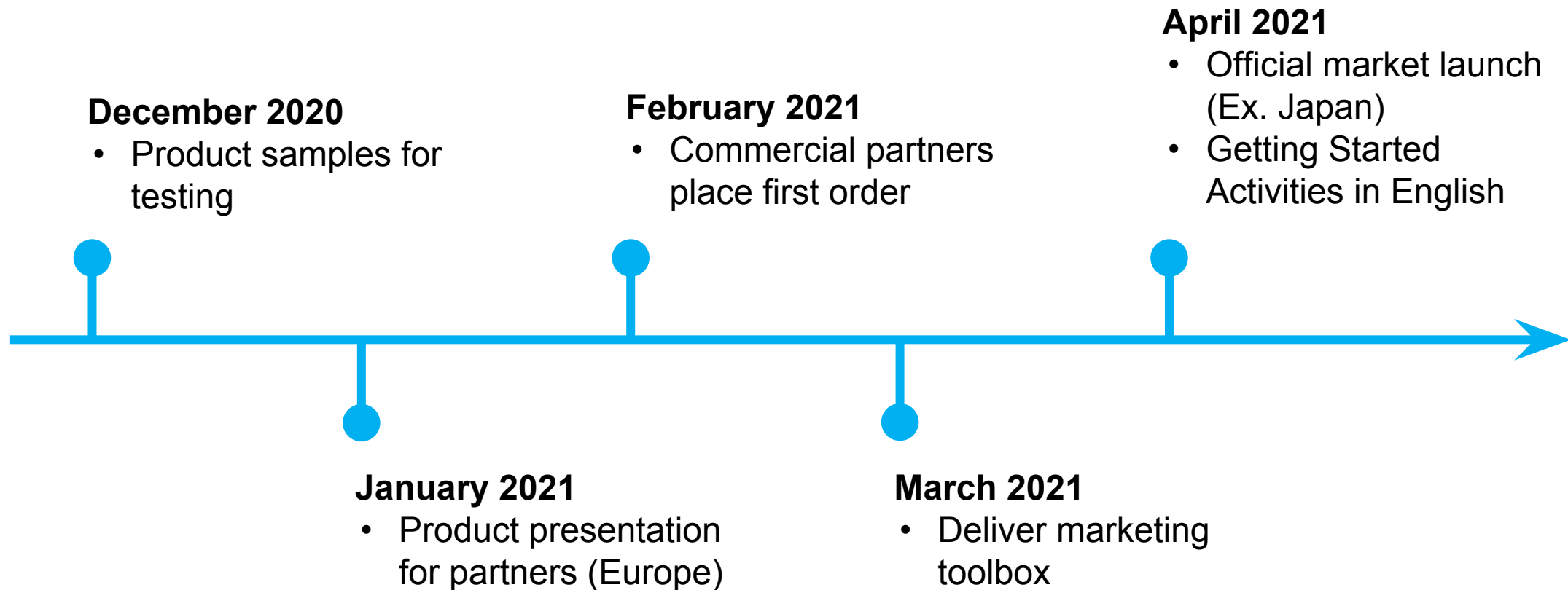
Additional

Product assortment for introduction

Product	SKU	Price ex. VAT	Contents	Curriculum
mBot2 kit	P1010132	USD 129 GBP 100 CAD 184.49 EUR 116.49 JPY 16880	CyberPi Encoder motors US and LF sensors Shield with battery Chassis Wheels Assembly parts USB cable	English version by April 2021
Bluetooth Dongle*	P5010002	USD 14,99	Bluetooth Dongle	n/a
Smart Camera Add-on Pack*	P1100022	USD 89	mBuild smart camera mBuild battery Different props (bar codes, color balls) Structural parts Assembly parts USB cable	English version by April 2021

*These two SKUs are already available in the market

mBot2 Timeline



CyberPi ecosystem timeline

Sept 2020

- CyberPi Go
- CyberPi 4-in-1
- Pocket shield
- (Innovation add-on)

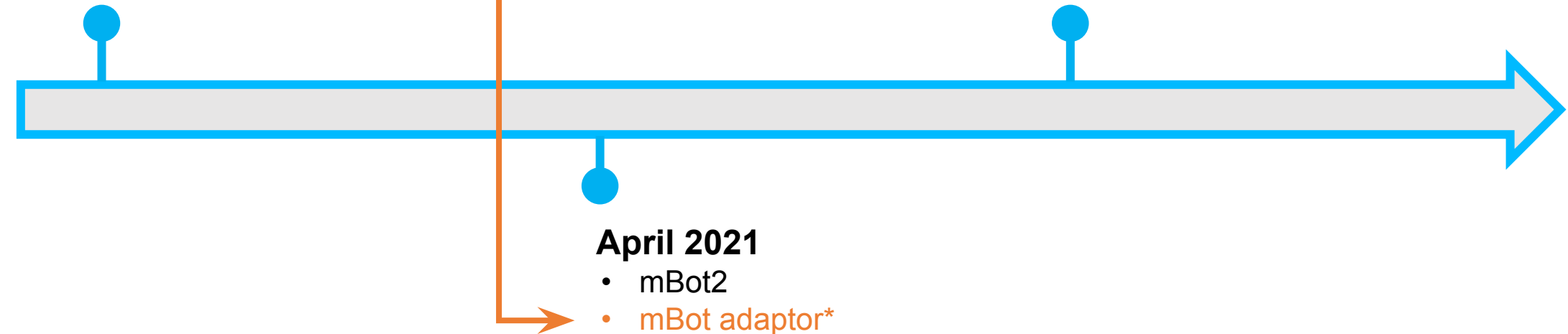
Together they
make the upgrade
kit for mBot 1.1

Q3 2021

- mBot2 extension
- CyberPi alone
- “mBuild lab”
- Advanced smart camera

April 2021

- mBot2
- mBot adaptor*



*We are evaluating the possibility to introduce the adaptor

mBlock software comparison

Features	Block-based	Python	
		Micro-Python (Upload mode)	Python3 (Live mode)
Platform Compatibility	Windows, OSX, Linux, Chromebook, Web	Windows, OSX, Linux, Chromebook, Web	Windows, OSX, Linux, Web
mBlock 5 – block-based editor	Yes	Yes	Not included
mBlock 5 – Python editor	Not included	Yes	Yes
mLink for web	Yes	Yes	Yes
3 rd party libraries	mBlock extensions	CyberPi extensions	Python libraries
CyberPi	Upload & Live Modes	Yes	Yes
Micro:bit	Only Upload Mode	Yes	No

Thank you!