esp8266

The ESP8266 is a low-cost Wi-Fi microchip, with a full TCP/IP stack and microcontroller capability, produced by Espressif Systemsb in Shanghai, China.

The chip first came to the attention of Western makers in August 2014 with the ESP-01 module, made by a third-party manufacturer Ai-Thinker.

This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands.

However, at first there was almost no English-language documentation on the chip and the commands it accepted.

The very low price and the fact that there were very few external components on the module, which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, the chip, and the software on it, as well as to translate the Chinese documentation.

The ESP8285 is an ESP8266 with 1 MiB of built-in flash, allowing the building of single-chip devices capable of connecting to Wi-Fi.

The successor to these microcontroller chips is the ESP32, released in 2016.

**Features**

ESP-01 module wireframe

Processor: L106 32-bit RISC microprocessor core based on the Tensilica Xtensa Diamond Standard 106Micro running at 80 MHz

Memory:

32 KiB instruction RAM

32 KiB instruction cache RAM

80 KiB user-data RAM

16 KiB ETS system-data RAM

External QSPI flash: up to 16 MiB is supported (512 KiB to 4 MiB typically included)

IEEE 802.11 b/g/n Wi-Fi

Integrated TR switch, balun, LNA, power amplifier and matching network

WEP or WPA/WPA2 authentication, or open networks

16 GPIO pins

SPI

I²C (software implementation)

I²S interfaces with DMA (sharing pins with GPIO)

UART on dedicated pins, plus a transmit-only UART can be enabled on GPIO2

10-bit ADC (successive approximation ADC).

**SDKs**

In October 2014, Espressif Systems released a software development kit (SDK) for programming the chip directly, which removed the need for a separate microcontroller.

Since then, there have been many official SDK releases from Espressif; Espressif maintains two versions of the SDK — one that is based on FreeRTOS and the other based on callbacks.

An alternative to Espressif's official SDK is the open-source ESP-Open-SDK[9] that is based on the GNU Compiler Collection (GCC) toolchain, maintained by Max Filippov. Another alternative is the "Unofficial Development Kit" by Mikhail Grigorev.

Other SDKs, mostly open-source, include:

Annex WiFI RDS — Free rapid development environment. Similar to ESP8266 Basic but much faster and better stability. Self-hosting browser-based development environment. Good peripheral support.

Arduino — A C++-based firmware. With this core, the ESP8266 CPU and its Wi-Fi components can be programmed like any other Arduino device.

The ESP8266 Arduino Core is available through GitHub.

ESP8266 BASIC — An open-source BASIC-like interpreter specifically tailored for the Internet of Things (IoT).

Self-hosting browser-based development environment.

ESP Easy — Developed by home automation enthusiasts.

ESPHome — ESPHome is a system to control your ESP8266/ESP32 by simple yet powerful configuration files and control them remotely through home automation systems.

ESP-Open-RTOS — Open-source FreeRTOS-based ESP8266 software framework.

ESP-Open-SDK — Free and open (as much as possible) integrated SDK for ESP8266/ESP8285 chips.

Espruino — An actively maintained JavaScript SDK and firmware, closely emulating Node.js. Supports a few MCUs, including the ESP8266.

ESPurna — Open-source ESP8285/ESP8266 firmware.

Forthright — Port of Jones Forth to the ESP8266 microcontroller.

MicroPython — A port of MicroPython (an implementation of Python for embedded devices) to the ESP8266 platform.

Mongoose OS — An open-source operating system for connected products. Supports ESP8266 and ESP32. Develop in C or JavaScript.

NodeMCU — A Lua-based firmware.

PlatformIO — A cross-platform IDE and unified debugger, which sits on top of Arduino code and libraries.

Punyforth — Forth-inspired programming language for the ESP8266.

Sming — An actively developed asynchronous C/C++ framework with superb performance and multiple network features.

uLisp — A version of the Lisp programming language specifically designed to run on processors with a limited amount of RAM.

ZBasic for ESP8266 — A subset of Microsoft's widely-used Visual Basic 6, which has been adapted as a control language for the ZX microcontroller family and the ESP8266.

Zerynth — IoT framework for programming ESP8266 and other microcontrollers in Python.