M5Stack Web IDE

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Contents

Getting Started

1. Burn firmware

Download firmware

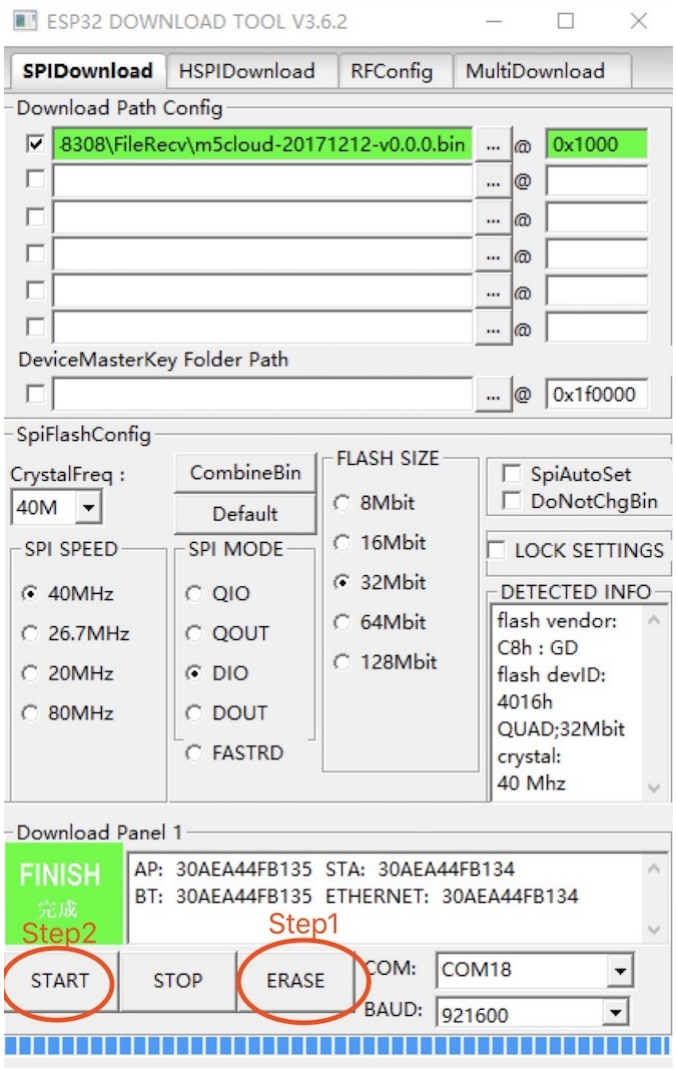
https://github.com/m5stack/M5Cloud/tree/master/firmwares

MacOS/Linux

- Installing esptool：

`pip install esptool` - Erase flash: `esptool.py --chip esp32 --port /dev/tty.SLAB_USBtoUART erase_flash` - Flash: `esptool.py --chip esp32 --port /dev/tty.SLAB_USBtoUART write_flash --flash_mode dio -z 0x1000 firmware.bin`

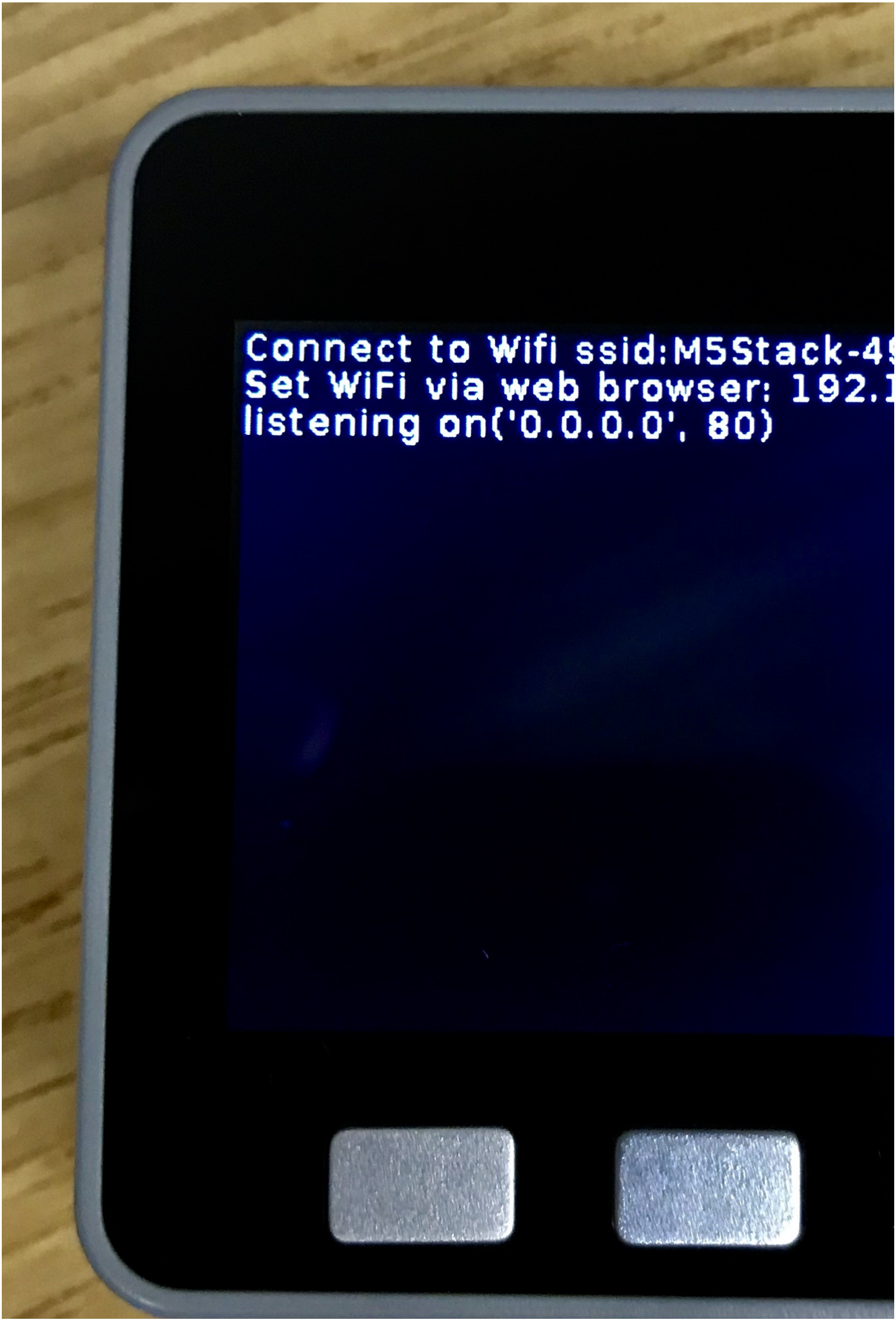
Windows



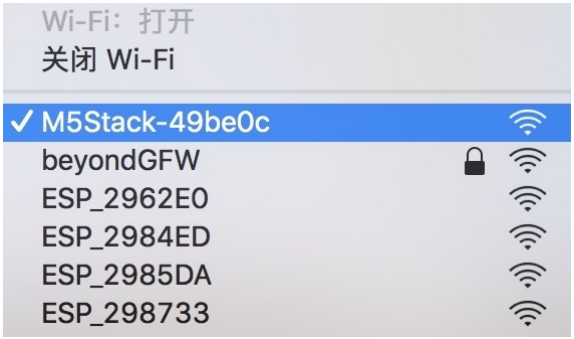
Windows can use Espressif Flash Download Tools(Download) (Erase first)：

2. Configure the WiFi

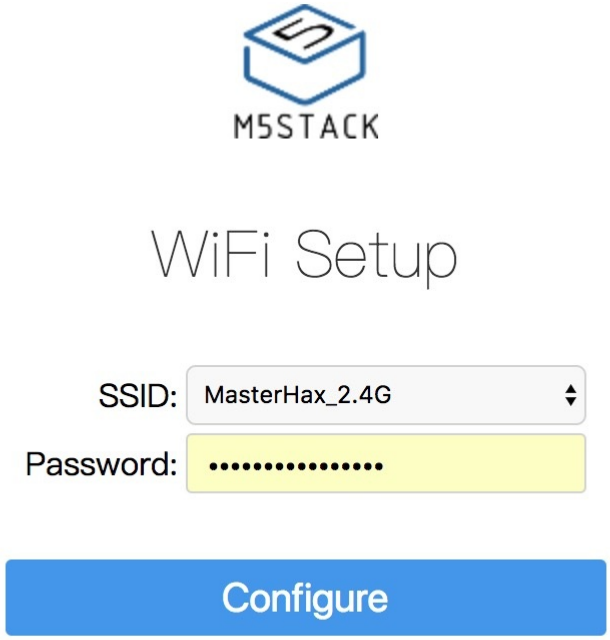
- Connecting M5Stack AP:


Connect to Wifi ssid:M5Stack-4
Set WiFi via web browser: 192.1
listening on('0.0.0.0', 80)

Connect the WiFi：

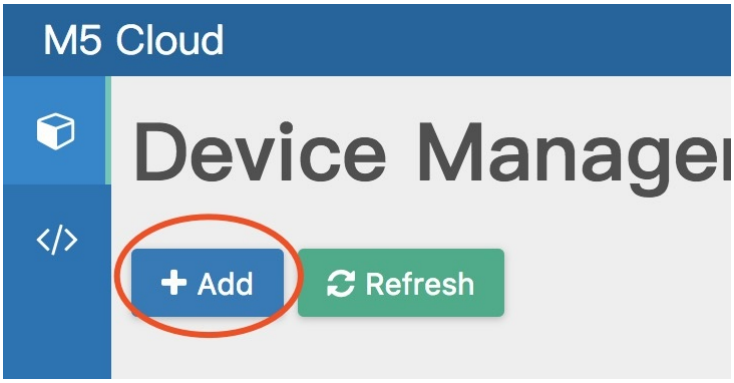


- Use Mobile Phone or PC browser login 192.168.4.1 setting the SSID and Password.



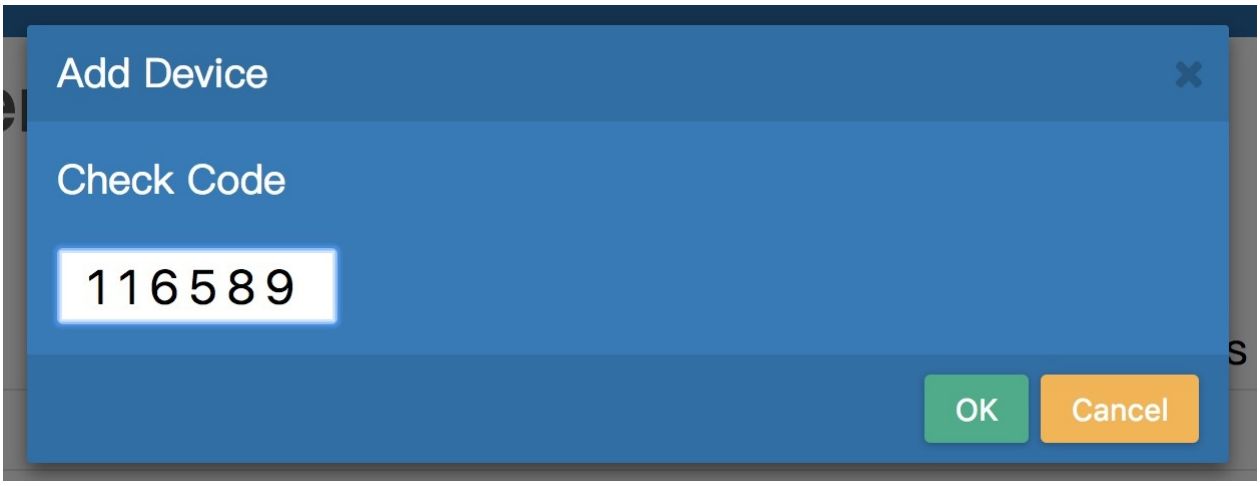
3. Binding device

Login: http://io.m5stack.com register account and add the device：

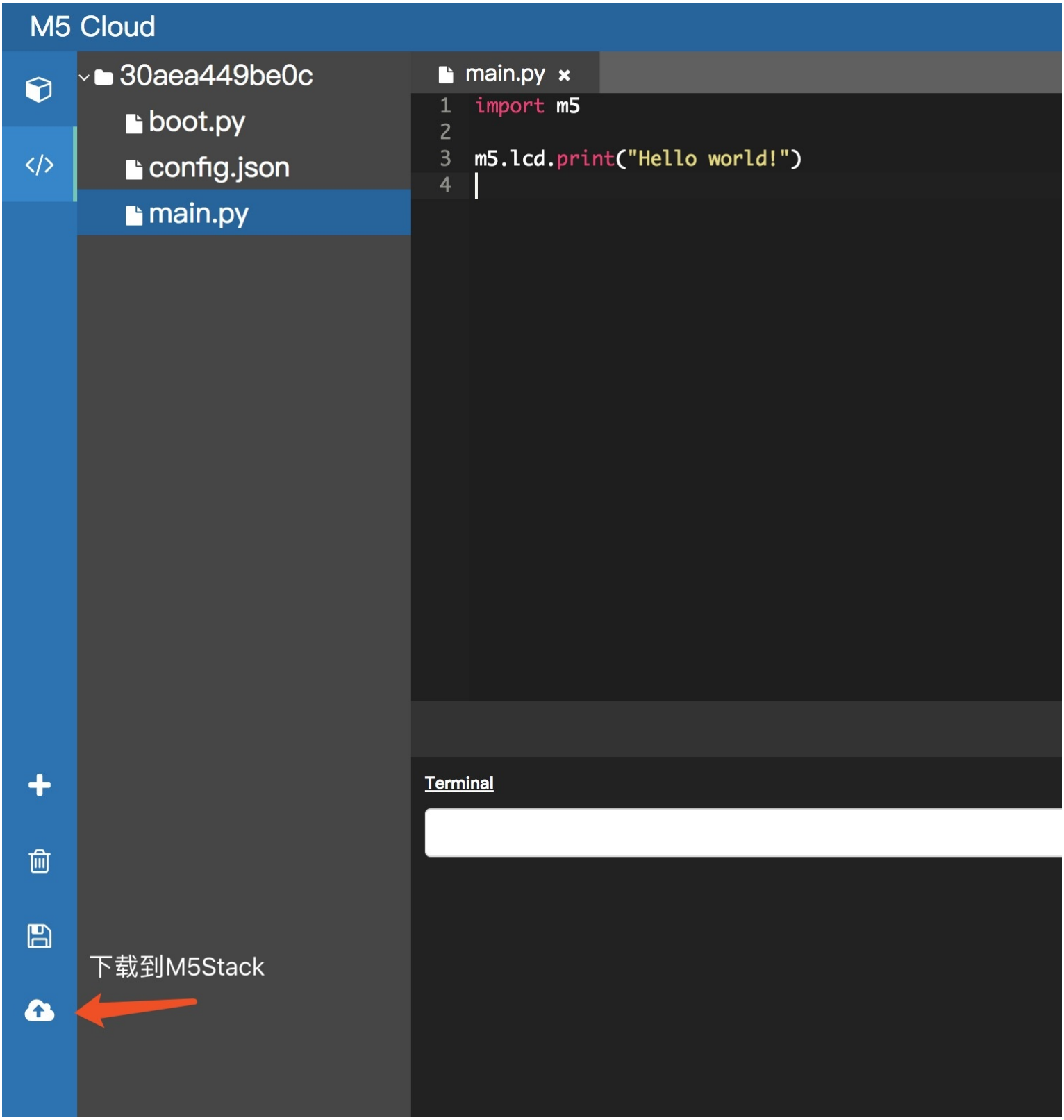


Input the Check Code for the M5Stack screen display， Check Code is random,after 60s will refresh.


Check Code:116589
add device at http://io.m5stack.com
M5Cloud MicroPython v0.2.5
IP:10.0.1.175, ID:30aea449c21c


Add Device
Check Code
116589
OK
Cancel

4. Coding



MicroPython API

Micropython Getting Started

LCD

Import M5Stack:

```
from m5stack import lcd
lcd.print('hello world!')
```

Colors

Color value are given as 24 bit integer numbers, 8-bit per color.

For example: **0xFF0000** represents the RED color. Only upper 6 bits of the color component value is used.

The following color constants are defined and can be used as color arguments:

BLACK, NAVY, DARKGREEN, DARKCYAN, MAROON, PURPLE, OLIVE, LIGHTGREY, DARKGREY, BLUE, GREEN, CYAN, RED, MAGENTA, YELLOW, WHITE, ORANGE, GREENYELLOW, PINK

Drawing

All **drawings** coordinates are **relative** to the **display window**.

Initialy, the display window is set to full screen, and there are methods to set the window to the part of the full screen.

Fonts

9 bit-mapped fornts and one vector 7-segment font are included. Unlimited number of fonts from file can also be used.

The following font constants are defined and can be used as font arguments:

FONT_Default, FONT_DefaultSmall, FONT_DejaVu18, FONT_Dejavu24, FONT_Ubuntu, FONT_Comic, FONT_Minya, FONT_Tooney, FONT_Small, FONT_7seg

---

Methods

lcd.pixel(x, y [,color])

Draw the pixel at position (x,y).
If *color* is not given, current foreground color is used.

lcd.readPixel(x, y)

Get the pixel color value at position (x,y).

lcd.line(x, y, x1, y1 [,color])

Draw the line from point (x,y) to point (x1,y1)
If *color* is not given, current foreground color is used.

lcd.lineByAngle(x, y, start, length, angle [,color])

Draw the line from point (x,y) with length *lenght* starting st distance *start* from center.
If *color* is not given, current foreground color is used.
The angle is given in degrees (0~359).

lcd.triangle(x, y, x1, y1, x2, y2 [,color, fillcolor])

Draw the triangel between points (x,y), (x1,y1) and (x2,y2).
If *color* is not given, current foreground color is used.
If *fillcolor* is given, filled triangle will be drawn.

lcd.circle(x, y, r [,color, fillcolor])

Draw the circle with center at (x,y) and radius r.
If *color* is not given, current foreground color is used.
If *fillcolor* is given, filled circle will be drawn.

lcd.ellipse(x, y, rx, ry [opt, color, fillcolor])

Draw the circle with center at (x,y) and radius r.
If *color* is not given, current foreground color is used.
**opt* argument defines the ellipse segment to be drawn, default id 15, all ellipse segments.

Multiple segments can drawn, combine (logical or) the values. *1 - upper left segment* 2 - upper right segment *4 - lower left segment* 8 - lower right segment

If *fillcolor* is given, filled elipse will be drawn.

lcd.arc(x, y, r, thick, start, end [color, fillcolor])

Draw the arc with center at (x,y) and radius *r*, starting at angle *start* and ending at angle *end*
The thicknes of the arc outline is set by the *thick* argument
If *fillcolor* is given, filled arc will be drawn.

lcd.poly(x, y, r, sides, thick, [color, fillcolor, rotate])

Draw the polygon with center at (x,y) and radius *r*, with number of sides *sides*
The thicknes of the polygon outline is set by the *thick* argument
If *fillcolor* is given, filled polygon will be drawn.
If *rotate* is given, the polygon is rotated by the given angle (0~359)

lcd.rect(x, y, width, height, [color, fillcolor])

Draw the rectangle from the upper left point at (x,y) and width *width* and height *height*
If *fillcolor* is given, filled rectangle will be drawn.

lcd.roundrect(x, y, width, height, r [color, fillcolor])

Draw the rectangle with rounded corners from the upper left point at **(x,y)** and width **width** and height **height**
Corner radius is given by **r** argument.
If **fillcolor** is given, filled rectangle will be drawn.

lcd.clear([color])

Clear the screen with default background color or specific color if given.

lcd.clearWin([color])

Clear the current display window with default background color or specific color if given.

lcd.orient(orient)

Set the display orientation.
Use one of predifined constants:
lcd.PORTRAIT, **lcd.LANDSCAPE**, **lcd.PORTRAIT_FLIP**, **lcd.LANDSCAPE_FLIP**

lcd.font(font [,rotate, transparent, fixedwidth, dist, width, outline, color])

Set the active font and its characteristics.

Argument	Description
font	required, use font name constant or font file name
rotate	optional, set font rotation angle (0~360)
transparent	only draw font's foreground pixels
fixedwidth	draw proportional font with fixed character width, max character width from the font is used
dist	only for 7-seg font, the distance between bars
width	only for 7-seg font, the width of the bar
outline	only for 7-seg font, draw the outline
color	font color, if not given the current foreground color is used

lcd.attrib7seg(dist, width, outline, color)

Set characteristics of the 7-segment font

Argument	Description
dist	the distance between bars
width	the width of the bar
outline	outline color
color	fill color

lcd.fontSize()

Return width and height of the active font

lcd.print(text[,x, y, color, rotate, transparent, fixedwidth, wrap])

Display the string *text* at possition (x,y).
If *color* is not given, current foreground color is used.

- **x**: horizontal position of the upper left point in pixels, special values can be given:
- CENTER, centers the text
- RIGHT, right justifies the text
- LASTX, continues from last X position; offset can be used: LASTX+n
- **y**: vertical position of the upper left point in pixels, special values can be given:
- CENTER, centers the text
- BOTTOM, bottom justifies the text
- LASTY, continues from last Y position; offset can be used: LASTY+n
- **text**: string to be displayed. Two special characters are allowed in strings:
- '\r' CR (0x0D), clears the display to EOL
- '\n' LF (ox0A), continues to the new line, x=0

lcd.text(x, y, text [, color])

Display the string *text* at possition (x,y).
If *color* is not given, current foreground color is used.

- **x**: horizontal position of the upper left point in pixels, special values can be given:
- CENTER, centers the text
- RIGHT, right justifies the text
- LASTX, continues from last X position; offset can be used: LASTX+n
- **y**: vertical position of the upper left point in pixels, special values can be given:
- CENTER, centers the text
- BOTTOM, bottom justifies the text
- LASTY, continues from last Y position; offset can be used: LASTY+n
- **text**: string to be displayed. Two special characters are allowed in strings:
- '\r' CR (0x0D), clears the display to EOL
- '\n' LF (ox0A), continues to the new line, x=0

lcd.textWidth(text)

Return the width of the string *text* using the active font fontSize

lcd.textClear(x, y, text [, color])

Clear the the screen area used by string *text* at possition (x,y) using the bacckground color *color*.
If *color* is not given, current background color is used.

lcd.image(x, y, file [,scale, type])

Display the image from the file *file* on position (x,y) ***JPG*** *and* ***BMP*** *can be displayed.* Constants **lcd.CENTER**, **lcd.BOTTOM**, **lcd.RIGHT** can be used for x&y * **x** and **y** values can be negative

scale (jpg): image scale factor: 0 to 3; if scale>0, image is scaled by factor 1/(2^scale) (1/2, 1/4 or 1/8)
scale (bmp): image scale factor: 0 to 7; if scale>0, image is scaled by factor 1/(scale+1)
type: optional, set the image type, constants *lcd.JPG* or *lcd.BMP* can be used. If not set, file extension and/or file content will be used to determine the image type.

lcd.setwin(x, y, x1, y1)

Set active display window to screen rectangle (x,y) - (x1,y1)

lcd.resetwin()

Reset active display window to full screen size.

lcd.savewin()

Save active display window dimensions.

lcd.restorewin()

Restore active display window dimensions previously saved wint savewin().

lcd.screensize()

Return the display size, (width, height)

lcd.winsize()

Return the active display window size, (width, height)

lcd.hsb2rgb(hue, saturation, brightness)

Converts the components of a color, as specified by the HSB model, to an equivalent set of values for the default RGB model.
Returns 24-bit integer value suitable to be used as color argiment

Arguments ***hue****: float: any number, the floor of this number is subtracted from it to create a fraction between 0 and 1. This fractional number is then multiplied by 360 to produce the hue angle in the HSB color model.* **saturation**: float; 0 ~ 1.0 * **brightness**: float; 0 ~ 1.0

lcd.compileFont(file_name [,debug])

Compile the source font file (must have **.c** extension) to the binary font file (same name, **.fon** extension) which can be used as external font.
If *debug=True* the information about compiled font will be printed.

You can create the **c** source file from any **tft** font using the included ttf2c_vc2003.exe program. See README for instructions.

Button

Method

```
buttonA.isPressed()
buttonA.isReleased()
buttonA.pressedFor(timeout)
```

```
# if set the callback param, it will interrupt callback function
# or if not set param it will return result at once
buttonA.wasPressed(callback=None)
buttonA.wasReleased(callback=None)
buttonA.releasedFor(timeout, callback=None)
```

Example

Loop:

```
from m5stack import *
import utime

while True:
  if buttonA.wasPressed():
    lcd.print('Button A was Pressed\n')

  if buttonA.wasReleased():
    lcd.print('Button A was Released\n')

  if buttonA.pressedFor(1.5):
    lcd.print('Button A pressed for 1.5s\n')

  if buttonA.releasedFor(2):
    lcd.print('Button A released for 2s press hold\n')

  utime.sleep(0.1)
```

Callback :

```
from m5stack import *

def on_wasPressed():
  lcd.print('Button B was Pressed\n')

def on_wasReleased():
  lcd.print('Button B was Released\n')

def on_releasedFor():
  lcd.print('Button B released for 1.2s press hold\n')

buttonB.wasPressed(on_wasPressed)
buttonB.wasReleased(on_wasReleased)
buttonB.releasedFor(1.2, on_releasedFor)
```

SD Card

```
import uos

uos.mountsd()
uos.listdir('/sd')
```

Speaker

```
from m5stack import *

speaker.volume(2)
speaker.tone(freq=1800)
speaker.tone(freq=1800, duration=200) # Non-blocking
```

GPIO

```
import machine

pinout = machine.Pin(0, machine.Pin.OUT)
pinout.value(1)

pinin = machine.Pin(2, machine.Pin.IN)
val = pinin.value()
```

PWM

```
pwm = machine.PWM(pin [, freq=f] [, duty=d] [, timer=tm]) pwm.init([ freq=f] [, duty=d] [, timer=tm])
```

Arg	Description
pin	esp32 GPIO number to be used as pwm output can be given as integer value or machine.Pin object
freq	**optional**, default 5 kHz; pwm frequeny in Hz (1 - 40000000)
duty	**optional**, default 50% kHz; pwm duty cycle in % (0 - 100)
timer	**optional**, default **0**; pwm timer (0 - 3)

PWM channel is selected automatically from 8 available pwm channels.

```
import machine
pwm = machine.PWM(26)
pwm.freq(5000)
pwm.duty(66) # 0.0 ~ 100.0
```

ADC

```
import machine

adc = machine.ADC(35)
adc.read()
```

DAC

```
import machine

dac = machine.DAC(machine.Pin(26))
dac.write(128)
```

I2C

```
from machine import I2C

i2c = I2C(freq=400000, sda=21, scl=22)
                              # create I2C peripheral at frequency of 400kHz
                              # depending on the port, extra parameters may be required
                              # to select the peripheral and/or pins to use

i2c.scan()                    # scan for slaves, returning a list of 7-bit addresses
```

```
i2c.writeto(42, b'123')        # write 3 bytes to slave with 7-bit address 42
i2c.readfrom(42, 4)            # read 4 bytes from slave with 7-bit address 42

i2c.readfrom_mem(42, 8, 3)     # read 3 bytes from memory of slave 42,
                               #   starting at memory-address 8 in the slave
i2c.writeto_mem(42, 2, b'\x10') # write 1 byte to memory of slave 42
                               #   starting at address 2 in the slave
```

SPI

```
from machine import SPI, Pin

spi = SPI(
    spihost=SPI.HSPI,
    baudrate=2600000
    sck=Pin(18),
    mosi=Pin(23),
    miso=Pin(19),
    cs=Pin(4)
)

spi.write(buf) #NOHEAP
spi.read(nbytes, *, write=0x00) #write is the byte to ?output on MOSI for each byte read in
spi.readinto(buf, *, write=0x00) #NOHEAP
spi.write_readinto(write_buf, read_buf) #NOHEAP; write_buf and read_buf can be the same
```

UART

```
from machine import UART

uart2 = UART(2, tx=17, rx=16)
uart2.init(115200, bits=8, parity=None, stop=1)
uart2.read(10)       # read 10 characters, returns a bytes object
uart2.read()         # read all available characters
uart2.readline()     # read a line
uart2.readinto(buf)  # read and store into the given buffer
uart2.write('abc')   # write the 3 characters
```

Timer

tm = machine.Timer(timer_no)

timer_no argument is the timer number to be used for the timer. It can be 0 - 3 for 4 hardware timers or 4 - 11 for extended timers. If extended timer is selected, timer 0 must already be configured in EXTBASE mode.

```
import machine

tcounter = 0

p1 = machine.Pin(27)
p1.init(p1.OUT)
p1.value(1)

def tcb(timer):
    global tcounter
    if tcounter & 1:
        p1.value(0)
    else:
        p1.value(1)
    tcounter += 1
    if (tcounter % 10000) == 0:
        print("[tcb] timer: {} counter: {}".format(timer.timernum(), tcounter))

t1 = machine.Timer(2)
t1.init(period=20, mode=t1.PERIODIC, callback=tcb)
```

Neopixel

```
import machine, time

np = machine.Neopixel(machine.Pin(22), 24)

def rainbow(loops=120, delay=1, sat=1.0, bri=0.2):
    for pos in range(0, loops):
        for i in range(0, 24):
            dHue = 360.0/24*(pos+i);
            hue = dHue % 360;
            np.setHSB(i, hue, sat, bri, 1, False)
        np.show()
        if delay > 0:
            time.sleep_ms(delay)

def blinkRainbow(loops=10, delay=250):
    for pos in range(0, loops):
        for i in range(0, 24):
            dHue = 360.0/24*(pos+i);
            hue = dHue % 360;
            np.setHSB(i, hue, 1.0, 0.1, 1, False)
        np.show()
        time.sleep_ms(delay)
        np.clear()
        time.sleep_ms(delay)
```

RTC

```
import machine
import utime

rtc = machine.RTC()
rtc.ntp_sync(server="hr.pool.ntp.org", tz="CET-1CEST")
rtc.synced()
True
utime.gmtime()
(2018, 1, 29, 16, 3, 18, 2, 29)
utime.localtime()
(2018, 1, 29, 17, 3, 30, 2, 29)
```

Boot Modes

Safe boot

After reset, if Button A is held, this will indicate the execution of main.py will be skipped.

M5stack firwmre is base on *MicroPython_ESP32_psRAM_LoBo* More docs: https://github.com/loboris/MicroPython_ESP32_psRAM_LoBo/wiki