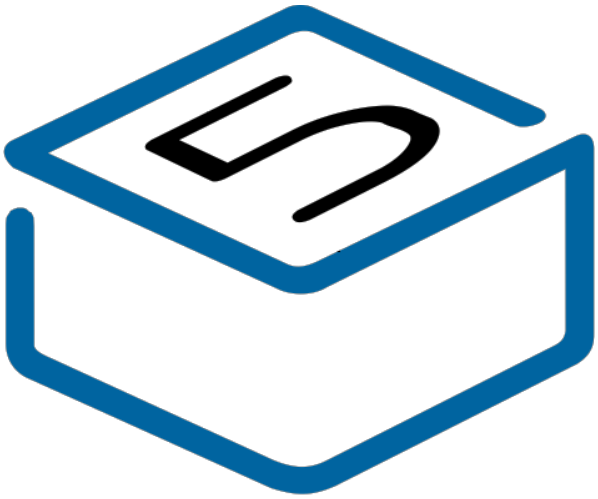
M5STACK-CORE2



M5STACK

2020

V0.01

1.OUTLINE

M5Stick CORE2 is ESP32 board which based on ESP32-D0WDQ6-V3 chip, contained 2-inch TFT screen. The board is made of PC+ABC.

1.1 Hardware Composition

The hardware of CORE2: ESP32-D0WDQ6-V3 chip, TFT screen, Green LED, Button, GROVE interface, TypeC-to-USB interface, Power Management chip and battery.

ESP32-D0WDQ6-V3 The ESP32 is a dual-core system with two Harvard Architecture Xtensa LX6 CPUs. All embedded memory,external memory and peripherals are located on the data bus and/or the instruction bus of these CPUs.With some minor exceptions (see below), the address mapping of two CPUs is symmetric, meaning that they usethe same addresses to access the same memory. Multiple peripherals in the system can access embeddedmemory via DMA.

TFT Screen is a 2-inch color screen driven ILI9342C with a resolution of 320 x 240. Operating voltage range is 2.6~3.3V, working temperature range is -25~55°C.

Power Management chip is X-Powers's AXP192. The operating voltage range is 2.9V~6.3V and the charging current is 1.4A.

CORE2 equips ESP32 with everything needed for programming, everything needed for operation and development

2. PIN DESCRIPTION

2.1. USB INTERFACE

M5CAMREA Configuration Type-C type USB interface, support USB2.0 standard communication protocol.

2.2. GROVE INTERFACE

4p disposed pitch of 2.0mm M5CAMREA GROVE interfaces, internal wiring and GND, 5V, GPIO32, GPIO33 connected.

3. FUNCTIONAL DESCRIPTION

This chapter describes the ESP32-D0WDQ6-V3 various modules and functions.

3.1. CPU AND MEMORY

Xtensa®single-/dual-core32-bitLX6microprocessor(s), upto600MIPS (200MIPSforESP32-S0WD/ESP32-U4WDH, 400 MIPS for ESP32-D2WD):

- 448 KB ROM
- 520 KB SRAM
- 16 KB SRAM in RTC
- QSPI supports multiple flash/SRAM chips

3.2. STORAGE DESCRIPTION

3.2.1. External Flash and SRAM

ESP32 support multiple external QSPI flash and static random access memory (SRAM), having a hardware-based AES encryption to protect the user programs and data.

- ESP32 access external QSPI Flash and SRAM by caching. Up to 16 MB external Flash code space is mapped into the CPU, supports 8-bit, 16-bit and 32-bit access, and can execute code.
- Up to 8 MB external Flash and SRAM mapped to the CPU data space, support for 8-bit, 16-bit and 32-bit access. Flash supports only read operations, SRAM supports read and write operations.

3.3. CRYSTAL

External 2 MHz~60 MHz crystal oscillator (40 MHz only for Wi-Fi/BT functionality)

3.4. RTC MANAGEMENT AND LOW POWER CONSUMPTION

ESP32 uses advanced power management techniques may be switched between different power saving modes. (See Table 5).

- *Power saving mode*

  - Active Mode: RF chip is operating. Chip may receive and transmit a sounding signal.

  - Modem-sleep mode: CPU can run, the clock may be configured. Wi-Fi / Bluetooth baseband and RF

  - Light-sleep mode: CPU suspended. RTC and memory and peripherals ULP coprocessor operation. Any wake-up event (MAC, host, RTC timer or external interrupt) will wake up the chip.

  - Deep-sleep mode: only the RTC memory and peripherals in a working state. Wi-Fi and Bluetooth connectivity data stored in the RTC. ULP coprocessor can work.

  - Hibernation Mode: 8 MHz oscillator and a built-in coprocessor ULP are disabled. RTC memory to restore the power supply is cut off. Only one RTC clock timer located on the slow clock and some RTC GPIO at work. RTC RTC clock or timer can wake up from the GPIO Hibernation mode.

- *Deep-sleep mode*

  - related sleep mode: power save mode switching between Active, Modem-sleep, Light-sleep mode. CPU, Wi-Fi, Bluetooth, and radio preset time interval to be awakened, to ensure connection Wi-Fi / Bluetooth.

  - Ultra Low-power sensor monitoring methods: the main system is Deep-sleep mode, ULP coprocessor is periodically opened or closed to measure sensor data. The sensor measures data, ULP coprocessor decide whether to wake up the main system.

Functions in different power consumption modes: TABLE 5

Power consumption mode	Active	Modem-sleep	Light-sleep	Deep-sleep	Hibernation
Sleep mode	Associated sleep mode			Ultra low-power Sensor measures data	-
CPU	open	open	pause	close	close
Wi-Fi/Bluetooth Radio	open	open	close	close	close
RTC memory	open	open	open	open	close
ULP coprocessor	open	open	open	open/close	close

4. ELECTRICAL CHARACTERISTICS

4.1. LIMIT PARAMETERS

Table 8: Limiting values

Symbol	Parameter	Min	Max	Unit
VDD33	Power supply voltage	–0.3	3.6	V
I_{output}[1]	Cumulative IO output current	-	1,100	mA
T_{store}	Storage temperature	–40	150	°C

1. V_{IO} to the power supply pad, Refer ESP32 Technical Specification Appendix IO_MUX, as SD_CLK of Power supply for VDD_SDIO.

Press and hold the side power button for two seconds to start the device.Press and hold for more than 6 seconds to turn off the device. Switch to the photo mode through the Home screen, and the avatar that can be obtained through the camera is displayed on the tft screen.The USB cable must be connected when working, and the lithium battery is used for short-term storage to prevent power failure.

FCC Statement:
Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

RF Exposure Information (SAR)

This phone is designed and manufactured not to exceed the emission limits for exposure to radio frequency (RF) energy set by the Federal Communications Commission of the United States.

During SAR testing, this device was set to transmit at its highest certified power level in all tested frequency bands, and placed in positions that simulate RF exposure in usage against the head with no separation, and near the body with the separation of 0 mm.
The SAR limit set by the FCC is 1.6W/kg. The FCC has granted an Equipment Authorization for this model phone with all reported SAR levels evaluated as in compliance with the FCC RF exposure guidelines.

IC Notice

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en

CAN ICES-003 (B)/NMB-003(B)

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

IC Radiation Exposure Statement

This EUT is compliance with SAR for general population/uncontrolled exposure limits in IC RSS-102 and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528 and IEC 62209. This equipment should be installed and operated with minimum distance 0 cm between the radiator and your body. This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

Cet appareil est conforme aux limites d'exposition DAS incontrôlée pour la population générale de la norme CNR-102 d'Industrie Canada et a été testé en conformité avec les méthodes de mesure et procédures spécifiées dans IEEE 1528 et IEC 62209. Cet appareil doit être installé et utilisé avec une distance

minimale de 0 cm entre l’émetteur et votre corps. Cet appareil et sa ou ses antennes ne doivent pas être co-localisés ou fonctionner en conjonction avec tout autre antenne ou transmetteur.

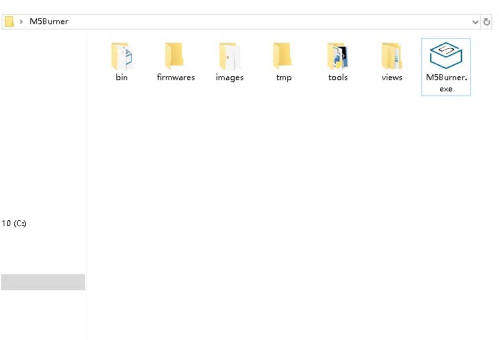
UIFlow Quick Start

This tutorial applies to M5Core2

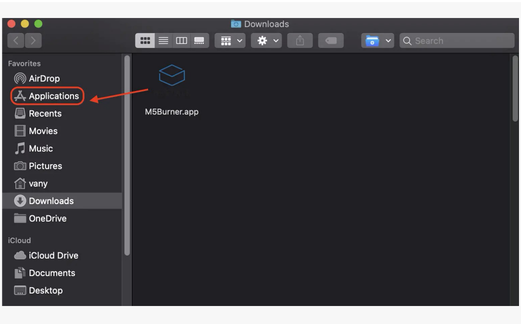
Burning tool

Please click the button below to download the corresponding M5Burner firmware burning tool according to your operating system. Unzip and open the application.

Windows10 MacOS Linux

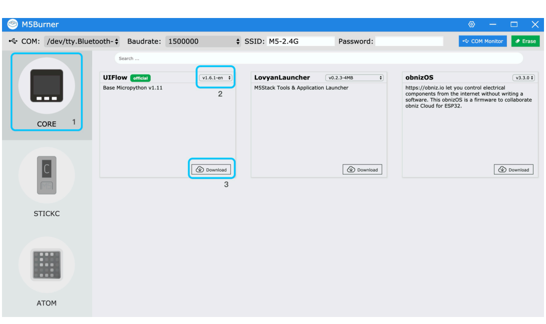


Note: After the installation of MacOS users, please put the application in the Application folder, as shown in the figure below.



Firmware burning

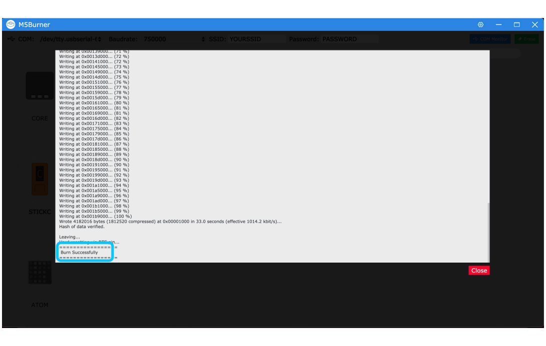
1.Double-click to open the Burner burning tool, select the corresponding device type in the left menu, select the firmware version you need, and click the download button to download.



2.Then connect the M5 device to the computer through the Type-C cable, select the corresponding COM port, the baud rate can use the default configuration in M5Burner, in addition, you can also fill in the WIFI that the device will be connected to during the firmware burning stage information. After configuration, click "Burn" to start burning.

BURNING-TO
FIRMWARE-B
CONFIGURE-
NETWORK-PI
HTTP
BLE-UART
UIFLOW-DESI
RELATED-LIN

3.When the burning log prompts `Burn Successfully` , it means that the firmware has been burned.



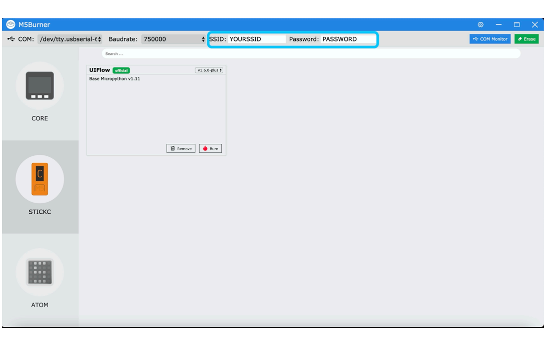
When first burning or the firmware program runs abnormally, you can click "Erase" to erase the flash memory. In the subsequent firmware update, there is no need to erase again, otherwise the saved Wi-Fi information will be deleted and the API Key will be refreshed.

Configure WIFI

UIFlow provides both offline and web version of the programmer. When using the web version, we need to configure a WiFi connection for the device. The following describes two ways to configure WiFi connection for the device (Burn configuration and AP hotspot configuration).

Burn configuration WiFi(recommend)

UIFlow-1.5.4 and versions above can write WiFi information directly through M5Burner.

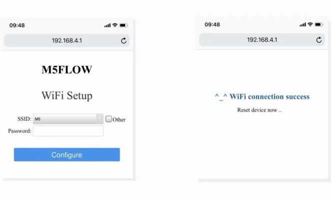


AP hotspot configuration WiFi

1. Press and hold the power button on the left to turn on the machine. If WiFi is not configured, the system will automatically enter the network configuration mode when it is turned on for the first time. Suppose you want to re-enter the network configuration mode after running other programs, you can refer to the operation below. After the UIFlow Logo appears at startup, quickly click the Home button (center M5 button) to enter the configuration page. Press the button on the right side of the fuselage to switch the option to Setting, and press the Home button to confirm. Press the right button to switch the option to WiFi Setting, press the Home button to confirm, and start the configuration.

2. After successfully connecting to the hotspot with your mobile phone, open the mobile phone browser to scan the QR code on the screen or directly access **192.168.4.1**, enter the page to fill in your personal WIFI information, and click Configure to record your WiFi information. The device will restart automatically after successfully configuring and enter programming mode.

Note: Special characters such as "space" are not allowed in the configured WiFi information.



Network Programming Mode and API KEY

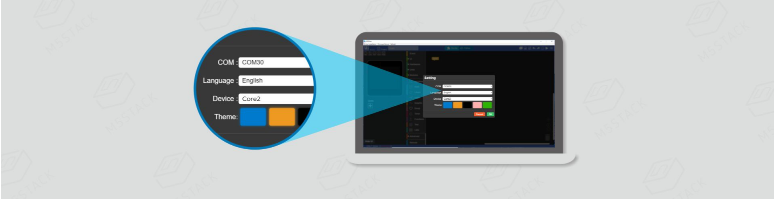
Enter network programming mode

Network programming mode is a docking mode between M5 device and UIFlow web programming platform. The screen will show the current network connection status of the device. When the indicator is green, it means that you can receive program push at any time. Under default situation, after the first successful WiFi network configuration, the device will automatically restart and enter the network programming mode. If you do not know how to re-enter the programming mode after running other applications, you can refer to the following operations.

restarting, press button A in the main menu interface to select the programming mode and wait till the right indicator of the network indicator to turn green in the programming mode page. Access UIFlow programming page by visiting flow.m5stack.com on a computer browser.

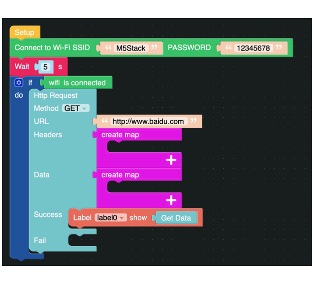
API KEY Pairing

API KEY is the communication credential for M5 devices when using UIFlow web programming. By configuring the corresponding API KEY on the UIFlow side, the program can be pushed for the specific device. The user needs to visit flow.m5stack.com in the computer web browser to enter the UIFlow programming page. Click the setting button in the menu bar at the upper right corner of the page, enter the API Key on the corresponding device, select the hardware used, click OK to save and wait till it prompts successfully connecting.



HTTP

Complete the above steps, then you can start programming with UIFlow. For example:Access Baidu via HTTP



BLE UART

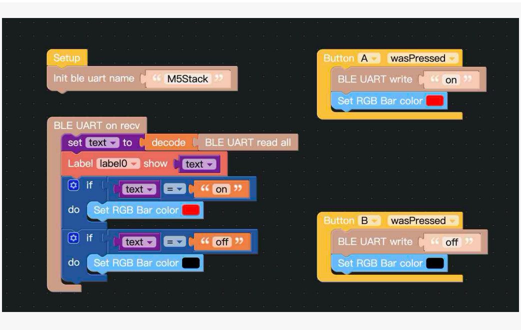
Function Description

Establish Bluetooth connection and enable Bluetooth passthrough service.

- **Init ble uart name** Initialize settings, configure Bluetooth device name.
- **BLE UART Writre** Send data using BLE UART.
- **BLE UART remain cache** Check the number of bytes of BLE UART data.
- **BLE UART read all** Read all data in BLE UART cache.
- **BLE UART read characters** Read n data in BLE UART cache.

Instructions

Establish Bluetooth passthrough connection and send on / off control LED.



UIFlow Desktop IDE

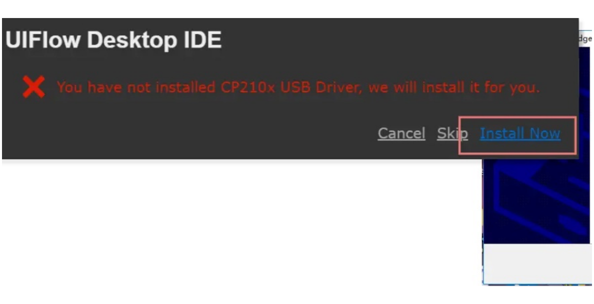
UIFlow Desktop IDE is an offline version of UIFlow programmer which does not require network connection, and can provide you with responsive program push experience. Please click the corresponding version of **UIFlow-Desktop-IDE** to download according to your operating system .

Windows10 MacOS Linux

USB programming mode

Unzip the downloaded UIFlow Desktop IDE archive and double-click to run the application.

After the app starts, it will automatically detect whether your computer has a USB driver (CP210X), click Install, and follow the prompts to finish installation.

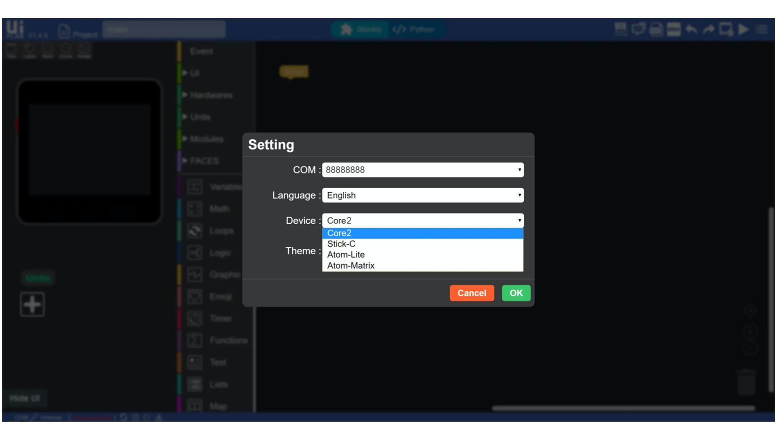


After the driver installation is complete, it will automatically enter the UIFlow Desktop IDE and automatically pop up the configuration box. At this time, connect the M5 device to the computer through the Tpye-C data cable.

Using UIFlow Desktop IDE requires M5 device with UIFlow firmware and enter ** USB programming mode **.

Click the power button on the left side of the device to restart, after entering the menu, quickly click the right button to select **USB mode**.

Select the corresponding port, and the programming device, click OK to connect.



Related Links

- UIFlow Block introduction