Python API Documentation for CyberPi

Welcome to use CyberPi for Python learning!

CyberPi provides abundant input and output functions, allowing you to interact with your code and view the output of your code.

CyberPi is equipped with built-in Bluetooth and Wi-Fi, which can be used to set up a local area network (LAN) or connect to the Internet. You can create your own projects with CyberPi. It can help you understand and master the knowledge and skills related to various fields, such as Internet of things (IoT), artificial intelligence (AI), computing, and network.

In addition, CyberPi supports more than 30 electronic modules and multiple extension shields, allowing you to create various projects such as smart farm, smart home, self-driving car, intelligent robot, and competition robot.

You can use the `cyberpi` library to implement the functions described in the preceding.

Import the `cyberpi` library

The `cyberpi` library described in this document refers to two separate libraries with the same name:

- MicroPython library that can run on CyberPi
- Python library that can run on computers

These two libraries include the same APIs and almost the same output.

The CyberPi team develop these two libraries in this way on purpose, so that the MicroPython code you compile in Upload mode (to run on CyberPi) can be executed as Python code in Live mode (to run on a computer). We think this would be a good way to help learners make the transition from MicroPython learning to Python learning.

To help you use the APIs more efficiently, the application scenarios of the APIs are labelled as follows:

: indicates that an API supports Python 3 programming and can be used in **Live** mode on the mBlock Python editor.

: indicates that an API supports MicroPython programming and can be used in **Upload** mode on the mBlock Python editor.

: indicates that an API supports both Python 3 and MicroPython programming and can be used in both **Live** and **Upload** modes on the mBlock Python editor.

You can use the `cyberpi` library on mBlock-Python Editor or mBlock 5.
Import the library as follows:

```
## Python coding-no omitting
import cyberpi
cyberpi.console.print("hello")


## MicroPython coding-omitting "cyberpi"
from cyberpi import *
console.print("hello")
```

The non-omitting coding way is preferable for Python coding (Live mode), which prevents errors of the code compiled for CyberPi when other Python libraries are imported.

The omitting coding way is preferable for MicroPython coding (Upload mode), which allows you to write fewer words.

mBlock 5 uses the non-omitting way for transcoding in most of the cases to prevent errors.

APIs in the `cyberpi` library

The `cyberpi` library provides multiple APIs for controlling hardware. This page describes the APIs for CyberPi. For the APIs provided for function extension and

extension boards, see:

APIs for Function Extension <https://www.yuque.com/makeblock-help-center-en/mcode/cyberpi-api-function-extension>

APIs for Extension boards <https://www.yuque.com/makeblock-help-center-en/mcode/cyberpi-api-shields>

APIs for mBuild Modules <https://www.yuque.com/makeblock-help-center-en/mcode/cyberpi-api-mbuild>

APIs for CyberPi

These APIs can be used to control CyberPi, allowing CyberPi to perform its functions.

APIs for CyberPi include the following:

Audio

CyberPi is equipped with a speaker and microphone. You can use the following APIs to record and play audio files and set the volume and playing speed.

Preset audio files

`audio.play_until(music_name)`

Plays a preset audio file

This API blocks the thread until the playing ends.

Parameter:

- *music* `str` : name of the audio file to be played. The table "Setting range and sound effects" describes the setting range and sound effects of this parameter.

`cyberpi.audio.play(music_name)`

Plays a preset audio file

Parameter:

- *music* `str` : name of the audio file to be played. The table "Setting range and sound effects" describes the setting range and sound effects of this parameter.

Setting range and sound effects

Category	File name	Variable name	Sou
01-Emotion	hello	SPEAKER.hello	hello
	hi	SPEAKER.hi	hi
	bye	SPEAKER.bye	bye
	yeah	SPEAKER.yeah	yeah
	wow	SPEAKER.wow	wow
	laugh	SPEAKER.laugh	laugh
	hum	SPEAKER.hum	hum
	sad	SPEAKER.sad	sad
	sigh	SPEAKER.sigh	sigh
	annoyed	SPEAKER.annoyed	annoy
	angry	SPEAKER.angry	angry
	surprised	SPEAKER.surprised	surpri
	yummy	SPEAKER.yummy	yumm
	curious	SPEAKER.curious	curiou
	embarrassed	SPEAKER.embarrassed	emba
	ready	SPEAKER.ready	ready
	sprint	SPEAKER.sprint	sprint
	sleepy	SPEAKER.sleepy	sleepy
	meow	SPEAKER.meow	meow
02-Electronic sounds	start	SPEAKER.start	start
	switch	SPEAKER.switch	switch
	beeps	SPEAKER.beeps	beeps
	buzzing	SPEAKER.buzzing	buzzin
	explosion	SPEAKER.explosion	explos
	jump	SPEAKER.jump	jump
	laser	SPEAKER.laser	laser
	level-up	SPEAKER.level-up	level-

	low-energy	SPEAKER.low-energy	low-e
	prompt-tone	SPEAKER.prompt-tone	prom
	right	SPEAKER.right	right
	wrong	SPEAKER.wrong	wrong
	ring	SPEAKER.ring	ring
	score	SPEAKER.score	score
	wake	SPEAKER.wake	wake
	warning	SPEAKER.warning	warni
03-Physical sounds	metal-clash	SPEAKER.metal-clash	metal
	shot	SPEAKER.shot-1	shot
	glass-clink	SPEAKER.glass-clink	glass-
	inflator	SPEAKER.inflator	inflato
	running water	SPEAKER.running-water	runnin
	clockwork	SPEAKER.clockwork	clockv
	click	SPEAKER.click	click
	current	SPEAKER.current	curren
	switch	SPEAKER.switch	switch
	wood-hit	SPEAKER.wood-hit-3	wood
	iron	SPEAKER.iron-1	iron
	drop	SPEAKER.drop	drop
	bubble	SPEAKER.bubble-1	bubbl
	wave	SPEAKER.wave	wave
	magic	SPEAKER.magic	magic
	spitfire	SPEAKER.spitfire	spitfir
	heartbeat	SPEAKER.heartbeat	heartb
	load	SPEAKER.load	load

Instrument simulating

Py + MP `cyberpi.audio.play_music(note, beat, type = "piano")`

Plays the specified note of the specified instrument for the specified beats

This API blocks the thread until the playing ends. You can use it to compile and play music.

Parameters:

- *type* `str` : type of the instrument to be simulated. The value is set to `piano` .
- *note* `int` : frequency of the sound to be played. Setting range: `0~132` . The table "Values and corresponding notes" describes the values and their corresponding notes.
- *beat* `float` : duration a note is to be played. Setting range: *beat* > 0. At general playing speed, one beat equals one second.

Values and corresponding notes

Value	Note	Value	Note	Value	No
0	C-1	43	G2	86	D6
1	C#-1	44	G#2	87	D#6
2	D-1	45	A2	88	E6
3	D#-1	46	A#2	89	F6
4	E-1	47	B2	90	F#6
5	F-1	48	C3	91	G6
6	F#-1	49	C#3	92	G#6
7	G-1	50	D3	93	A6
8	G#-1	51	D#3	94	A#6
9	A-1	52	E3	95	B6
10	A#-1	53	F3	96	C7
11	B-1	54	F#3	97	C#7
12	C0	55	G3	98	D7
13	C#0	56	G#3	99	D#7
14	D0	57	A3	100	E7
15	D#0	58	A#3	101	F7
16	E0	59	B3	102	F#7
17	F0	60	C4	103	G7

18	F#0	61	C#4	104	G#7
19	G0	62	D4	105	A7
20	G#0	63	D#4	106	A#7
21	A0	64	E4	107	B7
22	A#0	65	F4	108	C8
23	B0	66	F#4	109	C#8
24	C1	67	G4	110	D8
25	C#1	68	G#4	111	D#8
26	D1	69	A4	112	E8
27	D#1	70	A#4	113	F8
28	E1	71	B4	114	F#8
29	F1	72	C5	115	G8
30	F#1	73	C#5	116	G#8
31	G1	74	D5	117	A8
32	G#1	75	D#5	118	A#8
33	A1	76	E5	119	B8
34	A#1	77	F5	120	C9
35	B1	78	F#5	121	C#9
36	C2	79	G5	122	D9
37	C#2	80	G#5	123	D#9
38	D2	81	A5	124	E9
39	D#2	82	A#5	125	F9
40	E2	83	B5	126	F#9
41	F2	84	C6	127	G9
42	F#2	85	C#6		

Example program

```
import time, cyberpi

cyberpi.console.println('Press B to play music')
cyberpi.console.println('Press B to play music.')
while True:
    while not cyberpi.controller.is_press('b'):
        pass
    # You can right-click a block to view help information.
    # The block uses MIDI codes to indicate notes. The following MIDI c
    #
    # Numbered musical notation/Note/MIDI code
    # 1 C4 60
    # 2 D4 62
    # 3 E4 64
    # 4 F4 65
    # 5 G4 67
    # 6 A4 69
    # 7 B4 71
    cyberpi.audio.play_music(60, 0.25)
    cyberpi.audio.play_music(60, 0.25)
    cyberpi.audio.play_music(67, 0.25)
    cyberpi.audio.play_music(67, 0.25)
    cyberpi.audio.play_music(69, 0.25)
    cyberpi.audio.play_music(69, 0.25)
    cyberpi.audio.play_music(67, 0.25)
    time.sleep(1)
    cyberpi.audio.play_music(65, 0.25)
    cyberpi.audio.play_music(65, 0.25)
    cyberpi.audio.play_music(64, 0.25)
    cyberpi.audio.play_music(64, 0.25)
    cyberpi.audio.play_music(62, 0.25)
    cyberpi.audio.play_music(62, 0.25)
    cyberpi.audio.play_music(60, 0.25)


```

Py + MP `cyberpi.audio.play_drum(type, beat)`

Plays the specified sound for the specified beats

- *type* `str` : type of the instrument to be simulated.

  Setting range:

  `snare` : snare drum

  `bass-drum` : bass drum

  `side-stick` : beating the edge of a drum

  `crash-cymbal` : crash cymbal

  `open-hi-hat` : open hi-hat

`closed-hi-hat` : closed hi-hat
`tambourine` : tambourine
`hand-clap` : handclap
`claves` : claves

- *beat* `float` : duration a note to be played. The value must be greater than 0. At general playing speed, one beat equals one second.

Example program

```
# generated by mBlock5 for CyberPi
# codes make you happy

import event, time, cyberpi

@event.start
def on_start():
    global frequency
    while True:
        if cyberpi.is_tiltforward():
            cyberpi.audio.play_drum('snare', 0.25)

        if cyberpi.is_tiltforward():
            cyberpi.audio.play_drum('bass-drum', 0.25)

        if cyberpi.is_tiltforward():
            cyberpi.audio.play_drum('open-hi-hat', 0.25)

        if cyberpi.is_tiltforward():
            cyberpi.audio.play_drum('closed-hi-hat', 0.25)


```

Sounds recording and playing

Py + MP `cyberpi.audio.record()`

Starts to record sounds

When this API is executed, CyberPi starts to record sounds until `audio.stop_record()` is executed or the recording exceeds 10 seconds. The recorded file is stored in RAM, and so the recorded file is lost if CyberPi is turned off or restarted.

Py + MP `cyberpi.audio.stop_record()`

Stops recording sounds

This API needs to be used in combination with `audio.record()`.

`cyberpi.audio.play_record_until()`

Plays the recorded sounds

This API blocks the thread until the playing ends.

`cyberpi.audio.play_record()`

Plays the recorded sounds

Example program

```
# generated by mBlock5 for CyberPi
# codes make you happy

import time, event, cyberpi

@event.start
def on_start():
    """Press the middle of the joystick to start recording
    Press button A to stop recording
    Press button B to play the recorded sounds

    Move the joystick up or down to change the playing speed
    Move the joystick to the left or right to change the playing volume
    cyberpi.display.set_brush(255, 255, 255)
    cyberpi.led.set_bri(30)
    cyberpi.audio.set_vol(50)
    cyberpi.audio.set_tempo(100)
    cyberpi.console.println('1.Magical Recorder')
    cyberpi.console.println('Press the middle of the joystick to start
    cyberpi.console.println('')
    cyberpi.led.show('orange orange orange orange orange')

@event.is_press('middle')
def is_press():
    cyberpi.console.clear()
    cyberpi.console.println('Press button A to stop recording')
    cyberpi.console.println('')
    cyberpi.led.show('green green green green green')
    cyberpi.audio.record()

@event.is_press('a')
def on_received():
    cyberpi.console.clear()
    cyberpi.console.println('Press button B to play the recorded sounds
    cyberpi.console.println('Move the joystick up or down to change the
    cyberpi.console.println('')
    cyberpi.led.show('red red red red red')
    cyberpi.audio.stop_record()

Py + MP
@event.is_press('b')
def on_received1():
    cyberpi.console.clear()
    cyberpi.console.println('Playing...')
    cyberpi.console.println('Move the joystick up or down to change the
    cyberpi.console.println('')
    cyberpi.led.show('blue blue blue blue blue')
    cyberpi.audio.play_record_until()

@event.is_press('up')
def is_press1():
    """Move the joystick up or down to change the playing speed.
    The speed setting function is a feature of CyberPi's audio system,
    The speed setting function can also be used to slow down or speed u
```

```
    cyberpi.led.off(0)
    cyberpi.audio.add_tempo(10)
    cyberpi.console.println(str('Playing speed:') + str(cyberpi.audio.g
    cyberpi.console.println('')

@event.is_press('down')
def is_press2():
    cyberpi.led.off(0)
    cyberpi.audio.add_tempo(-10)
    if cyberpi.audio.get_tempo() < 40:
        cyberpi.audio.set_tempo(40)

    cyberpi.console.println(str('Playing speed:') + str(cyberpi.audio.g
    cyberpi.console.println('')

@event.is_press('left')
def is_press3():
    """Move the joystick to the left or right to change the playing vol
    cyberpi.led.off(0)
    cyberpi.audio.add_vol(-10)
    cyberpi.console.println(str('Playing volume:') + str(cyberpi.audio.
    cyberpi.console.println('')

@event.is_press('right')
def is_press4():
    cyberpi.led.off(0)
    cyberpi.audio.add_vol(10)
    cyberpi.console.println(str('Playing volume:') + str(cyberpi.audio.
    cyberpi.console.println('')


```

```
['C2','65'],   ['D2','73'],   ['E2','82'],   ['F2','87'],
['G2','98'],   ['A2','110'],  ['B2','123'],  ['C3','131'],
['D3','147'],  ['E3','165'],  ['F3','175'],  ['G3','196'],
['A3','220'],  ['B3','247'],  ['C4','262'],  ['D4','294'],
['E4','330'],  ['F4','349'],  ['G4','392'],  ['A4','440'],
['B4','494'],  ['C5','523'],  ['D5','587'],  ['E5','659'],
['F5','698'],  ['G5','784'],  ['A5','880'],  ['B5','988'],
['C6','1047'], ['D6','1175'], ['E6','1319'], ['F6','1397'],
['G6','1568'], ['A6','1760'], ['B6','1976'], ['C7','2093'],
['D7','2349'], ['E7','2637'], ['F7','2794'], ['G7','3136'],
['A7','3520'], ['B7','3951'], ['C8','4186'], ['D8','4699'],
```

- `t` : duration the sound is to be played. Setting range: $t \geq 0$

Example program

```
import event, time, cyberpi

@event.is_press('a')
def on_received():
    global frequency
    for count in range(2):
        cyberpi.audio.play_tone(800, 1)
        cyberpi.audio.play_tone(200, 1)

```

Speed and volume of CyberPi's speaker

You can use the following APIs to set the playing speed and volume of CyberPi's speaker.

Py + MP `cyberpi.audio.add_tempo(pct)`

Changes the playing speed of CyberPi's speaker

Parameter:

- *pct:* `int`, percentage (of the normal playing speed) by which the playing speed is to be changed; a negative value indicates decreasing the speed, and a positive one indicates increasing the speed

Py + MP `cyberpi.audio.set_tempo(pct)`

Sets the playing speed of CyberPi's speaker

Parameter:

- *pct:* `int`, percentage of the normal playing speed; setting range: `25-400` %

Py + MP `cyberpi.audio.get_tempo()`

Obtains the playing speed of CyberPi's speaker

The value returned is an integer, ranging from 25 to 400 (%).

Py + MP `cyberpi.audio.add_vol(val)`

Changes the playing volume of CyberPi's speaker

Parameter:

- *pct:* `int`, percentage by which the playing volume is changed; setting range: `-10`

`0–+100` %; a negative value indicates decreasing the volume, and a positive one indicates increasing the volume

`cyberpi.audio.set_vol(val)`

Sets the playing volume of CyberPi's speaker

Parameter:

- *pct:* `int` , percentage of the playing volume; setting range: `0–100` %

`cyberpi.audio.get_vol()`

Obtains the playing volume of CyberPi's speaker

The value returned is an integer, ranging from 0 to 100 (%).

`cyberpi.audio.stop()`

Stops the playing of all sounds

LED

CyberPi is equipped with five programmable LEDs. You can use the following APIs to compile programs for controlling the LEDs.

`cyberpi.led.on(r, g, b, id = "all")`

Sets the color(s) of the LEDs

Parameters:

- *r:* `int` or `str`
  - r: `int` , intensity of the red color; setting range: `0 - 255`
  - r: `str` , full name or abbreviation of a color; the following describes colors and their abbreviations:

```
red r
orange o
yellow y
green g
cyan c
blue b
purple p
white w
black k
```

- *g:* `int` , intensity of the green color; setting range: `0-255`
- *b:* `int` , intensity of the blue color; setting range: `0-255`
- *id:* `int` or `str` ; the default value is `all`
  id: `str` , only the value `all` is valid.
  id: `int` , setting range: `1-5` , indicating the position of an LED. The following figure shows the
  positions of the LEDs.

Example program

```
import cyberpi
cyberpi.led.on(255,0,0) #Lights up all the LEDs
```

```
import cyberpi
cyberpi.led.on('red', id = 1) #Lights up LED 1 in red
```

```
import cyberpi
cyberpi.led.on('r',  id = 1) #Lights up LED 1 in red
```

Py + MP `cyberpi.led.play(name = "rainbow")`

Displays the specified LED animation

This API blocks the thread until the display ends.

Parameter:

- *name:* `str`, name of an LED animation; the default value is `rainbow`, and the options include the following:
  `rainbow`
  `spoondrift`
  `meteor_blue`
  `meteor_green`
  `flash_red`
  `flash_orange`
  `firefly`

Py + MP `cyberpi.led.show(color)`

Sets the color(s) of the five LEDs

Parameter:

- *color:* `str`, color(s) of the five LEDs, set in the `color1 color2 color3 color4 color5` mode, with one space between any two colors. If you set more than five colors, only the first five colors are used. You can set this parameter to the full name or abbreviation of the colors. The options include the following:
  `red`, `r`
  `green`, `g`
  `blue`, `b`
  `yellow`, `y`
  `cyan`, `c`
  `purple`, `p`
  `white`, `w`
  `orange`, `o`
  `black`, `k`

Py + MP `led.move(step = 1)`

Makes the colors of the LEDs roll from left to right by the specified number of positions

Parameter:

- *step:* `int`, number of positions by which the colors of the LEDs roll; setting range: `-4-+4`; default value: `1`
  For example, you set the colors of the five LEDs to `r, o, y, g, c` and then use this API. When you set step to 0, the colors of the LEDs are shown in Figure A; and when you set step to 1, the colors roll from left to right by one position, and the color of

the first LED is that of the original last LED, as shown in Figure B

Figure A (step = 0)

Figure B (step = 1)

Py + MP `cyberpi.led.off(id = "all")`

Turns off the specified LED(s)

Parameter:

- *id:* `int` or `str`, position of the LED to be turned off; the default value is `all`, indicating all the LEDs; when you set it to an integer, the setting range is 1 to 5.

Py + MP `cyberpi.led.add_bri(brightness)`

Changes the brightness of CyberPi's LEDs

Parameter:

- *brightness:* `int`, percentage by which the brightness is to be changed; setting range: `-100–+100` %; a negative value indicates decreasing, and a positive one indicates increasing.

Py + MP `cyberpi.led.set_bri(brightness)`

Sets the brightness of CyberPi's LEDs

Parameter:

- *brightness:* `int`, brightness of the LEDs, in percentage; setting range: `0–100` (%)

Py + MP `cyberpi.led.get_bri()`

Obtains the brightness of CyberPi's LEDs

The returned value is an integer ranging from `0` to `100`.

Example program

```
# generated by mBlock5 for CyberPi
# codes make you happy

import cyberpi
while True:
    for count in range(10):
        cyberpi.led.add_bri(10)
        cyberpi.led.move(1)

    for count2 in range(10):
        cyberpi.led.add_bri(-10)
        cyberpi.led.move(1)
```

Display

CyberPi is equipped with a 1.89-inch full-color display. With the following APIs, you can use CyberPi to display texts and images, draw charts, design games, and create apps.

Texts and images

Py + MP `cyberpi.console.print(message)`

Displays texts on CyberPi's screen with automatic line breaks
When this block is executed, texts are displayed on the same line, and when a line is full, the texts are continued on new lines.
Parameter:

- *message:* `str` , text to be displayed, such as `hello`

Example program

```
import cyberpi
cyberpi.console.print('hello')
cyberpi.console.print('world')
```

Py + MP `cyberpi.console.println(message)`

Displays texts on CyberPi's screen with forced line breaks

- *message:* `str` , text to be displayed, such as `hello`

Example program

```
import cyberpi
cyberpi.console.println('hello world')
cyberpi.console.print('hello'+' '+'world')
```

Positions of texts

Py + MP `cyberpi.display.show_label(message, size, x, y)`

Displays a text in the specified position of CyberPi's screen

Parameter:

- *message:* `str` , text to be displayed, such as `hello`
- *size:* `int` , font size of the text to be displayed; setting range: `16` , `24` , and `32`
- *x:* `str` or `int` , position where the text is to be displayed

  When x is `str` , the options are as follows:

  `top_mid` : in the upper center

  `top_left` : in the upper left

  `top_right` : in the upper right

  `center` : in the center

  `mid_left` : in the middle left

  `mid_right` : in the middle right

  `bottom_mid` : in the lower center

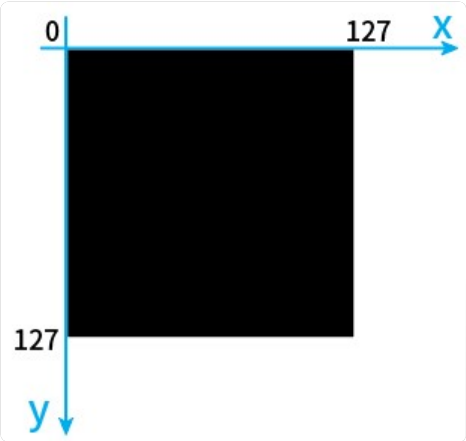
  `bottom_left` : in the lower left

  `bottom_right` : in the lower right

  When x is `int` , the value ranges from `0` to `128` , indicating the x-coordinate of the upper left corner of the text.

- *y:* `int` , y-coordinate of the upper left corner of the text; setting range: `0-128`

  The following figure shows the x- and y-coordinates defined for CyberPi's screen.



Example program

```
```

```
```

Charts

Py + MP `cyberpi.linechart.add(data)`

Adds a piece of data and displays a line chart

You can use the API `cyberpi.display.set_brush(color)` to set the color of a line, and thus can draw line charts in different colors to present different data sets.

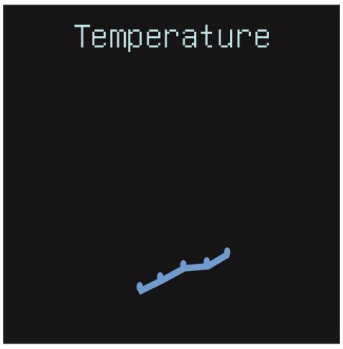
Parameter:

- *data:* `float`, ranging from `0` to `100`
  If a value to be input exceeds the setting range, rescale all the original data to be within the setting range.
  For example, you can rescale the values 200, 300, and 400 to 20, 30, and 40, respectively.

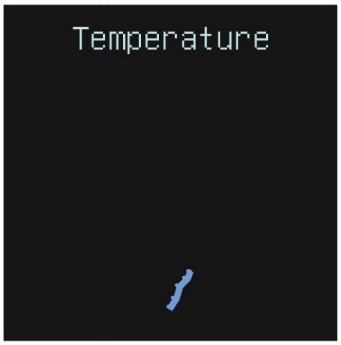
Py + MP `cyberpi.linechart.set_step(step)`

Sets the spacing between data points in a line chart

- *step:* `int`, spacing between data points; setting range: `0-128` (pixels)
  For example, the following figures show the line charts with the same data but different data point spacings.



8-pixel spacing



2-pixel spacing

`cyberpi.barchart.add(data)`

Adds a piece of data and displays a bar chart

You can use the API display.set_brush(r, g, b) to set the color of a bar, and thus can draw a bar chart with different colors of bars to present different data sets. The width of a bar changes with the number of bars.

Parameter:

- *data:* `float` , ranging from `0` to `100`
  If a value to be input exceeds the setting range, rescale all the original data to be within the setting range.
  For example, you can rescale the values 200, 300, and 400 to 20, 30, and 40, respectively.

~~`cyberpi.piechart.add(data)`~~

~~Adds a piece of data and displays a pie chart~~

~~You can use the API display.set_brush(r, g, b) to set the color of a section, and thus can draw a pie chart with different colors of sections to present different pieces of data. The degree of a section changes with the number of pieces of data.~~

~~Parameter:~~

- ~~*data:* `float` , ranging from `0` to `+∞`~~

`cyberpi.table.add(row, column, data)`

Adds a piece of data and displays a table

The number of rows and columns depends on the content you input. A maximum table of 4 (rows) × 3 (columns) is supported. When a piece of content is too long, it scrolls in the cell.

You can use the API `display.set_brush(r, g, b)` to set the color of the content.

The content can be texts and predefined icons.

Parameter:

- *row:* `int`, number of rows to be created
- *column:* `int`, number of columns to be created
- *data:* `str`, content to be input into a cell of the table

Example program

```python
# generated by mBlock5 for CyberPi
# codes make you happy

import random, cyberpi, event, time

@event.start
def on_start():
    cyberpi.console.println('2.Volumn-reactive Lights and Columns')
    cyberpi.console.println('2.光影音量柱')
    cyberpi.console.println('Press B to start')
    cyberpi.console.println('按 B 以开始...')
    while not cyberpi.controller.is_press('b'):
        cyberpi.display.set_brush(random.randint(1, 255), random.randir

        # The color of the texts changes randomly before you press butt
        cyberpi.console.print('')
        time.sleep(0.1)

    cyberpi.broadcast('Message 1')

@event.receive('Message 1')
def on_receive():
    """The bar chart changes with the volume of the sounds in the ambie
    The brightness of the LEDs also changes with the volume."""
    cyberpi.led.on(114, 0, 255, 1)
    cyberpi.led.on(191, 0, 255, 2)
    cyberpi.led.on(255, 0, 195, 3)
    cyberpi.led.on(255, 0, 72, 4)
    cyberpi.led.on(255, 0, 0, 5)
    while True:
        cyberpi.led.set_bri(cyberpi.get_loudness("maximum"))
        cyberpi.display.set_brush(114, 0, 255)
        cyberpi.barchart.add(cyberpi.get_loudness("maximum"))
        time.sleep(0.02)
        cyberpi.display.set_brush(191, 0, 255)
        cyberpi.barchart.add(cyberpi.get_loudness("maximum"))
        time.sleep(0.02)
        cyberpi.display.set_brush(255, 0, 195)
        cyberpi.barchart.add(cyberpi.get_loudness("maximum"))
        time.sleep(0.02)
        cyberpi.display.set_brush(255, 0, 72)
        cyberpi.barchart.add(cyberpi.get_loudness("maximum"))
        time.sleep(0.02)
        cyberpi.display.set_brush(255, 24, 24)
        cyberpi.barchart.add(cyberpi.get_loudness("maximum"))
        time.sleep(0.05)
```

Py + MP `cyberpi.display.set_brush(r, g, b)`

- *r:* `int` or `str`
  r: `int` , intensity of the red color; setting range: `0 - 255`
  r: `str` , full name or abbreviation of a color; the following describes colors and their abbreviations:

```
red r
orange o
yellow y
green g
cyan c
blue b
purple p
white w
black k
```

- *g:* `int` , intensity of the green color, ranging from `0` to `255`
- *b:* `int` , intensity of the blue color, ranging from `0` to `255`

Display directions

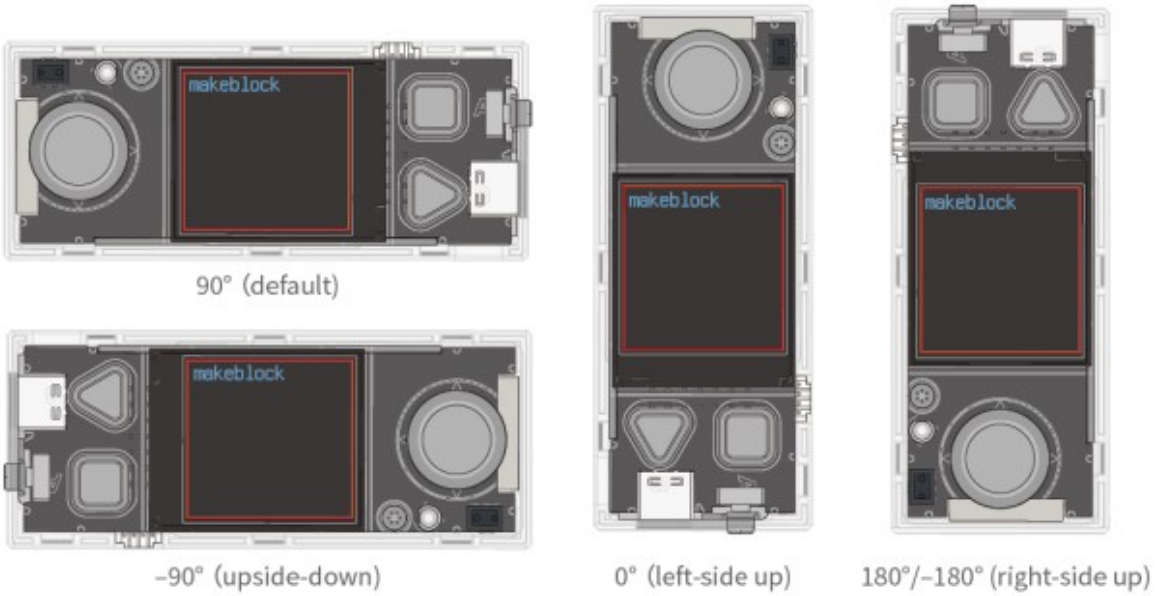
Py + MP `cyberpi.display.rotate_to(angle)`

Sets CyberPi's screen to the specified displaying direction (angles)

Parameter

- *angle:* `int` , displaying direction; setting range: `-90°` , `0°` , `90°` , `180°` , and `-180°`

The corresponding displaying directions are shown in the following figure.



Py + MP `cyberpi.display.clear()`

Clears CyberPi's screen

Py + MP `cyberpi.display.off()`

Turns off the background light of CyberPi's screen

Sensing

With the following APIs, you can obtain output values of the sensors on your CyberPi or information about your CyberPi.

Button or joystick status

CyberPi is equipped a joystick (that can be moved in five directions to implement control) and two buttons (buttons A and B), as shown in the following figure.

The following APIs are available for programming CyberPi:

Py + MP `cyberpi.controller.is_press(name)`

Determines whether the specified button is pressed or the joystick is moved to the specified direction

Parameter:

- *name:* `str` , name of the button or joystick direction
  Setting range:
  - `a` : button A (in the square shape)
  - `b` : button B (in the rectangle shape)
  - `up` : joystick moved up
  - `down` : joystick moved down
  - `left` : joystick moved to the left
  - `right` : joystick moved to the right
  - `middle` : joystick pressed in the center
  - `any_direction` : joystick moved in any one direction
  - `any_button` : button A or B
  - `any` : any button or joystick moving direction

A `bool` value is returned.

Py + MP `cyberpi.controller.get_count(name)`

Obtains the number of times the specified button is pressed or the joystick is moved to the specified direction

Parameter:

- *name:* `str` , name of the button or joystick direction
  Setting range:
  - `a` : button A (in the square shape)
  - `b` : button B (in the rectangle shape)
  - `up` : joystick moved up
  - `down` : joystick moved down
  - `left` : joystick moved to the left
  - `right` : joystick moved to the right
  - `middle` : joystick pressed in the center

An `int` value is returned.

Py + MP `cyberpi.controller.reset_count(name)`

Resets the number of times the specified button is pressed or the joystick is moved to the specified direction

Parameter:

- *name:* `str` , name of the button or joystick direction
  Setting range:
  `a` : button A (in the square shape)
  `b` : button B (in the rectangle shape)
  `up` : joystick moved up
  `down` : joystick moved down
  `left` : joystick moved to the left
  `right` : joystick moved to the right
  `middle` : joystick pressed in the center
  `any_direction` : joystick moved in any one direction
  `any_button` : button A or B
  `any` : any button or joystick moving direction

Sensor outputs

Py + MP `cyberpi.get_bri()`

Obtains the ambient light brightness detected by the light sensor on CyberPi

An `int` value ranging from `0` to `100` is returned. When the value returned is 100, the upper measuring limit is reached.

Py + MP `cyberpi.get_loudness(mode = "maximum")`

Obtains the ambient sound loudness detected by the microphone on CyberPi

Parameter:

- *mode:* `str` , type of loudness you want to obtain
  Setting range
  `average` : average loudness in a period
  `maximum` : maximum loudness in a period; obviously, this mode is preferable for sound-sensitive projects.

An `int` value ranging from `0` to `100` is returned. When the value returned is 100, the upper measuring limit of the microphone is reached.

Timer

`cyberpi.timer.get()`

Obtains the count value of the timer

The timer starts to count when CyberPi starts up.

A `float` value is returned, in seconds.

`cyberpi.timer.reset()`

Resets the count value of CyberPi's timer to 0

Other outputs

`cyberpi.get_mac_address()`

Obtains the media access control address (MAC address) of the Wi-Fi

Note that the address obtained may be wrong if Wi-Fi is not connected.

The value returned is a 12-byte `str` value, for example, `FFEE33445566` .

`cyberpi.get_battery()`

Obtains the battery level (in %) of the pocket shield connected to CyberPi

An `int` value ranging from `0` to `100` is returned. When the value 100 is returned, the battery is at its highest level; and when 0 is returned, no pocket shield is connected to CyberPi or the battery of the connected pocket shield runs out of battery.

`cyberpi.get_firmware_version()`

Obtains the version number of the firmware

The value returned is a `str` value, for example, `44.01.001` .

`cyberpi.get_ble()`

Obtains the Bluetooth device name used by CyberPi

The value returned is a `str` value, for example, `Makeblock_LE_XXXXX`.

`cyberpi.get_name()`

Obtains the name of your CyberPi

The default name is `cyberpi`, and you can set the name of your CyberPi by using the API `set_name(name)`.

`cyberpi.set_name(name)`

Sets the name of your CyberPi

The name you set is displayed on the UI of the CyberOS system that runs on your CyberPi. By setting device names, users can find their CyberPis or identify one another on a LAN or IoT.

Parameter:

- *name:* `str`, name you set for your CyberPi, for example, `Alex`, `Tom`

`cyberpi.get_language()`

Obtains the system language currently used on CyberPi

The value returned is a `str` value and may be one of the following:

`"chinese"`: Chinese
`"cantonese"`: Cantonese
`"japanese"`: Japanese
`"english"`: English
`"french"`: French
`"german"`: German
`"spanish"`: Spanish
`"portuguese"`: Portuguese
`"russian"`: Russian
`"korean"`: Korean
`"italian"`: Italian
`"dutch"`: Dutch

Motion Sensing

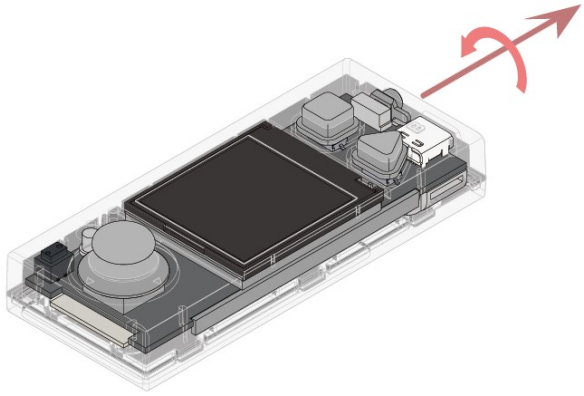
With the gyroscope, accelerometer, and built-in motion detection algorithm on CyberPi, you can implement motion-based control. You can use the following APIs to obtain the postures of CyberPi.

CyberPi's postures

Py + MP `cyberpi.is_tiltforward()`

Determines whether CyberPi is tilted forward

The following figure shows the posture of tilting forward.

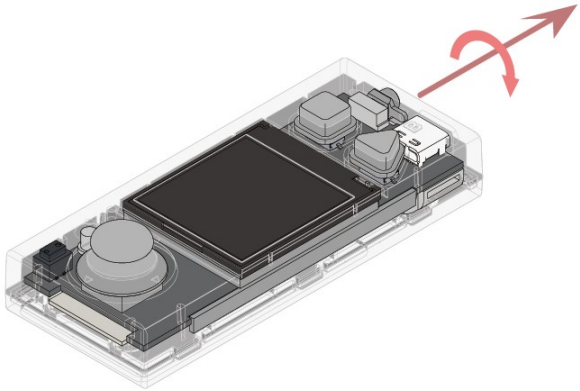


A `bool` value is returned.

Py + MP `cyberpi.is_tiltback()`

Determines whether CyberPi is tilted backward

The following figure shows the posture of tilting backward.

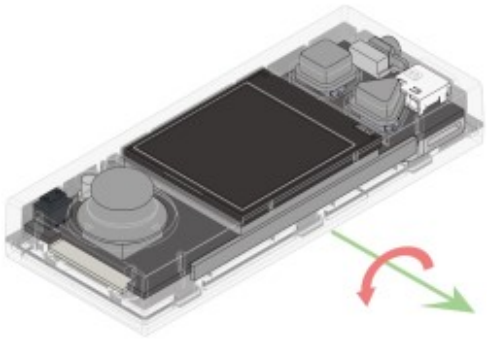


A `bool` value is returned.

Py + MP `cyberpi.is_tiltleft()`

Determines whether CyberPi is tilted to the left

The following figure shows the posture of tilting to the left.

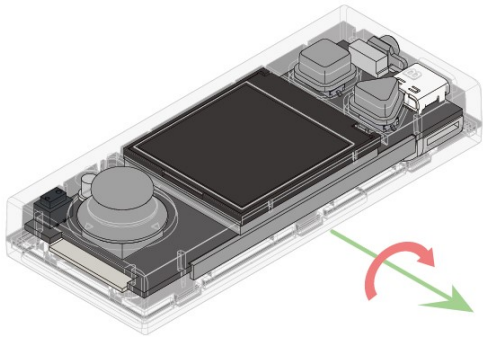


A `bool` value is returned.

Py + MP `cyberpi.is_tiltright()`

Determines whether CyberPi is tilted to the right

The following figure shows the posture of tilting to the right.

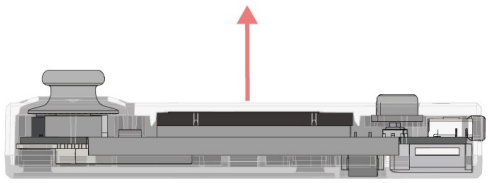


A `bool` value is returned.

Py + MP `cyberpi.is_faceup()`

Determines whether CyberPi faces up

The following figure shows the posture of facing up.

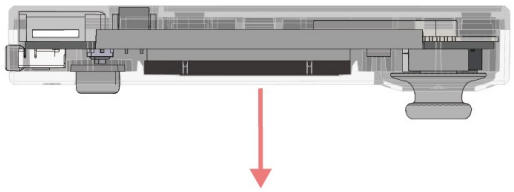


A `bool` value is returned.

`cyberpi.is_facedown()`

Determines whether CyberPi faces down

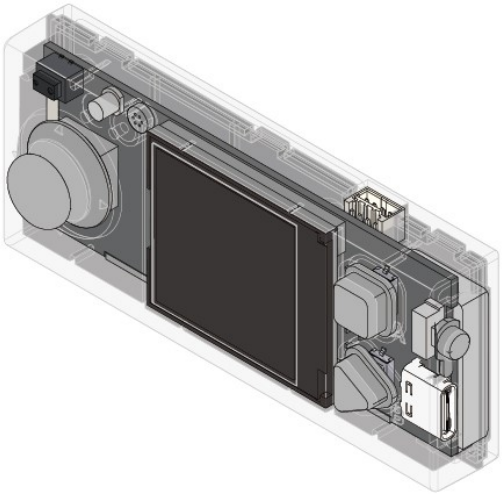
The following figure shows the posture of facing down.



A `bool` value is returned.

`cyberpi.is_stand()`

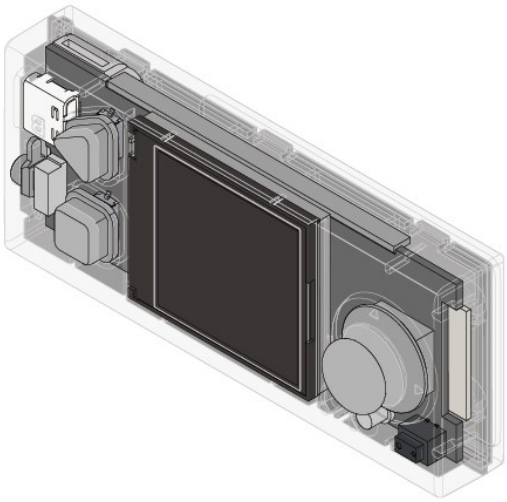
Determines whether CyberPi is placed perpendicular to the ground, with the LED strip on the bottom, as shown in the following figure:



A `bool` value is returned.

`cyberpi.is_handstand()`

Determines whether CyberPi is placed perpendicular to the ground, with the LED strip on the top, as shown in the following figure:



返回 `bool` 。

Continuous motions

Py + MP `cyberpi.is_shake()`

Determines whether CyberPi is shaken

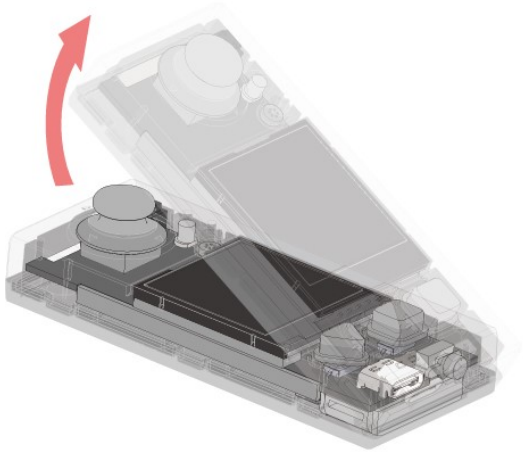
It is determined that CyberPi is shaken when the shaking strength is higher than 20.

A `bool` value is returned.

Py + MP `cyberpi.is_waveup()`

Determine whether CyberPi is waved up

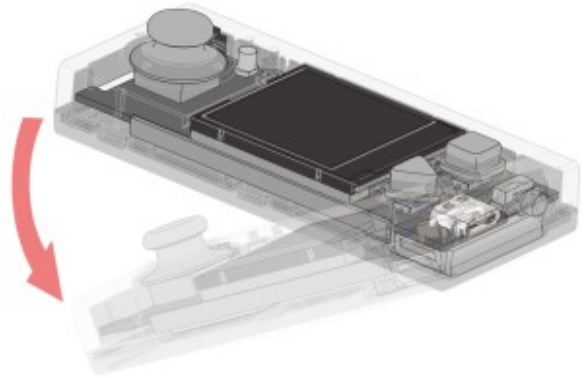
A `bool` value is returned.



Py + MP `cyberpi.is_wavedown()`

Determine whether CyberPi is waved down

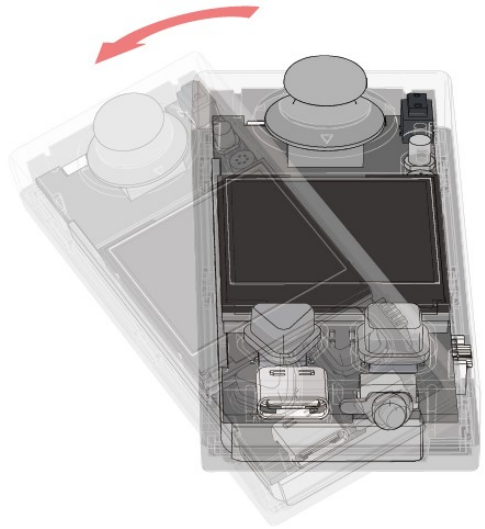
A `bool` value is returned.



Py + MP `cyberpi.is_waveleft()`

Determine whether CyberPi is waved to the left

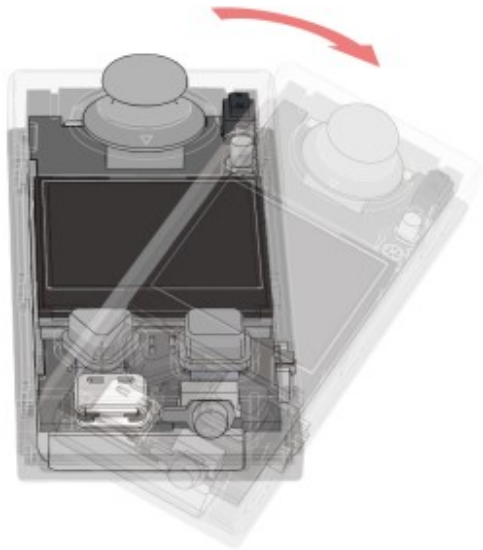
A `bool` value is returned.



Py + MP `cyberpi.is_waveright()`

Determine whether CyberPi is waved to the right

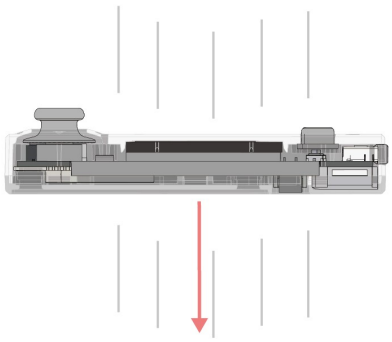
A `bool` value is returned.



Py + MP `cyberpi.is_freefall()`

Determines whether CyberPi is falling down

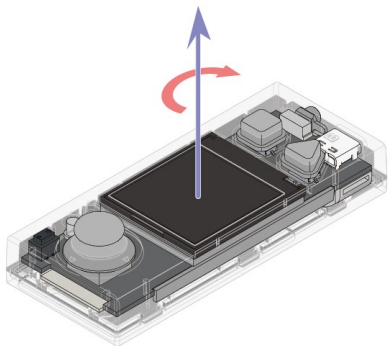
A `bool` value is returned.



Py + MP `cyberpi.is_clockwise()`

Determines whether CyberPi rotates clockwise around the z-axis

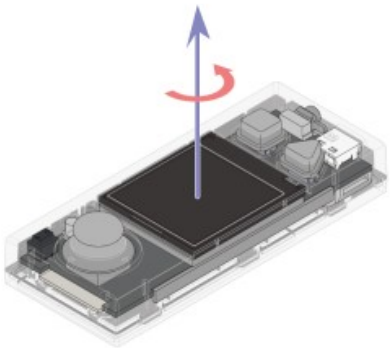
A `bool` value is returned.



Py + MP `cyberpi.is_anticlockwise()`

Determines whether CyberPi rotates counterclockwise around the z-axis

A `bool` value is returned.



Posture and acceleration data

Py + MP `cyberpi.get_shakeval()`

Obtains the shaking strength

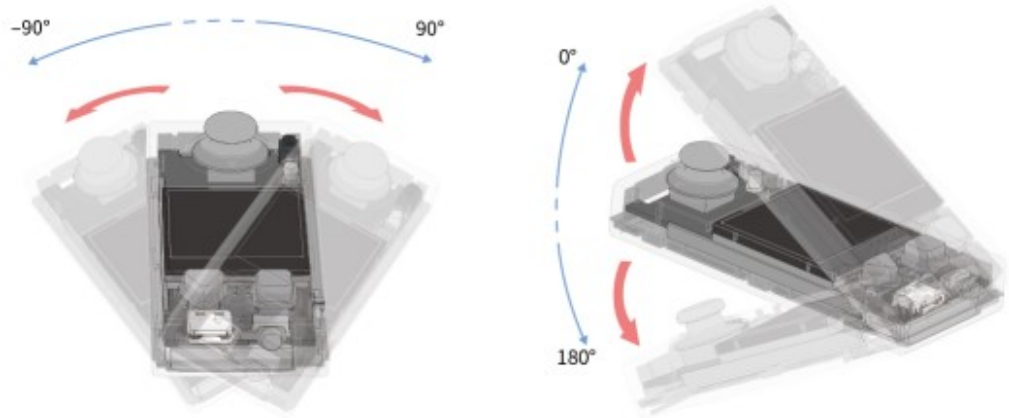
The shaking strength is positively related to the shaking frequency and amplitude.

An `int` value ranging from `0` to `100` is returned. When the value returned is 100, the upper shaking strength limit is reached.

Py + MP `cyberpi.get_wave_angle()`

Obtains the direction in which CyberPi is shaken

An `int` value ranging from `-179` to `180` is returned, in degrees.



Py + MP `cyberpi.get_wave_speed()`

Obtains the speed at which CyberPi is waved

The speed is positively related to but not equal to the actual moving speed of CyberPi.

A large error may be caused in the value obtained due to the integral error.

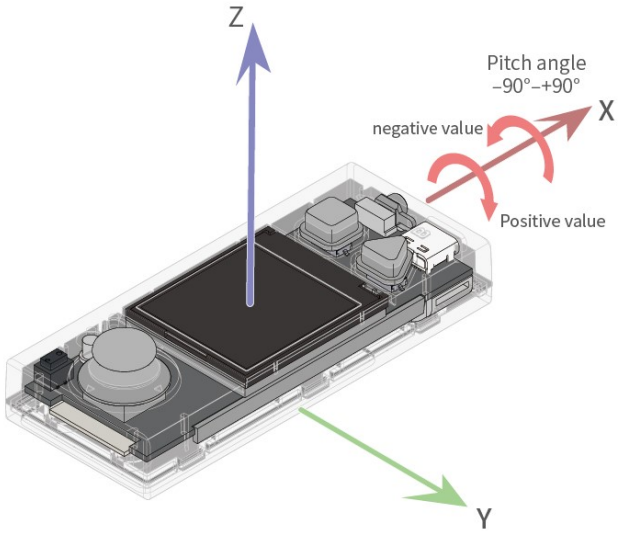
An `int` value ranging from `0` to `100` is returned.

Py + MP `cyberpi.get_pitch()`

Obtains the pitch angle of CyberPi

The pitch angle refers to the angle between the y-axis and horizontal plane.

An `int` value ranging from `-90` to `90` is returned, in degrees.

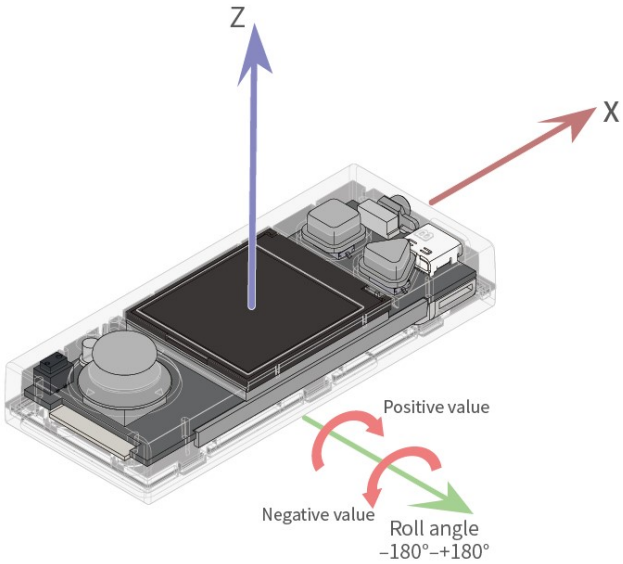


Py + MP `cyberpi.get_roll()`

Obtains the roll angle of CyberPi

The roll angle refers to the angle between the x-axis and horizontal plane.

An `int` value ranging from `-179` to `180` is returned, in degrees.

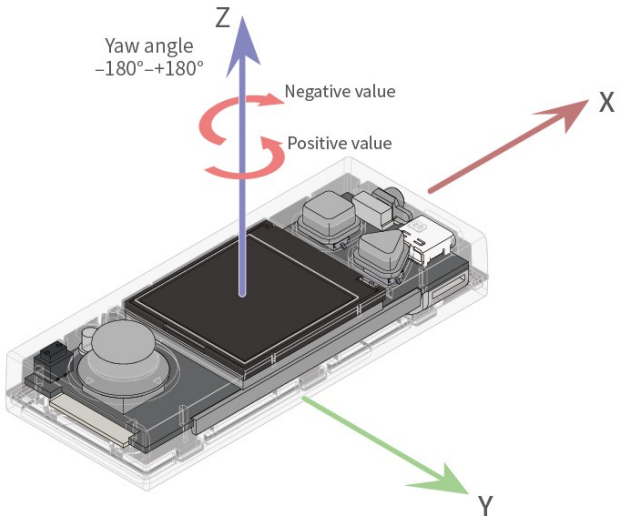


Py + MP `cyberpi.get_yaw()`

Obtains the yaw angle of CyberPi

The yaw angle refers to the angle CyberPi rotates around the z-axis.

An `int` value ranging from `-180` to `180` is returned, in degrees.



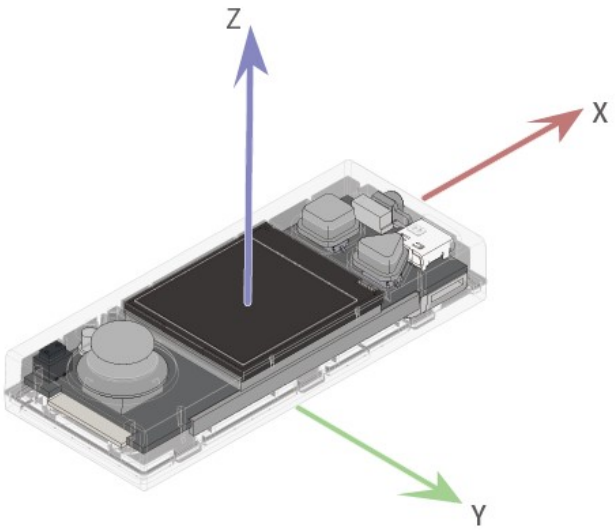
Note: Accumulated errors may be caused in the obtained yaw angle due to the lack of compass. You can use the API `reset_yaw()` to calibrate the yaw angle. No compass is configured in CyberPi, and therefore, `reset_yaw()` is used to reset the yaw angle to 0.

Py + MP `cyberpi.reset_yaw()`

Resets the yaw angle

No compass is configured in CyberPi, and therefore, `reset_yaw()` is used to reset the yaw angle to 0.

Py + MP `cyberpi.get_acc(axis)`



Obtains the output (in m/s^2) of the accelerometer on the specified axis

Parameter:

- *axis:* `str`, axis defined for CyberPi; setting range: `x`, `y`, and `z`

  A `float` value is returned. Note that the accelerometer measures Earth's gravity. When CyberPi is placed on a desk, the output of the accelerometer on the z-axis is $-9.8m/s^2$ ($1g = 9.8m/s^2$).

`cyberpi.get_gyro(axis)`

Obtains the angular speed around the specified axis

Parameter:

- *axis:* `str`, axis defined for CyberPi; setting range: `x`, `y`, and `z`

An `int` value ranging from `-500` to `500` is returned, in degree/seconds (°/s).

`cyberpi.get_rotation(axis)`

Obtains the angle CyberPi rotates around the specified axis, with the counterclockwise direction as the positive direction

Parameter:

- *axis:* `str`, axis defined for CyberPi; setting range: `x`, `y`, and `z`

A value is returned, in degrees.

`cyberpi.reset_rotation(axis= "all")`

Resets the angle (s) CyberPi rotates around the specified axis(axes) to zero

After this API is executed, the value obtained by `get_rotation(axis)` is counted

from zero.

Parameter:

- *axis:* `str`, axis or all the axes defined for CyberPi; setting range: `x`, `y`, `z`, and `all`

Wi-Fi

CyberPi is equipped with a Wi-Fi module. You can use the following APIs to connect CyberPi to the Internet or perform LAN broadcast.

Py + MP `cyberpi.wifi.connect(ssid, password)`

Starts Wi-Fi connection

This API doesn't block the thread, and therefore CyberPi is not necessarily connected to the Internet when this API stops. You need to use `wifi.is_connect()` to determine whether the Wi-Fi connection is complete.

Parameter:

- *ssid:* `str`, Wi-Fi account; set it to an account that can be used
- *password:* `str`, Wi-Fi password; set it to the password of the account you use

Py + MP `cyberpi.wifi.is_connect()`

Detects the Wi-Fi connection status

A `bool` value is returned.

Py + MP `cyberpi.wifi_broadcast.set(message, val)`

Sends a LAN broadcast

For more information, see LAN broadcast.

Py + MP `cyberpi.wifi_broadcast.get(message)`

Receives a LAN broadcast

For more information, see LAN broadcast.

Cloud Services

After connecting CyberPi to the Internet, you can use various cloud services provided by

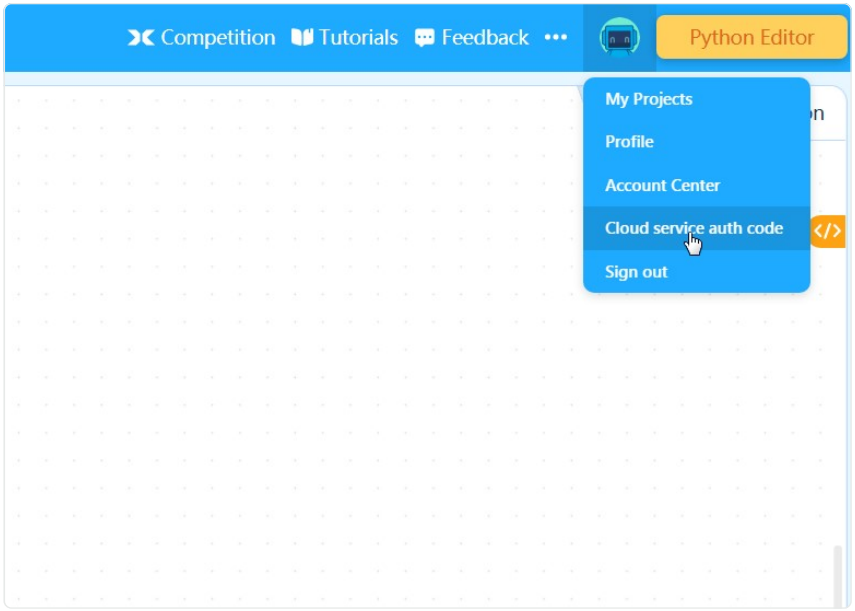
Makeblock to implement the AI and IoT functions of CyberPi.

Py + MP `cyberpi.cloud.setkey(key)`

Use the API `cyberpi.cloud.setkey(key)` to verify your mBlock account, so that you can use the cloud services provided by Makeblock. Note that you can use this API only after you have connected CyberPi to the Internet.

Parameter:

- *key:* `str`, authorization code for cloud services
  Sign in to mBlock 5 on the web or your PC client, and then obtain your cloud service authorization code as follows.



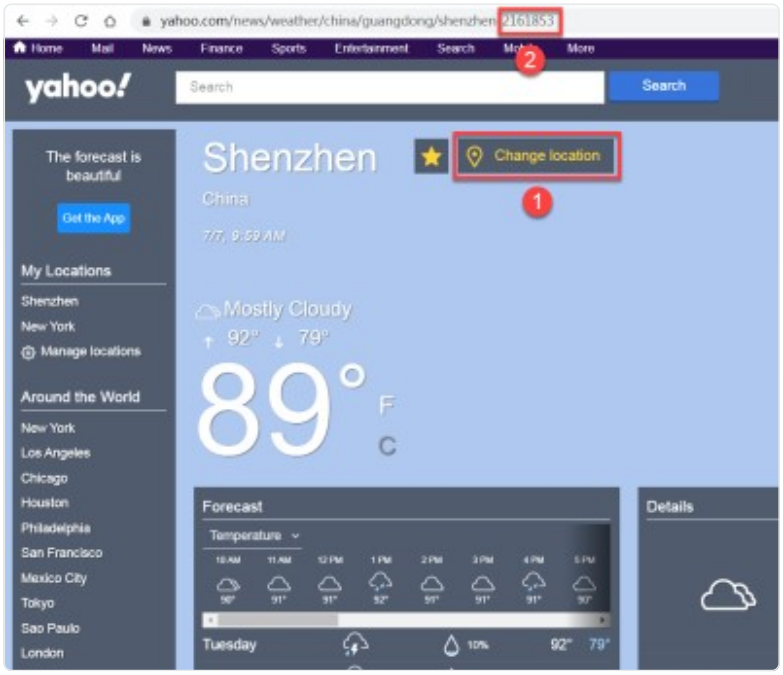
IoT

Py + MP `cyberpi.cloud.weather(option, woe_id)`

Obtains the real-time weather data of the specified location

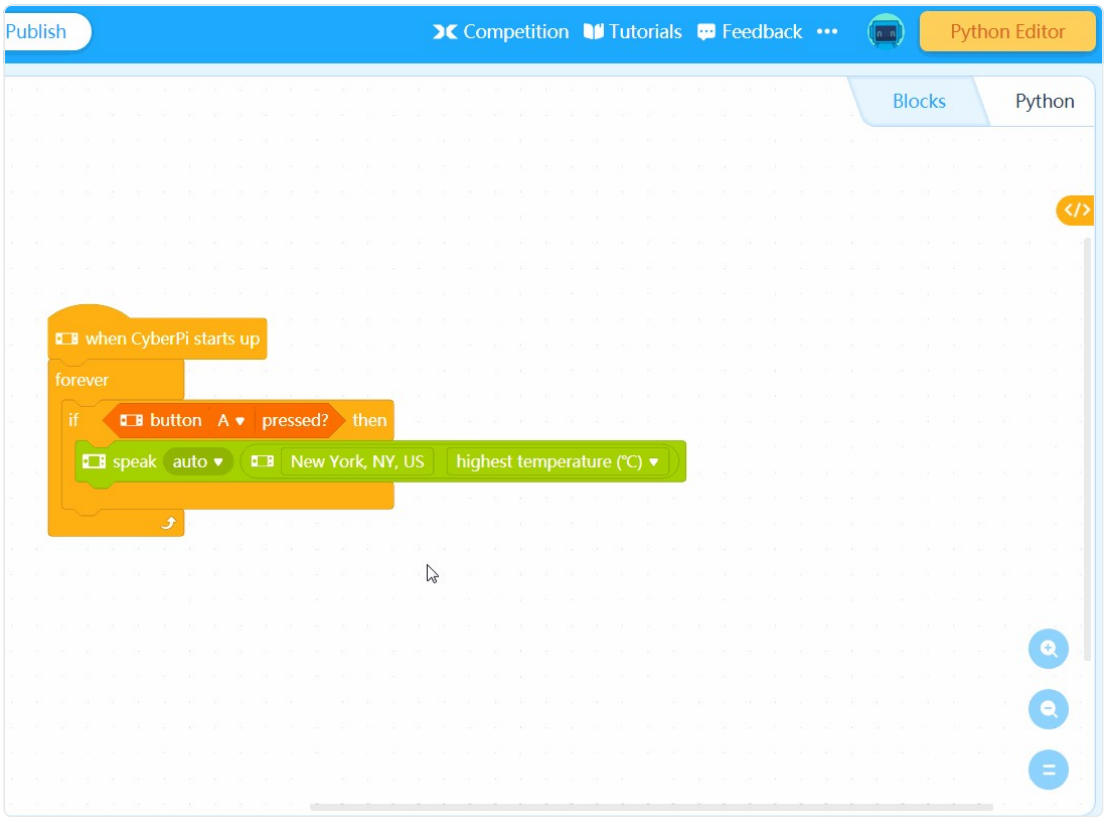
Parameters:

- *option:* `str`, weather data option
  Setting range:
  `max_temp`: highest temperature
  `min_temp`: lowest temperature
  `weather`: temperature
  `humidity`: humidity
- *woe_id:* `str`, code of the city for which weather data is to be obtained
  You can visit Yahoo Weather <https://www.yahoo.com/news/weather> to obtain the codes of cities.



Change the location to the one of which the weather information is to be searched for, and then view the code on the address bar.

Alternatively, you can view the code of a city in the corresponding block on mBlock 5, as shown in the following figure.



A `str` value is returned, providing the weather information.

The returned value may be one of the following:

```
0 tornado
1 tropical storm
2 hurricane
3 severe thunderstorms
4 thunderstorms
5 mixed rain and snow
6 mixed rain and sleet
7 mixed snow and sleet
8 freezing drizzle
9 drizzle
10  freezing rain
11  showers
12  rain
13  snow flurries
14  light snow showers
15  blowing snow
16  snow
17  hail
18  sleet
19  dust
20  foggy
21  haze
22  smoky
23  blustery
24  windy
25  cold
26  cloudy
27  mostly cloudy (night)
28  mostly cloudy (day)
29  partly cloudy (night)
30  partly cloudy (day)
31  clear (night)
32  sunny
33  fair (night)
34  fair (day)
35  mixed rain and hail
36  hot
37  isolated thunderstorms
38  scattered thunderstorms
39  scattered showers (day)
40  heavy rain
41  scattered snow showers (day)
42  heavy snow
43  blizzard
44  not available
45  scattered showers (night)
46  scattered snow showers (night)
47  scattered thundershowers
```

`cyberpi.cloud.air(option, woe_id)`

- *option:* `str` , air quality option

  Setting range

  `aqi` : air quality index

  `pm2.5` : density of PM2.5

  `pm10` : density of PM10

  `co` : density of CO

  `so2` : density of SO_2

  `no2` : density of NO_2
- *woe_id:* `str` , code of the city for which weather data is to be obtained

A `str` value is returned, providing the corresponding air quality information.

`cyberpi.cloud.time(option, location)`

- *option:* `str` , time option

  Setting range:

  `sunrise_time` : sunrise time

  `sunrise_hour` : hour of the sunrise time

  `sunrise_minute` : minute of the sunrise time

  `sunrise_set` : sunset time

  `sunset_hour` : hour of the sunset time

  `sunset_minute` : minute of the sunset time

[To be implemented]

  `hour` : hour of the specified time zone

  `minute` : minute of the specified time zone

  `second` : second of the specified time zone

  `year` : year of the specified time zone

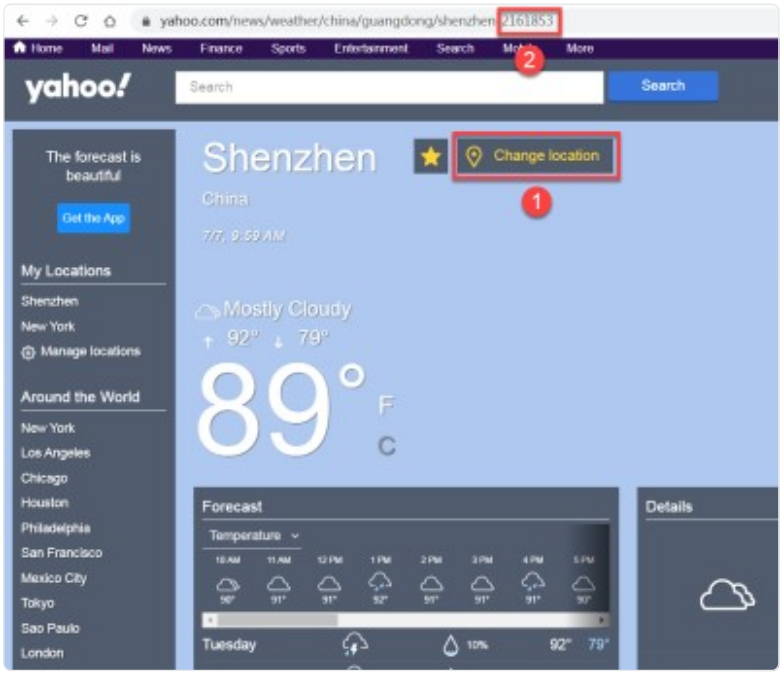
  `month` : month of the specified time zone

  `day` : week day of the specified time zone

  `date` : date of the specified time zone
- *location:* `str` or `int`

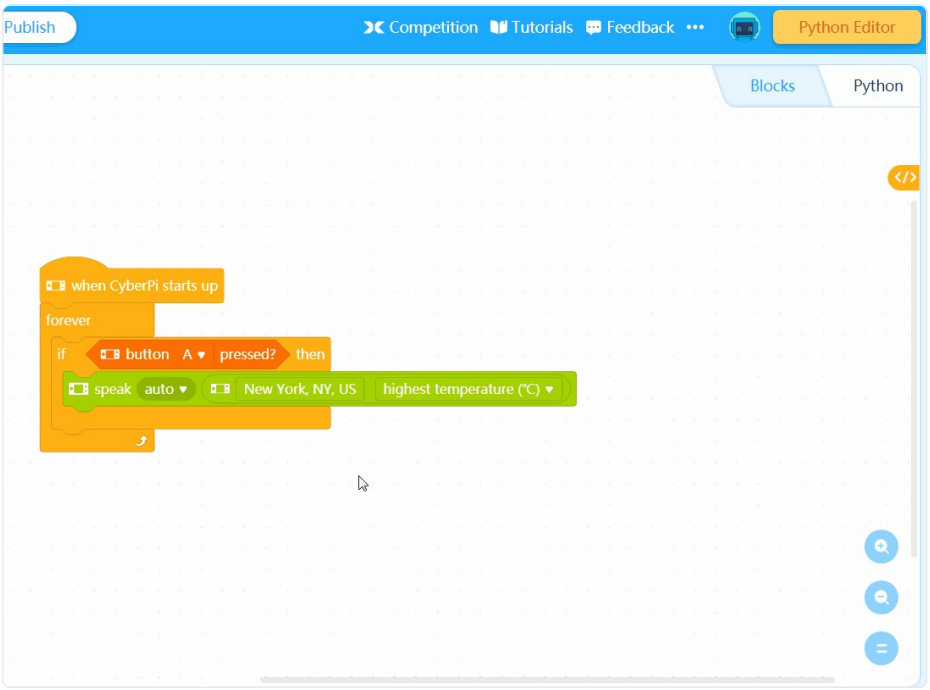
  `str` : code of the city for which weather data is to be obtained

  You can visit Yahoo Weather <https://www.yahoo.com/news/weather> to obtain the codes of cities.



Change the location to the one of which the weather information is to be searched for, and then view the code on the address bar.

Alternatively, you can view the code of a city in the corresponding block on mBlock 5, as shown in the following figure.



[To be implemented] `int` : time zone of which the time information is to be obtained.

Setting range: –12 to +12

A `str` or `int` value is returned, providing the corresponding time information.

AI

CyberPi provides some AI capabilities. After being connected to the Internet, CyberPi can recognize speeches, read texts out loud, and translate some texts through the corresponding AI interfaces.

`cyberpi.cloud.listen(language, t=3)`

Starts to recognize a speech in the specified language

This API blocks the thread until the speech is recognized.

Parameters:

- *language:* `str` , language of the speech to be recognized
  Setting range:
  `"chinese"` : Chinese
  `"chinese_taiwan"` : Taiwan Mandarin
  `"cantonese"` : Cantonese
  `"japanese"` : Japanese
  `"english"` : English
  `"french"` : French
  `"german"` : German
  `"spanish"` : Spanish
  `"portuguese"` : Portuguese
  `"russian"` : Russian
  `"korean"` : Korean
  `"italian"` : Italian
  `"dutch"` : Dutch

- *t:* `float` or `str` ; the default value is 3
  When you set **t** to `int` , it indicates the period for recognizing a speech, in seconds; when you set it to `str` , you can set it only to `record` , indicating that the last recorded audio file is used for speech recognization.

`cyberpi.cloud.listen_result()`

Obtains the last recognized speech

A `str` value is returned.

`cyberpi.cloud.tts(language, message)`

Reads the specified text out loud

Parameters:

- *language:* `str` , language in which the text is to read out loud
  Currently, the **language** parameter can't be set due to the limitation of cloud services. This API automatically recognizes the content of **message** and reads it out loud in Chinese or English. The following languages will be gradually supported:

  `"chinese"` : Chinese
  `"chinese_taiwan"` : Taiwan Mandarin
  `"cantonese"` : Cantonese
  `"japanese"` : Japanese
  `"english"` : English
  `"french"` : French
  `"german"` : German
  `"spanish"` : Spanish
  `"portuguese"` : Portuguese
  `"russian"` : Russian
  `"korean"` : Korean
  `"italian"` : Italian
  `"dutch"` : Dutch
- *message:* `str` , text to be read out loud

`cyberpi.cloud.translate(language, message)`

Translates a text to the specified language

Parameters:

- *language:* `str` , target language of the translation
  Setting range:
  `"chinese"` : Chinese
  `"chinese_taiwan"` : Taiwan Mandarin
  `"cantonese"` : Cantonese
  `"japanese"` : Japanese
  `"english"` : English
  `"french"` : French
  `"german"` : German
  `"spanish"` : Spanish
  `"portuguese"` : Portuguese
  `"russian"` : Russian
  `"korean"` : Korean
  `"italian"` : Italian

`"dutch"` : Dutch

- *message:* `str` , text to be translated

Broadcast

CyberPi supports multiple types of broadcasts. With these broadcasts, CyberPi can implement communication between threads and on LANs and the Internet.

Basic broadcast

`cyberpi.broadcast(message)`

Sends a broadcast message

The message can be received by all threads on CyberPi or by mBlock sprites in **Live** mode.

Parameter:

- *message:* `str` , name of the broadcast message

LAN broadcast

> **Note:**
>
> - All CyberPis on the same LAN must use the same channel for communication.
> - Without router connection, CyberPis use the same default channel and thus can communicate with each other on the LAN; when CyberPi is connected to a router, its channel depends on the setting of the router, which may be different from the default channel, and thus it may fail to communicate with another CyberPi that is not connected to the router.
> - Therefore, to ensure proper communication, if you use a router, connect all CyberPis on the same LAN to the router.

`cyberpi.wifi_broadcast.set(message, val)`

Sends a LAN broadcast message

Parameters:

- *message:* `str` , name of the LAN broadcast message
- *val:* `str` , value transmitted by the LAN broadcast message

`cyberpi.wifi_broadcast.get(message)`

Obtains the value transmitted by a LAN broadcast message

Parameter:

- *message:* `str`, name of the LAN broadcast message.

A `str` value is returned.

Tips: CyberPi may fail to receive a broadcast when you use this API in a program. Some APIs may block the thread when being executed, causing CyberPi to miss a broadcast.
The following program is an example: a CyberPi sends a broadcast when the **time.sleep(1)** code is executed, and the CyberPi supposed to receive the broadcast misses it.

```
import cyberpi
import time

while True:
    cyberpi.led.on(0,0,255,1)
    time.sleep(1)
    cyberpi.wifi_broadcast.get(message)
```

Upload mode broadcast

`cyberpi.upload_broadcast.set(message, val)`

Sends an upload mode broadcast message

When CyberPi is connected to mBlock 5 through Bluetooth or a USB cable, upload mode broadcast messages are received by mBlock 5 sprites. This API is preferable for projects in which real-time interaction between mBlock 5 sprites and hardware devices is required.

Parameters:

- *message:* `str`, name of the upload mode broadcast message
- *val:* `str`, value transmitted by the upload mode broadcast message

`cyberpi.upload_broadcast.get(message)`

Obtains the value transmitted by the specified upload mode broadcast message

Parameter

- *message:* `str` , name of the upload mode broadcast message

A `str` value is returned.

> **Tips:** CyberPi may fail to receive a broadcast when you use this API in a program. Some APIs may block the thread when being executed, causing CyberPi to miss a broadcast.
> The following program is an example: a CyberPi sends a broadcast when the **time.sleep(1)** code is executed, and the CyberPi supposed to receive the broadcast misses it.

```
import cyberpi
import time

while True:
    cyberpi.led.on(0,0,255,1)
    time.sleep(1)
    cyberpi.upload_broadcast.get(message)
```

User cloud broadcast

Py + MP `cyberpi.cloud_broadcast.set(message, val)`

Sends a user cloud broadcast message

To use this API, you need to use `wifi.is_connect()` and `cloud.setkey(key)` to obtain the permission to use the cloud services provided by Makeblock for your CyberPi.

User cloud messages can be used to share data across devices and projects. For example, after signing in to mBlock 5 on multiple PCs, you can send a user cloud broadcast message on one PC to all the other online hardware devices and mBlock 5 sprites on the other PCs.

With this API, you can easily access and control your hardware devices through the Internet. In addition, you can use mBlock 5 or mBlock-Python Editor to design visual interaction UIs.

Parameters:

- *message:* `str` , name of the user cloud broadcast message
- *val:* `str` , value transmitted by the user cloud broadcast message

Py + MP `cyberpi.cloud_broadcast.get(message)`

Obtains the value transmitted by the specified user cloud broadcast message

Parameter:

- *message:* `str` , name of the user cloud broadcast message

A `str` value is returned.

Tips: CyberPi may fail to receive a broadcast when you use this API in a program. Some APIs may block the thread when being executed, causing CyberPi to miss a broadcast.
The following program is an example: a CyberPi sends a broadcast when the **time.sleep(1)** code is executed, and the CyberPi supposed to receive the broadcast misses it.

```
import cyberpi
import time

while True:
    cyberpi.led.on(0,0,255,1)
    time.sleep(1)
    cyberpi.cloud_broadcast.get(message)
```

Script control

MP `cyberpi.stop_all()`

Stops all the scripts

MP `cyberpi.stop_this()`

Stops the current script

MP `cyberpi.stop_other()`

Stops all the scripts except the current one

MP `cyberpi.restart()`

Restarts CyberPi

Events

CyberPi supports the execution of multiple threads. You can add a thread for CyberPi by adding the corresponding event header, and the thread listens to the specified event. When the event happens, the subsequent code in the thread is executed.

> **Note:** The Events APIs can't be used in Python3 programming. You need to use the threading mechanism provided by Python3 to compile multi-thread code.

Event compiling

Event headers are compiled by using decorators, as shown in the following example:

```
import cyberpi

@cyberpi.event.start # Event to be listened to
def callback():
    cyberpi.led.on("green") # Code to be executed after the event happer

@cyberpi.event.received('hello') # Event (with a parameter) to be liste
def callback():
    cyberpi.led.on("blue") # Code to be executed after the event happens
```

In this coding way, when the event defined in the event header happens, the subsequent code is executed. In the preceding example, the function name `callback()` is used. As a matter of fact, however, any function name that meets the naming convention can be used. In addition, it's OK to use function names repeatedly because functions are defined after events.

As you can see in the preceding example, the function `callback()` is executed when you start CyberPi and the other function `callback()` is executed when CyberPi receives the broadcast message "hello." No conflict occurs because they are defined after different events.

Event determination mechanism

An event header is triggered only when the event listened to happens. For example, if the event "button *x* pressed" is listened to, the event header is triggered and the subsequent code is executed only when the state of button *x* is changing from "unpressed" to "pressed". If button *x* keeps in the pressed state, the subsequent code is not executed.

Event header APIs for CyberPi

MP `cyberpi.event.start`

Listens to the start of CyberPi and executes the subsequent code when CyberPi starts

MP `cyberpi.event.is_press(name)`

Listens to the state of the specified button or joystick moving direction and executes the subsequent code when the specified button is pressed or the joystick is moved to the specified direction

Parameter:

- *name:* `str` , name of the button or joystick direction

  Setting range:

  `a` : button A (in the square shape)

  `b` : button B (in the rectangle shape)

  `up` : joystick moved up

  `down` : joystick moved down

  `left` : joystick moved to the left

  `right` : joystick moved to the right

  `middle` : joystick pressed in the center

  `any_direction` : joystick moved in any one direction

  `any_button` : button A or B

  `any` : any button or joystick moving direction

MP `cyberpi.event.is_tiltforward`

Listens to the posture of CyberPi and executes the subsequent code when CyberPi tilts forward

MP `cyberpi.event.is_tiltback`

Listens to the posture of CyberPi and executes the subsequent code when CyberPi tilts backward

MP `cyberpi.event.is_tiltleft`

Listens to the posture of CyberPi and executes the subsequent code when CyberPi tilts to the left

MP `cyberpi.event.is_tiltright`

Listens to the posture of CyberPi and executes the subsequent code when CyberPi tilts to the right

MP `cyberpi.event.is_faceup`

Listens to the posture of CyberPi and executes the subsequent code when CyberPi's screen faces up

MP `cyberpi.event.is_facedown`

Listens to the posture of CyberPi and executes the subsequent code when CyberPi's screen faces down

MP `cyberpi.event.is_shake`

Listens to the motion of CyberPi and executes the subsequent code when CyberPi is shaken

MP `cyberpi.event.is_waveup`

Listens to the motion of CyberPi and executes the subsequent code when CyberPi is waved up

MP `cyberpi.event.is_wavedown`

Listens to the motion of CyberPi and executes the subsequent code when CyberPi is waved down

`cyberpi.event.is_waveleft`

Listens to the motion of CyberPi and executes the subsequent code when CyberPi is waved to the left

`cyberpi.event.is_waveright`

Listens to the motion of CyberPi and executes the subsequent code when CyberPi is waved to the right

`cyberpi.event.is_freefall`

Listens to the motion of CyberPi and executes the subsequent code when CyberPi falls down

`cyberpi.event.is_clockwise`

Listens to the motion of CyberPi and executes the subsequent code when CyberPi rotates clockwise around the z-axis

`cyberpi.event.is_anticlockwise`

Listens to the motion of CyberPi and executes the subsequent code when CyberPi rotates counterclockwise around the z-axis

`cyberpi.event.greater_than(threshold, type)`

Listens to the comparison result and executes the subsequent code when the value is greater than the threshold

Parameters:

- *threshold:* `int` , threshold; setting range: `0-100`
- *type:* `str` , type of the data source
  Setting range:
  `microphone` : microphone
  `light_sensor` : light sensor
  `shake_val` : shaking strength

`timer` : timer

`cyberpi.event.smaller_than(threshold, type)`

Listens to the comparison result and executes the subsequent code when the value is smaller than the threshold

Parameters:

- *threshold:* `int` , threshold; setting range: `0-100`
- *type:* `str` , type of the data source
  Setting range:
  `microphone` : microphone
  `light_sensor` : light sensor
  `shake_val` : shaking strength
  `timer` : timer

`cyberpi.event.receive(message)`

Listens to the specified broadcast message and executes the subsequent code when the broadcast message is received

Parameter

- *message:* `str` , name of the broadcast message listened to

`cyberpi.event.upload_broadcast(message)`

Listens to the specified upload mode broadcast message and executes the subsequent code when the upload mode broadcast message is received

Parameter:

- *message:* `str` , name of the upload mode broadcast message listened to

`cyberpi.event.cloud_broadcast(message)`

Listens to the specified user cloud broadcast message and executes the subsequent code when the user cloud broadcast message is received

Parameter:

- *message:* `str` , name of the user cloud broadcast message listened to

MP `cyberpi.event.wifi_broadcast(message)`

Listens to the specified LAN broadcast message and executes the subsequent code when the LANbroadcast message is received

Parameter:

- *message:* `str` , name of the LAN broadcast message listened to

Change history

Date	Description
2020/07/08	Initial draft
2020/08/25	Added the description of the **Sprites** and **Doodle** APIs Added the API `cyberpi.piechart.add(data)` , `cyberpi.ge` `cyberpi.is_stand()` , `cyberpi.is_handstand()` , `cyber` `tand` , and `cyberpi.event.is_handstand`
2020/09/29	Modified the APIs `cyberpi.cloud.listen(language,t=3)` , `cyberpi.cloud.tts(language, message)` , and `cyberpi.` `te(language, message)` Added the "APIs for mBot2 Shield" and "APIs for mBuild module
2020/11/12	Separated the APIs for function extension, extension boards, and modules from this page and created new pages for them. Curren describes only the APIs for CyberPi.
2021/02/25	Added a note for "LAN broadcast."
2021/6/25	Added the labels for indicating whether the APIs support Python programming, MicroPython programming, or both

<https://service.weibo.com/share/share.php?url=https%3A%2F%2Fwww.yuque.com%2Fmakeblo
pic=https%3A%2F%2Fcdn.nlark.com%2Fyuque%2F0%2F2020%2Fpng%2F757912%2
e27c18c11826.png&title=Python%20API%
%20Welcome%20to%20use%20CyberPi%20for%20Python%20learning!CyberPi%20provides%20abun
%2C%20allowing%20you%20to%20interact%20v