Espressif, SoCs, Arduino and Language

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Instituto de Ciências Exatas e Naturais
Faculdade de Computação

About Espressif

Espressif Systems is a public multinational, fabless semiconductor company established in 2008, with offices in China, the Czech Republic, India, Singapore and **Brazil**.

We have a passionate team of engineers and scientists from all over the world, focused on developing cutting-edge wireless communication, low-power, **AIoT** (Artificial Intelligence of Things) solutions.

About Espressif

We have created the popular **ESP8266**, **ESP32**, ESP32-S, ESP32-C and ESP32-H series of chips, modules and development boards.

At the same time, by open-sourcing our technology and solutions, we aim to enable developers to use Espressif's solutions globally and build their own smart-connected devices.

SoCs (Systems on Chip)

ESP8266 Series

32-bit MCU & 2.4 GHz Wi-Fi

High-performance 160 MHz single-core CPU

+19.5 dBm output power ensures a good physical range

Sleep current is less than 20 μA, making it suitable for battery-powered and wearable-electronics applications

Peripherals include UART, GPIO, I2C, I2S, SDIO, PWM, ADC and SPI

Fonte: https://www.espressif.com/en/products/socs

SoCs (Systems on Chip)

ESP32 Series

32-bit MCU & 2.4 GHz Wi-Fi & Bluetooth/Bluetooth LE

Two or one CPU core(s) with adjustable clock frequency, ranging from 80 MHz to 240 MHz

+19.5 dBm output power ensures a good physical range

Classic Bluetooth for legacy connections, also supporting L2CAP, SDP, GAP, SMP, AVDTP, AVCTP, A2DP (SNK) and AVRCP (CT)

Support for Bluetooth Low Energy (Bluetooth LE) profiles including L2CAP, GAP, GATT, SMP, and GATT-based profiles like BluFi, SPP-like, etc

Bluetooth Low Energy (Bluetooth LE) connects to smart phones, broadcasting low-energy beacons for easy detection

Sleep current is less than 5 μA, making it suitable for battery-powered and wearable-electronics applications

Peripherals include capacitive touch sensors, Hall sensor, SD card interface, Ethernet, high-speed SPI, UART, I2S and I2C

Fonte: https://www.espressif.com/en/products/socs

SoCs (Systems on Chip)

ESP32-H Series

32-bit RISC-V MCU & Bluetooth 5 (LE) & IEEE 802.15.4

32-bit RISC-V single-core processor that operates at up to 96 MHz

320 KB SRAM, 128 KB ROM, 4 KB LP Memory, and works with external flash

19 programmable GPIOs, with support for UART, SPI, I2C, I2S, Remote Control Peripheral, LED PWM, Full-speed USB Serial/JTAG Controller, GDMA, MCPWM

Can be used for building Thread end devices, as well as Thread border router and Matter bridge by combining it and ESP Wi-Fi SoC

Fonte: https://www.espressif.com/en/products/socs

SoCs (Systems on Chip)

ESP32-C Series

32-bit RISC-V MCU & 2.4 GHz Wi-Fi & Bluetooth 5 (LE)

32-bit RISC-V single-core processor that operates at up to 120 MHz

State-of-the-art power and RF performance

576 KB ROM, 272 KB SRAM (16 KB for cache) on the chip

14 programmable GPIOs: SPI, UART, I2C, LED PWM controller, General DMA controller (GDMA), SAR ADC, Temperature sensor

Fonte: https://www.espressif.com/en/products/socs

SoCs (Systems on Chip)

ESP32-S Series

32-bit MCU & 2.4 GHz Wi-Fi

High-performance 240 MHz single-core CPU

Ultra-low-power performance: fine-grained clock gating, dynamic voltage and frequency scaling

Security features: eFuse、flash encryption, secure boot, signature verification, integrated AES, SHA and RSA algorithms

Peripherals include 43 GPIOs, 1 full-speed USB OTG interface, SPI, I2S, UART, I2C, LED PWM, LCD interface, camera interface, ADC, DAC, touch sensor, temperature sensor

Fonte: https://www.espressif.com/en/products/socs

ESP8266 Series

Modules

32-bit MCU & 2.4 GHz Wi-Fi

ESP8266 embedded, Xtensa® single-core 32-bit LX6 microprocessor, up to 160 MHz

+19.5 dBm output at the antenna ensures a good physical range

Sleep current is less than 20 µA, making it suitable for battery-powered and wearable-electronics applications

Peripherals include UART, GPIO, I2C, I2S, SDIO, PWM, ADC and SPI

Fully certified with integrated antenna and software stacks

Fonte: https://www.espressif.com/en/products/modules

ESP32 Series

Modules

32-bit MCU & 2.4 GHz Wi-Fi & Bluetooth/Bluetooth LE

ESP32 embedded, two or one Xtensa® 32-bit LX6 microprocessor(s) with adjustable clock frequency, ranging from 80 MHz to 240 MHz

Classic Bluetooth for legacy connections, also supporting L2CAP, SDP, GAP, SMP, AVDTP, AVCTP, A2DP (SNK) and AVRCP (CT)

Support for Bluetooth Low Energy (Bluetooth LE) profiles including L2CAP, GAP, GATT, SMP, and GATT-based profiles like BluFi, SPP-like, etc

Bluetooth Low Energy (Bluetooth LE) connects to smart phones, broadcasting low-energy beacons for easy detection

Sleep current is less than 5 μA, making it suitable for battery-powered and wearable-electronics applications

Peripherals include capacitive touch sensors, Hall sensor, SD card interface, Ethernet, high-speed SPI, UART, I2S and I2C

Fully certified with integrated antenna and software stacks

Fonte: https://www.espressif.com/en/products/modules

ESP32-H Series

Modules

32-bit RISC-V MCU & Bluetooth 5 (LE) & IEEE 802.15.4

32-bit RISC-V single-core processor that operates at up to 96 MHz

320 KB SRAM, 128 KB ROM, 4 KB LP Memory, and works with external flash

19 programmable GPIOs, with support for UART, SPI, I2C, I2S, Remote Control Peripheral, LED PWM, Full-speed USB Serial/JTAG Controller, GDMA, MCPWM

Can be used for building Thread end devices, as well as Thread border router and Matter bridge by combining it and ESP Wi-Fi SoC

Fonte: https://www.espressif.com/en/products/modules

ESP32-C Series

Modules

32-bit RISC-V MCU & 2.4 GHz Wi-Fi & Bluetooth 5 (LE)

32-bit RISC-V single-core processor that operates at up to 120 MHz

State-of-the-art power and RF performance

576 KB ROM, 272 KB SRAM (16 KB for cache) on the chip

14 programmable GPIOs: SPI, UART, I2C, LED PWM controller, General DMA controller (GDMA), SAR ADC, Temperature sensor

Fonte: https://www.espressif.com/en/products/modules

ESP32-S Series

Modules

32-bit MCU & 2.4 GHz Wi-Fi

ESP32-S2 embedded, Xtensa® single-core 32-bit LX7 microprocessor, up to 240 MHz

Ultra-low-power performance: fine-grained clock gating, dynamic voltage and frequency scaling

Security features: eFuse, flash encryption, secure boot, signature verification, integrated AES, SHA and RSA algorithms

Peripherals include 43 GPIOs, 1 full-speed USB OTG interface, SPI, I2S, UART, I2C, LED PWM, LCD interface, camera interface, ADC, DAC, touch sensor, temperature sensor

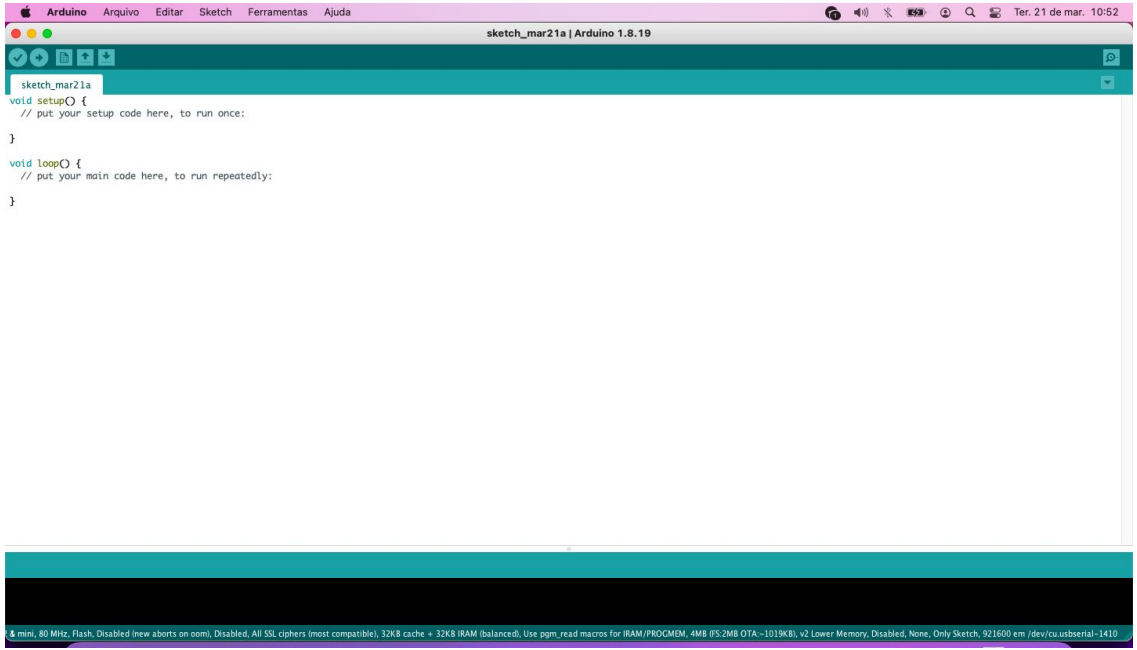
Availability of common cloud connectivity agents and common product features shortens the time to market

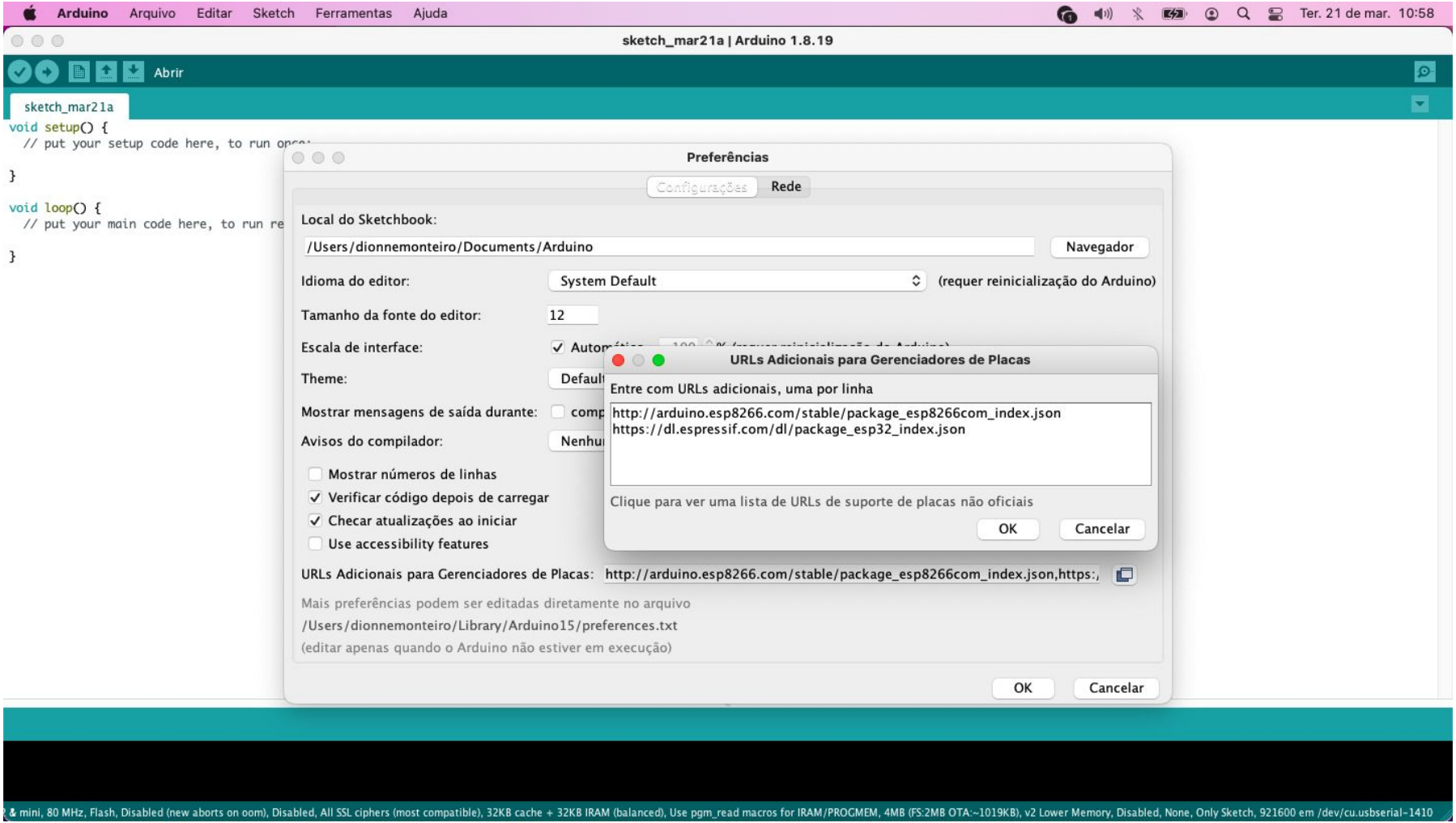
Fully certified with integrated antenna and software stacks

Fonte: https://www.espressif.com/en/products/modules

Getting Started - Arduino IDE

https://www.arduino.cc/




Arduino Arquivo Editar Sketch Ferramentas Ajuda
Ter. 21 de mar. 10:58
sketch_mar21a | Arduino 1.8.19
Abrir
sketch_mar21a
void setup() {
// put your setup code here, to run once:
}
void loop() {
// put your main code here, to run repeatedly:
}
Preferências
Configurações
Rede
Local do Sketchbook:
/Users/dionnemonteiro/Documents/Arduino
Navegador
Idioma do editor:
System Default
(requer reinicialização do Arduino)
Tamanho da fonte do editor:
12
Escala de interface:
Theme:
Mostrar mensagens de saída durante:
Avisos do compilador:
Mostrar números de linhas
Verificar código depois de carregar
Checar atualizações ao iniciar
Use accessibility features
URLs Adicionais para Gerenciadores de Placas:
http://arduino.esp8266.com/stable/package_esp8266com_index.json,https:,
Mais preferências podem ser editadas diretamente no arquivo
/Users/dionnemonteiro/Library/Arduino15/preferences.txt
(editar apenas quando o Arduino não estiver em execução)
OK
Cancelar
URLs Adicionais para Gerenciadores de Placas
Entre com URLs adicionais, uma por linha
http://arduino.esp8266.com/stable/package_esp8266com_index.json
https://dl.espressif.com/dl/package_esp32_index.json
Clique para ver uma lista de URLs de suporte de placas não oficiais
OK
Cancelar
& mini, 80 MHz, Flash, Disabled (new aborts on oom), Disabled, All SSL ciphers (most compatible), 32KB cache + 32KB IRAM (balanced), Use pgm_read macros for IRAM/PROGMEM, 4MB (FS:2MB OTA:~1019KB), v2 Lower Memory, Disabled, None, Only Sketch, 921600 em /dev/cu.usbserial-1410

Getting Started - Add the boards

ESP32

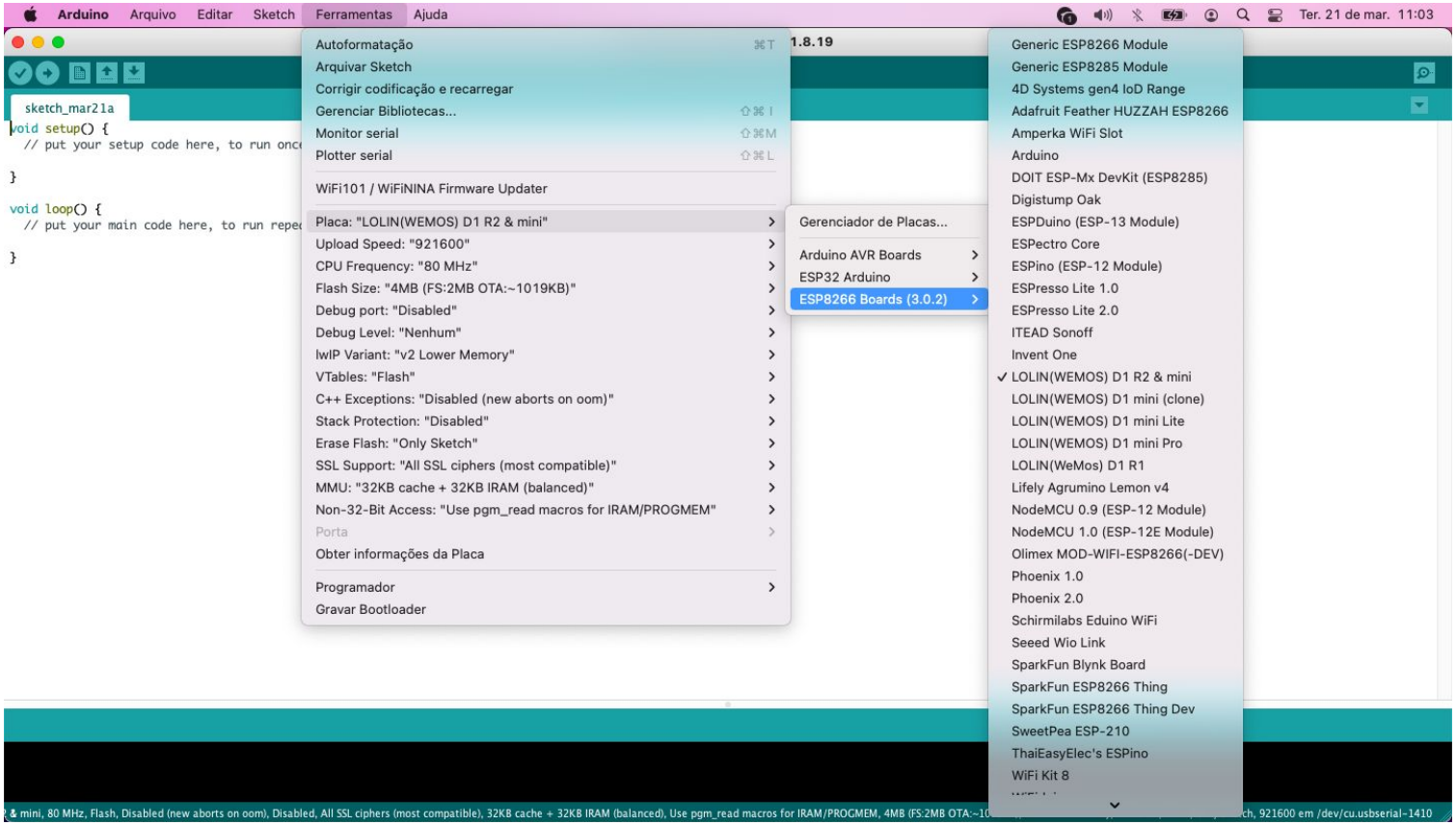
https://raw.githubusercontent.com/espressif/arduino-esp32/gh-pages/package_esp32_index.json

ESP8266

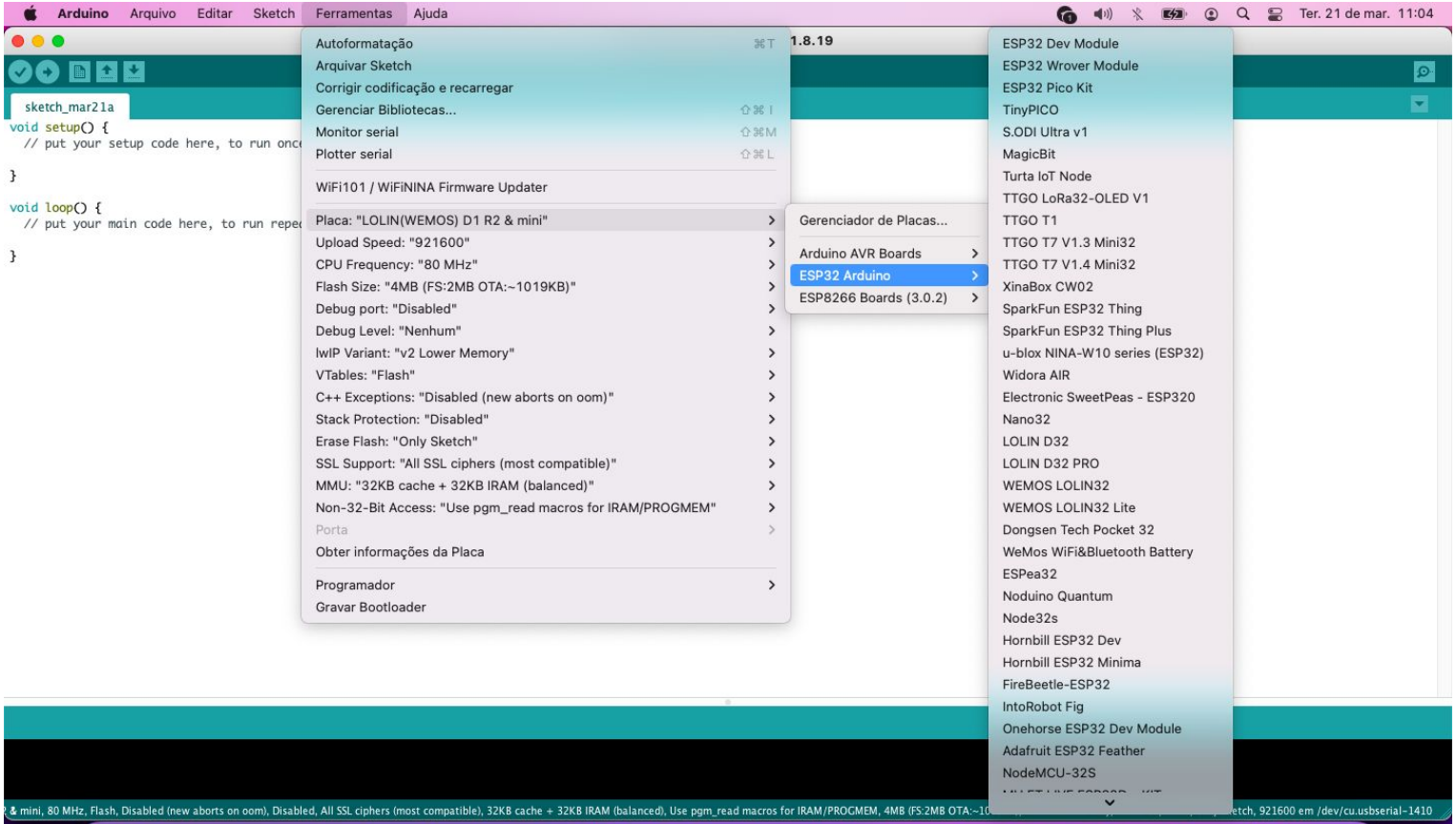
https://arduino.esp8266.com/stable/package_esp8266com_index.json

Install both

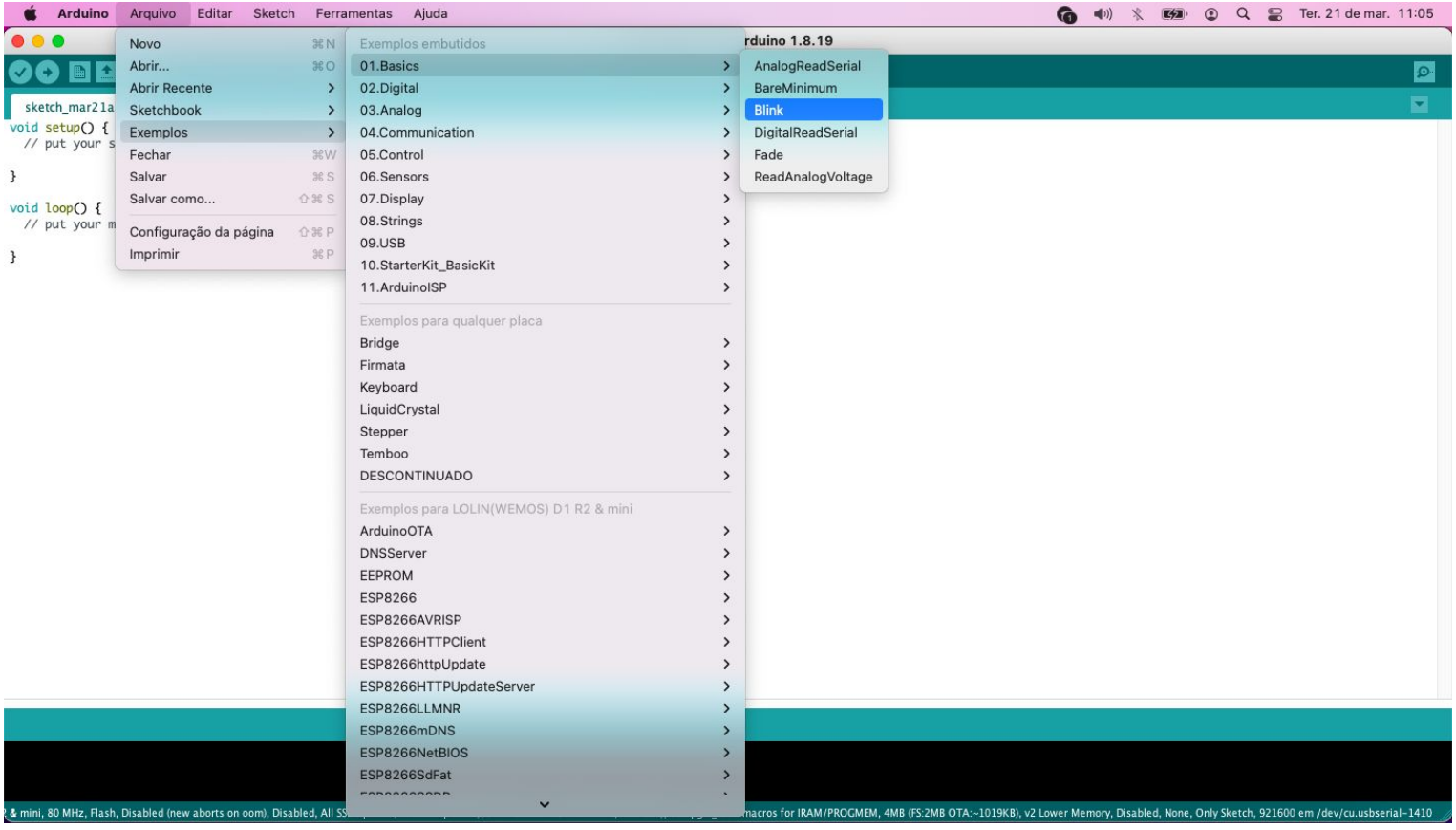
Select the board



Select the board



Examples


Arduino
Arquivo
Editar
Sketch
Ferramentas
Ajuda
Ter. 21 de mar. 11:05
Novo ⌘N
Abrir... ⌘O
Abrir Recente
Sketchbook
Exemplos
Fechar ⌘W
Salvar ⌘S
Salvar como... ⇧⌘S
Configuração da página ⇧⌘P
Imprimir ⌘P
Exemplos embutidos
01.Basics
02.Digital
03.Analog
04.Communication
05.Control
06.Sensors
07.Display
08.Strings
09.USB
10.StarterKit_BasicKit
11.ArduinoISP
AnalogReadSerial
BareMinimum
Blink
DigitalReadSerial
Fade
ReadAnalogVoltage
Exemplos para qualquer placa
Bridge
Firmata
Keyboard
LiquidCrystal
Stepper
Temboo
DESCONTINUADO
Exemplos para LOLIN(WEMOS) D1 R2 & mini
ArduinoOTA
DNSServer
EEPROM
ESP8266
ESP8266AVRISP
ESP8266HTTPClient
ESP8266httpUpdate
ESP8266HTTPUpdateServer
ESP8266LLMNR
ESP8266mDNS
ESP8266NetBIOS
ESP8266SdFat
sketch_mar21a
void setup() {
// put your s
}
void loop() {
// put your m
}

Blink a LED

setup()

loop()

pinMode(pin, mode)

Pin: any I/O pins

Mode: INPUT/OUTPUT/INPUT_PULLUP

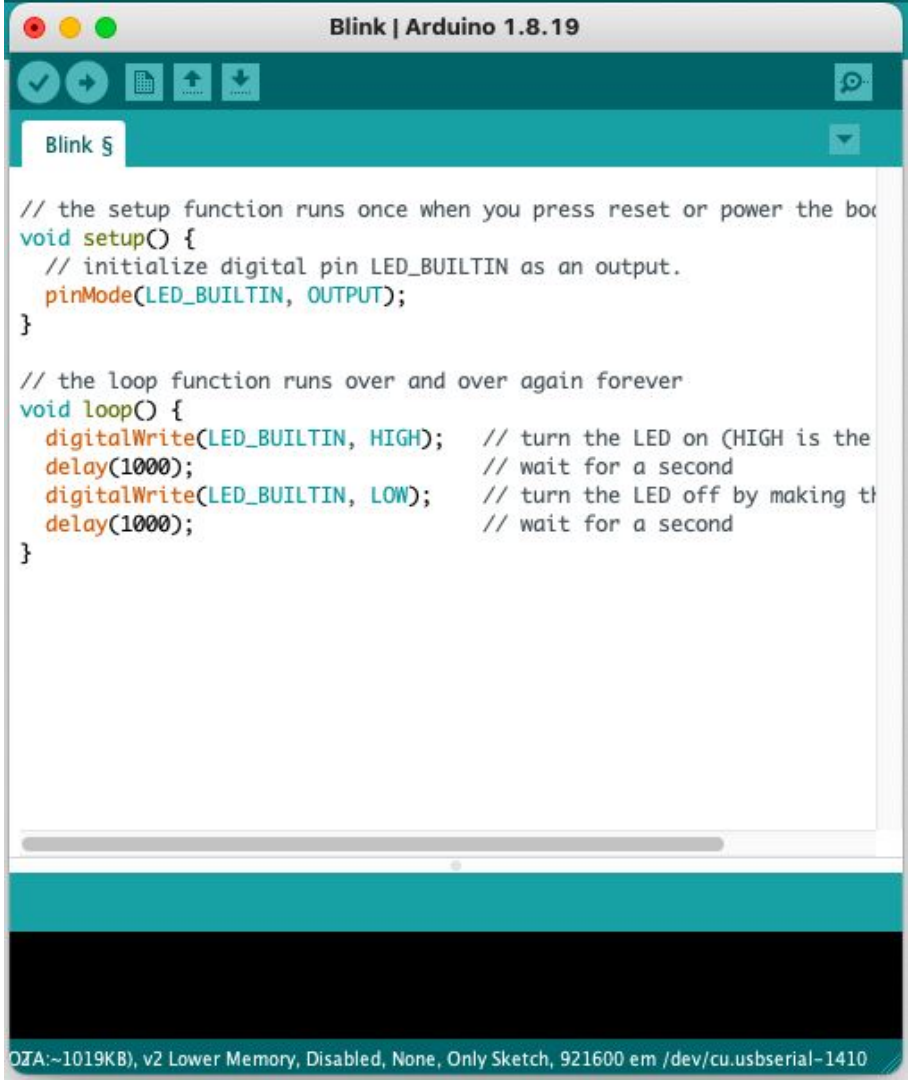
digitalWrite(pin, value)

Pin: any I/O pins

Value: LOW, HIGH

delay(time)

time: the time in milliseconds



More about the language

Language reference

Functions

Variables

Structure