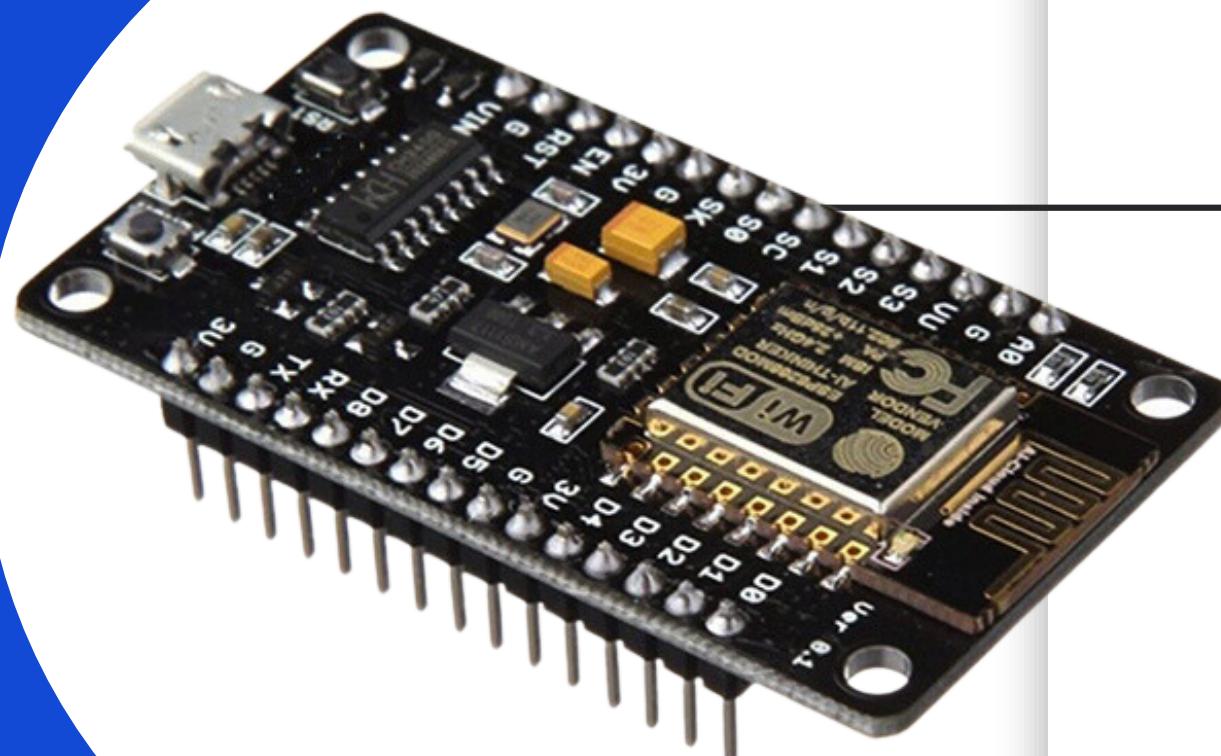




INTRODUCTION TO ESP8266



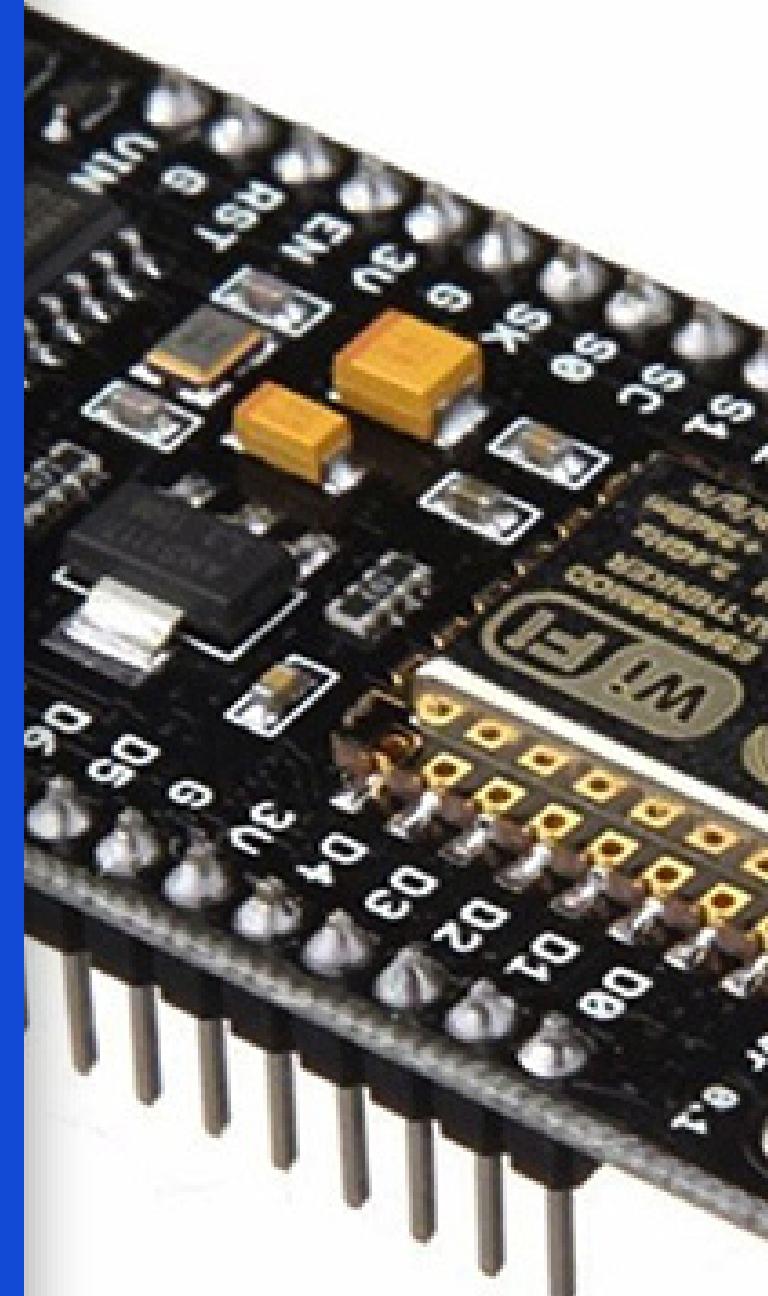
What is an **ESP8266 NodeMCU**?

- The **ESP8266** is a low-cost Wi-Fi chip developed by Espressif Systems.
- It can be used as a standalone device, or as a **UART** to Wi-Fi adaptor to allow other microcontrollers to connect to a Wi-Fi network.

Why is ESP8266 so popular?

- **Low Cost**
- **Low Power**
- **Wi-Fi**
- **Compatible with the Arduino Programming Language**
- **Compatible with MicroPython**

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What can you do with an ESP8266?

- Create a web server to control outputs
- Create a web server to display sensor readings
- Send HTTP requests
- Control outputs, read inputs, and set interrupts

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- Data logging projects
- Communicate with third-party services
- Create web applications
- Send emails, notifications, post tweets, etc.





ESP8266-12E Wi-Fi chip



- Processor : Xtensa Single-core 32-bit L106
- Memory :
 - 32 KB instruction RAM**
 - 32 KB instruction cache RAM**
 - 80 KB user-data RAM**
 - 16 KB ETS system-data RAM**
- Wi-Fi Range: IEEE 802.11 b/g/n Wi-Fi
- 17 GPIO pins
- Serial Peripheral Interface Bus (SPI)
- I2C
- I2S
- UART on dedicated pins, plus a transmit-only UART can be enabled on GPIO2
- 10-bit ADC

Difference Between ESP8266 and ESP32

	ESP8266	ESP32
MCU	Xtensa Single-core 32-bit L106	Xtensa Dual-Core 32-bit LX6 with 600 DMIPS
Bluetooth	No	Bluetooth 4.2 and BLE (Bluetooth Low Energy)
Frequency	80 MHz	160 MHz
SRAM	No	Yes
Flash	No	Yes
GPIO	17	34
PWM	8 Channels	16 Channels
SPI/I2C/I2S/UART	2/1/2/2	4/2/2/2
ADC	10-bit	12-bit
Touch Sensor	No	Yes
Temperature Sensor	No	Yes
Hall effect sensor	No	Yes
Price	240rs-500rs	500rs-1000rs

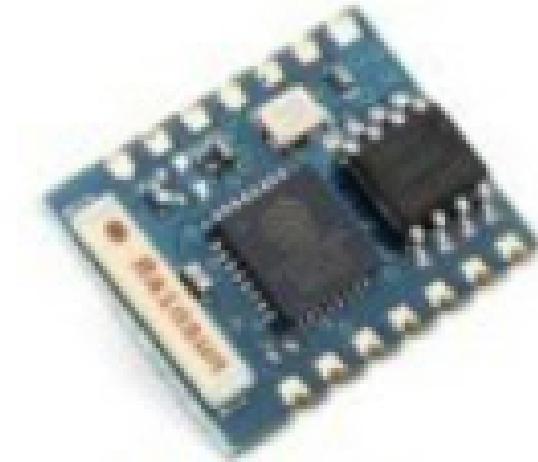
ESP8266 Versions



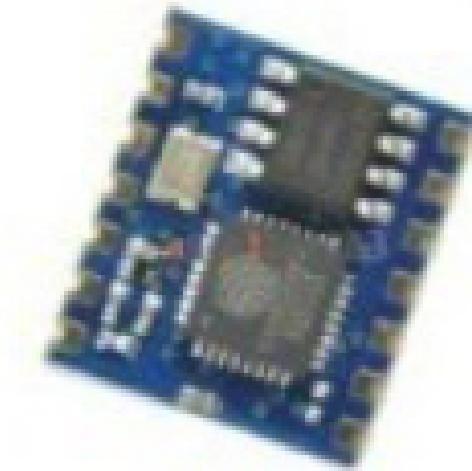
ESP-01



ESP-02



ESP-03



ESP-04



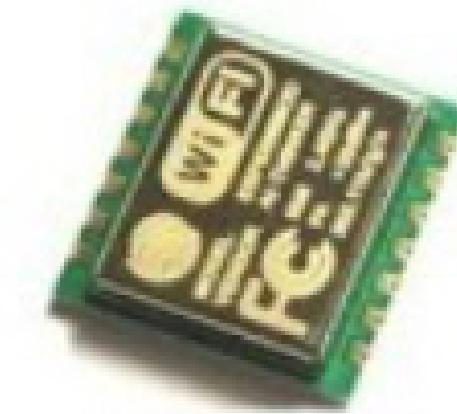
ESP-05



ESP-06



ESP-07



ESP-08



ESP-09



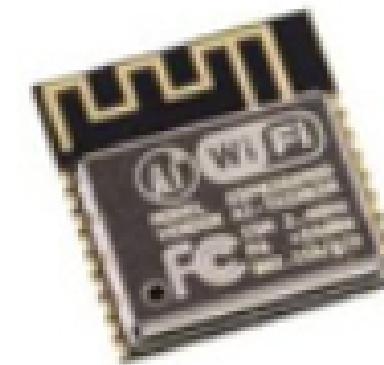
ESP-10



ESP-11



ESP-12E



ESP-13



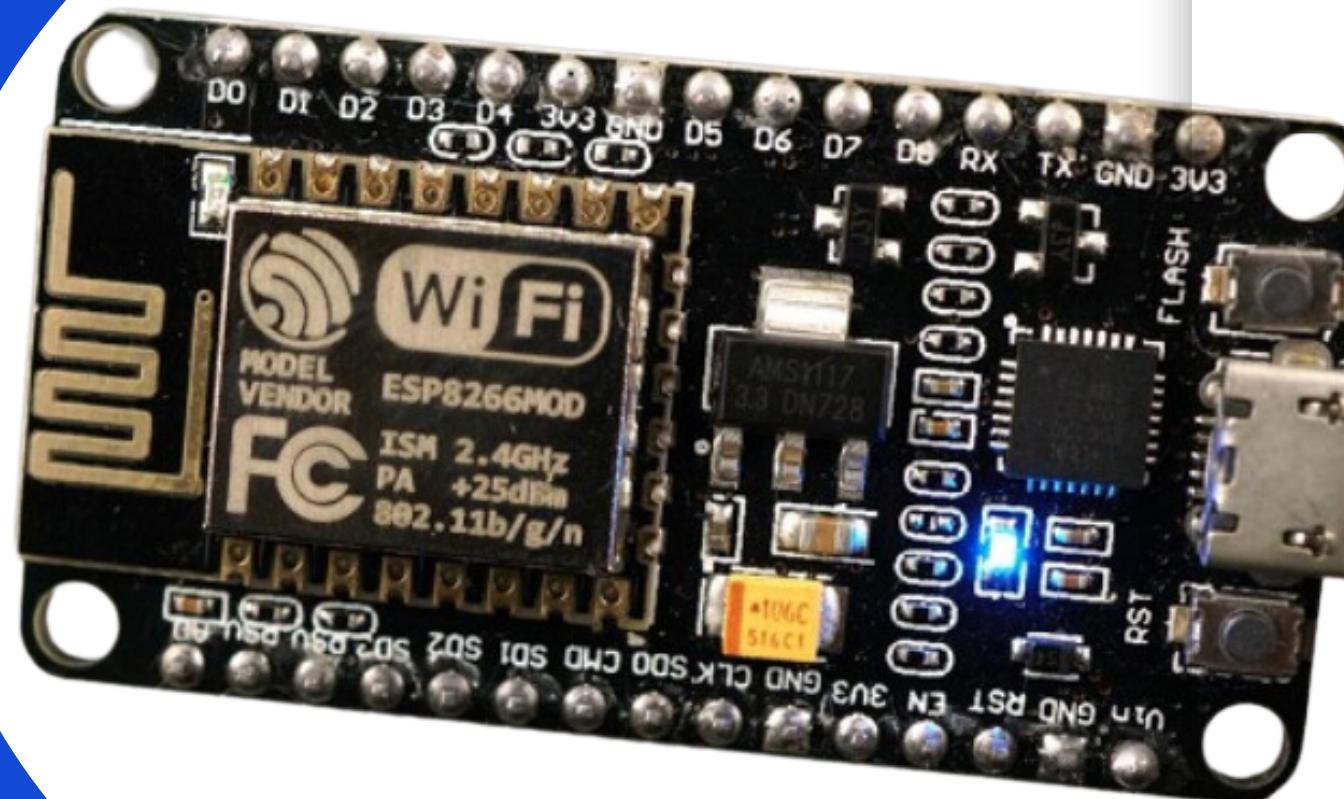
ESP8266 NodeMCU Development Boards



How to Choose an ESP8266 Development Board?

- USB-to-UART interface and voltage regulator circuit
- BOOT and RESET/EN buttons
- Pin configuration and the number of pins
- Size
- Antenna connector

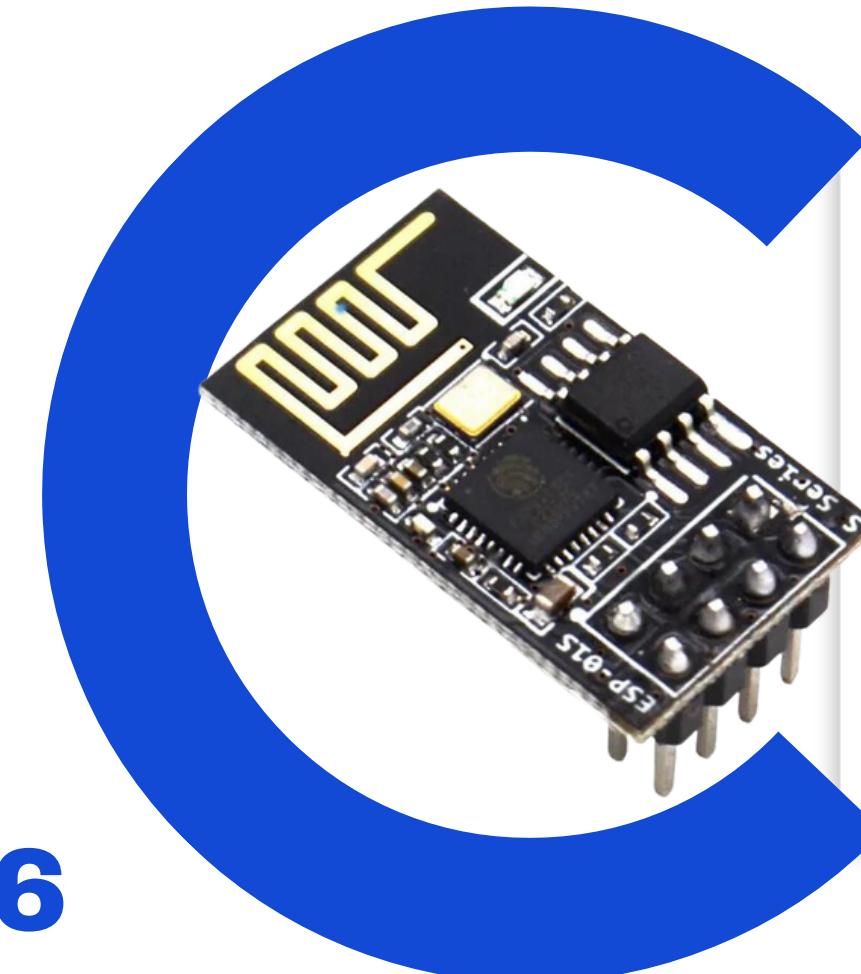




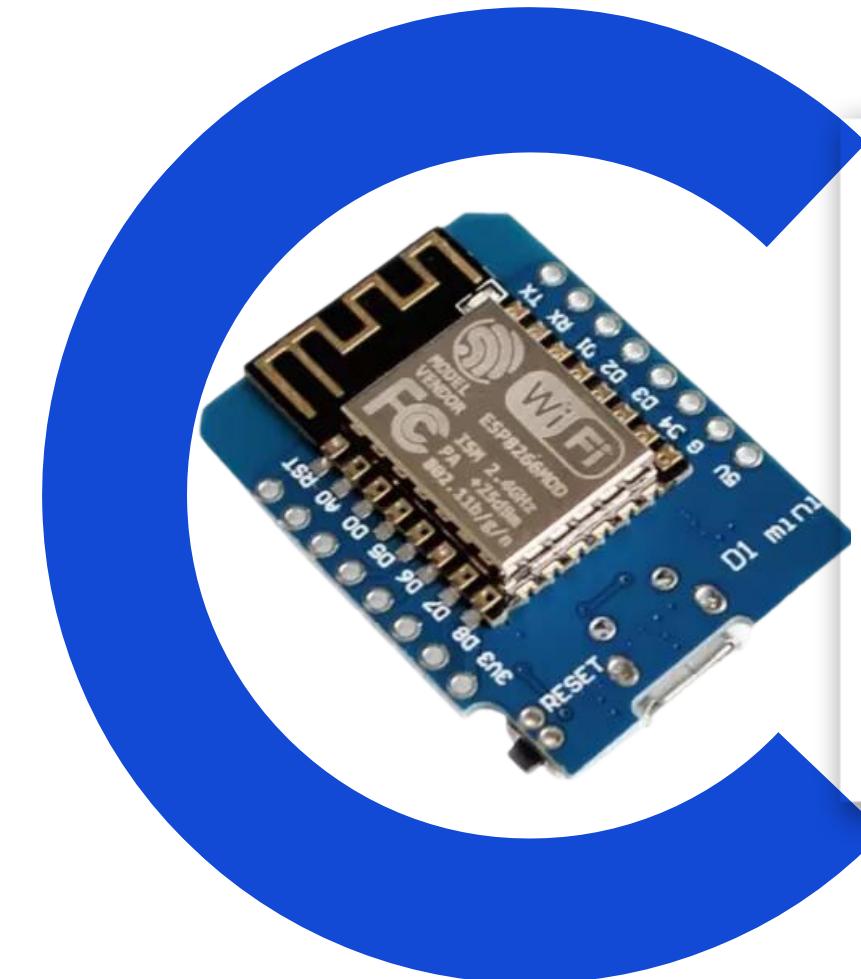
ESP8266-12E NodeMCU Kit

- 4 MB Flash Memory
- Built-in Voltage Regulator
- No need for a Programmer
- On Board Antenna for Wi-Fi Signal
- Reset and Flash Button
- Built-in LED

Other Popular ESP8266 Development Boards



ESP-01

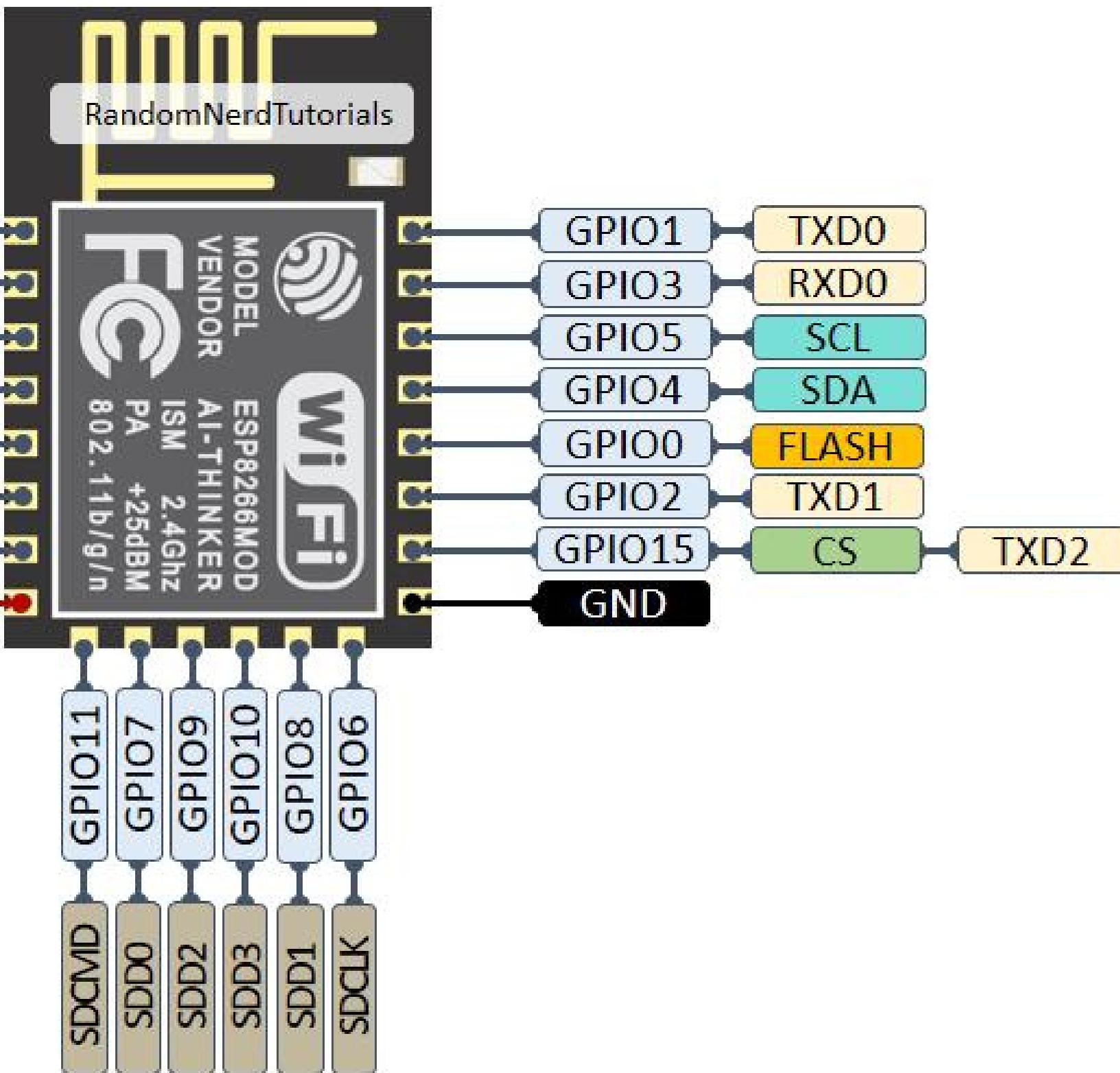


WeMos D1 Mini

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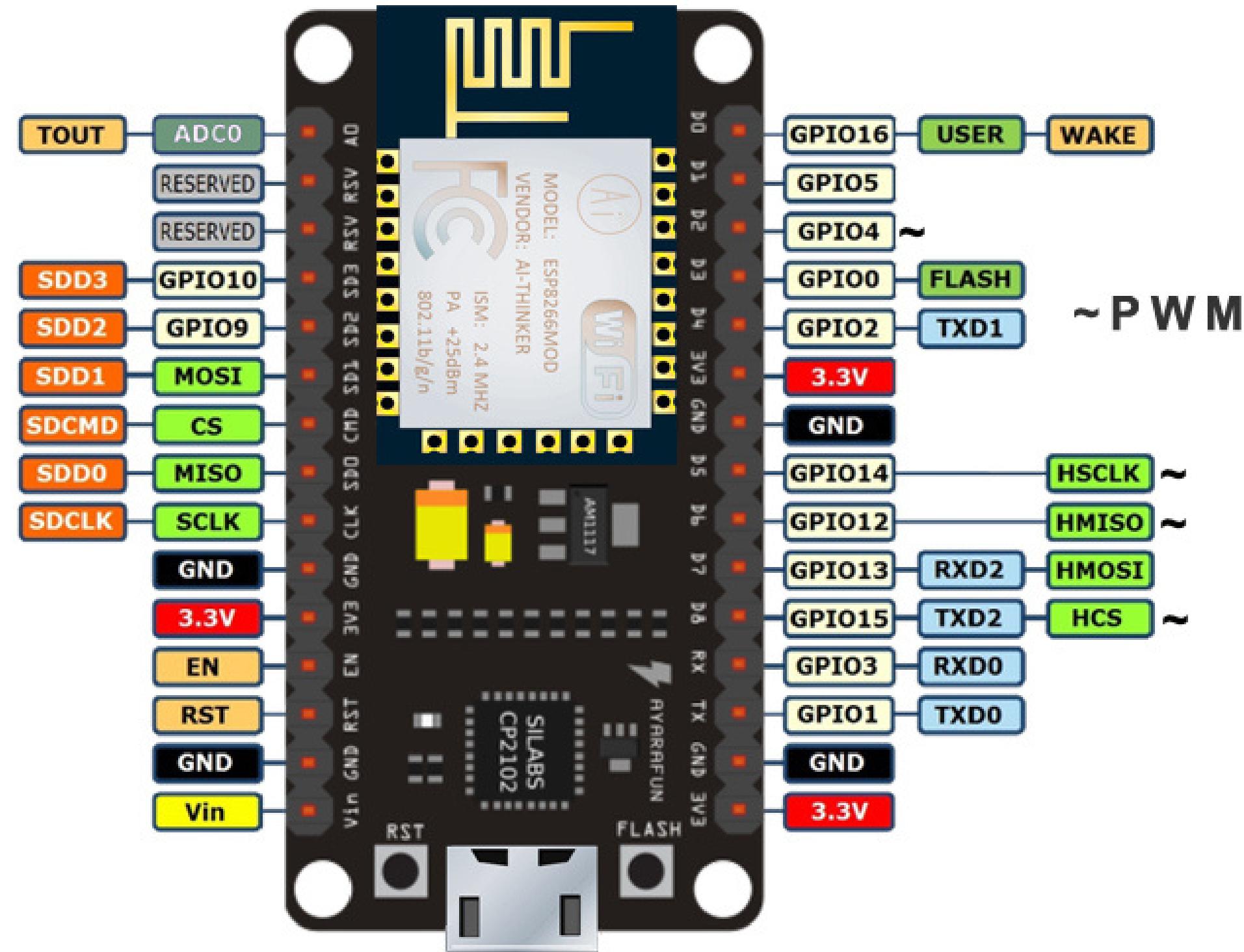
Difference Between ESP-01, ESP-12E Node MCU and WeMos D1 Mini

	ESP-01	ESP-12E Node MCU	WeMos D1 Mini
GPIOs	4	11	11
ADC	1	1	1
Flash Memory	1 MB	4 MB	4 MB
Breadboard friendly	No	Yes	Yes
USB to Serial Convertor	No	Yes	Yes
Size	24.75mm x 14.5mm (0.97" x 0.57")	48.55mm x 25.6mm (1.91" x 1")	34.2mm x 25.6mm (1.35" x 1")



ESP8266 12-E Chip Pinout

ESP8266 12-E NodeMCU kit pinout diagram

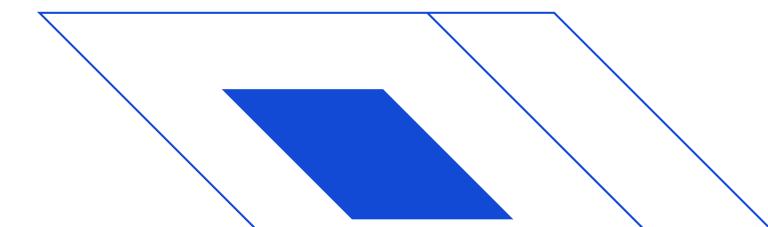
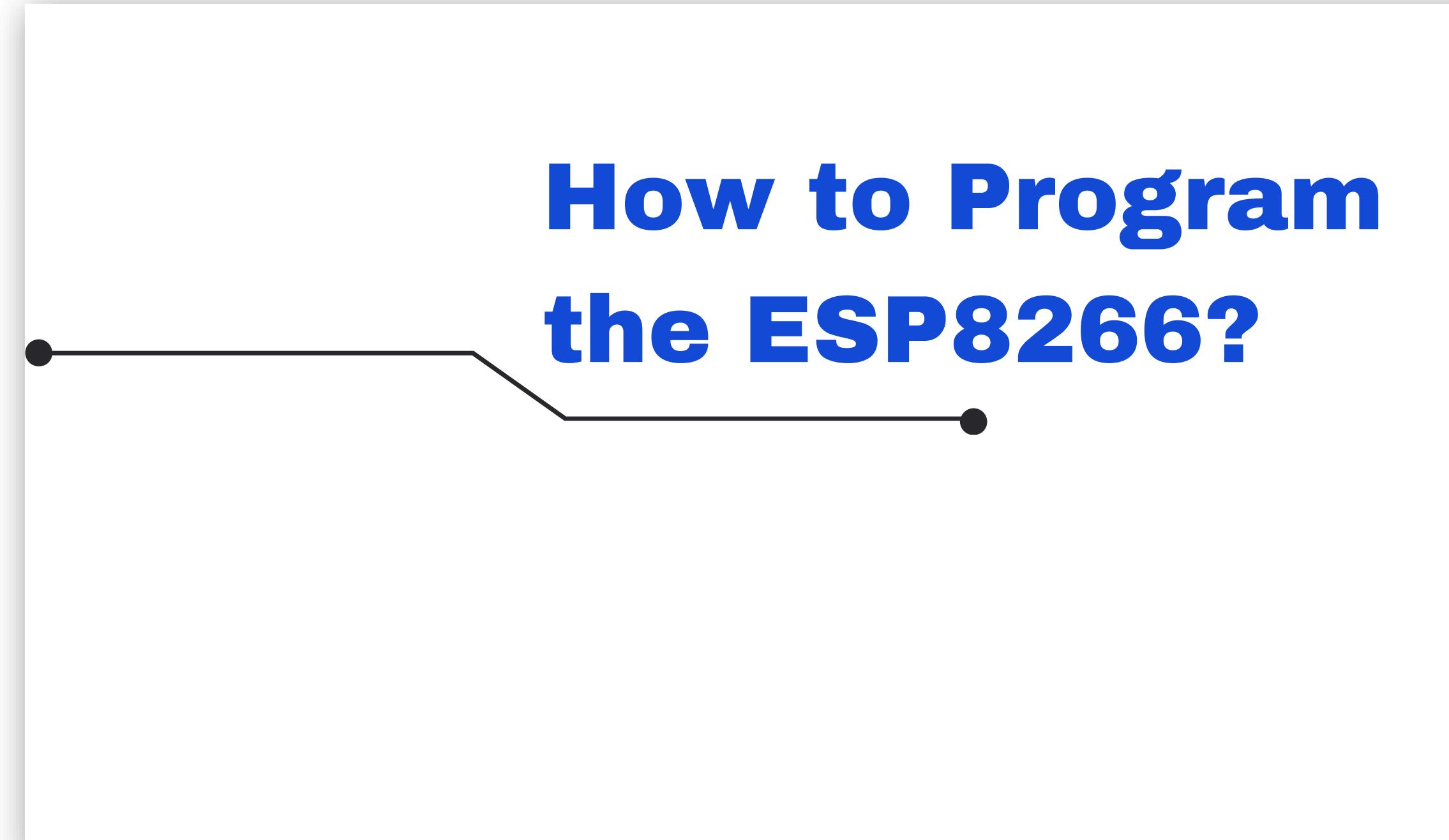


ESP8266 Peripherals

- 17 GPIOs
- SPI
- I2C
- I2S
- UART
- 10-bit ADC

Best Pins to Use – ESP8266

Label	GPIO	Input	Output	Notes
D0	GPIO 16	No Interrupt	No PWM or I2C Support	HIGH at boot used to wake up from deep sleep
D1	GPIO 5	OK	OK	often used as SCL (I2C)
D2	GPIO 4	OK	OK	often used as SDA (I2C)
D3	GPIO 0	Pulled up	OK	connected to FLASH button, boot fails if pulled LOW
D4	GPIO 2	Pulled up	OK	HIGH at boot connected to on-board LED, boot fails if pulled LOW
D5	GPIO 14	OK	OK	SPI (SCLK)
D6	GPIO 12	OK	OK	SPI (MISO)
D7	GPIO 13	OK	OK	SPI (MOSI)
D8	GPIO 15	Pulled to GND	OK	SPI (CS) Boot fails if pulled HIGH
RX	GPIO 3	OK	RX pin	HIGH at boot
TX	GPIO 1	TX pin	OK	HIGH at boot debug output at boot, boot fails if pulled LOW
A0	ADC 0	Analog Input	X	





Thank you

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