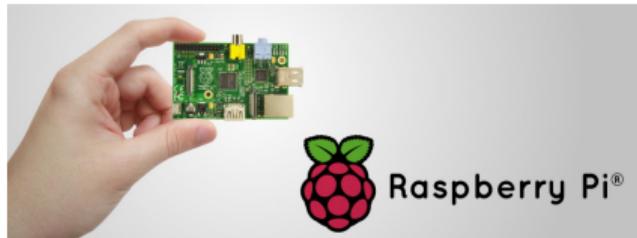


# Introduction to Raspberry Pi

Introducción al IoT



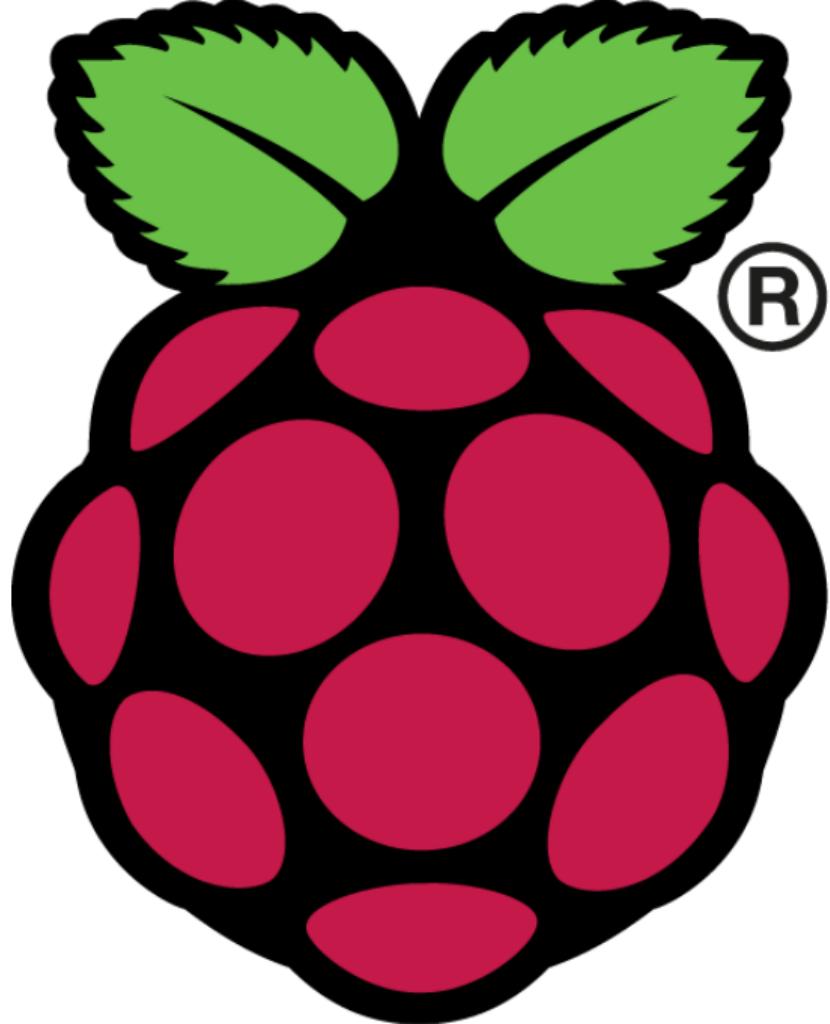
**Marco Teran**

2022

# Outline

- 1 Introduction
- 2 What is Raspberry Pi?
- 3 Raspberry Pi: The Timeline
- 4 Operating System
- 5 Hardware
- 6 Networking
- 7 Operating System
- 8 Others

# Introduction

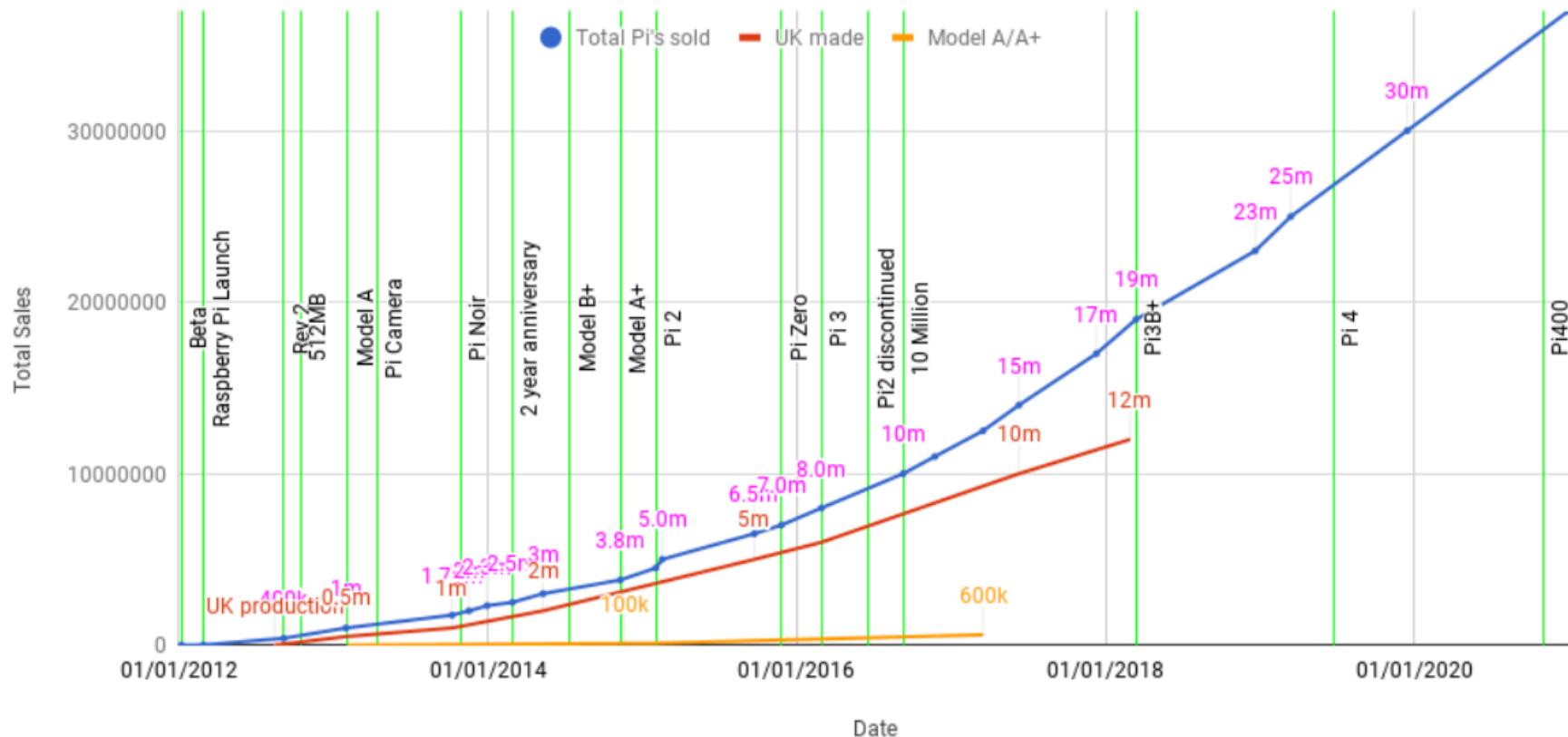


# What is Raspberry Pi?

# What is Raspberry Pi?

- The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote the teaching of basic computer science in schools and in developing countries.
- The original model became far more popular than anticipated, selling outside of its target market for uses such as robotics.
- Over 5 million Raspberry Pis have been sold before February 2015, making it the best-selling British computer. By November 2016 they had sold 11 million units.

# Raspberry Pi Sales



# Raspberry Pi: The Timeline

# Raspberry Pi: The Timeline

- The first generation (Raspberry Pi 1 Model B) was released in February 2012. It was followed by a simpler and inexpensive model Model A.
- In 2014, the foundation released a board with an improved design in Raspberry Pi 1 Model B+. These boards are approximately credit-card sized and represent the standard mainline form-factor.
- Improved A+ and B+ models were released a year later. A "compute module" was released in April 2014 for embedded applications, and a Raspberry Pi Zero with smaller size and reduced input/output (I/O) and general-purpose input/output (GPIO) capabilities was released in November 2015 for US\$5.

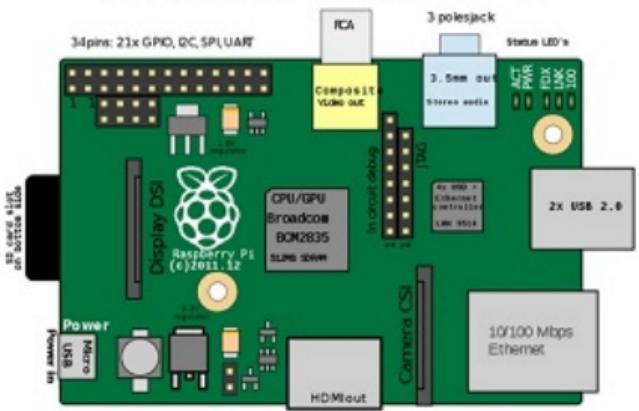
# Raspberry Pi: The Timeline

- The Raspberry Pi 2 which added more RAM was released in February 2015.
- Raspberry Pi 3 Model B released in February 2016, is bundled with on-board WiFi, Bluetooth and USB boot capabilities.
- As of January 2017, Raspberry Pi 3 Model B is the newest mainline Raspberry Pi.
- Raspberry Pi boards are priced between US\$5–35.
- As of 28 February 2017, the Raspberry Pi Zero W was launched, which is identical to the Raspberry Pi Zero, but has the Wi-Fi and Bluetooth functionality of the Raspberry Pi 3 for US\$10.

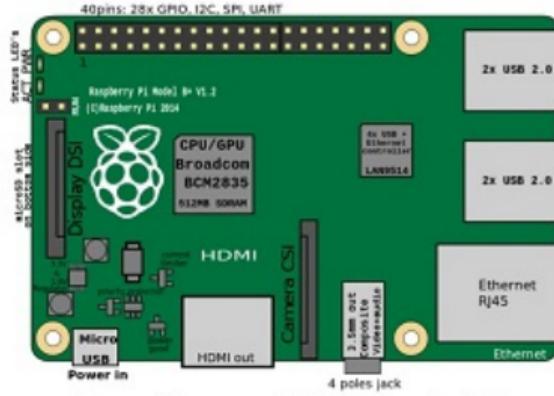


# Raspberry Pi Model B

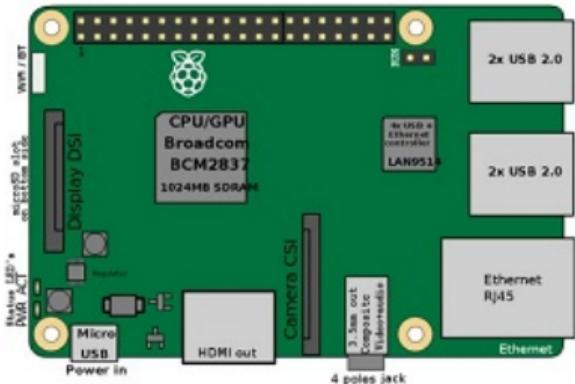
## Raspberry Pi 1 Model B



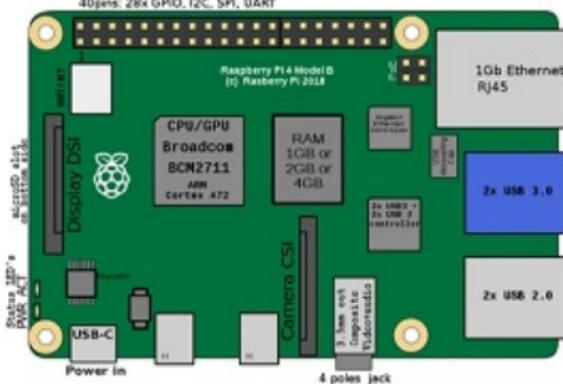
## Raspberry Pi 1 Model B+



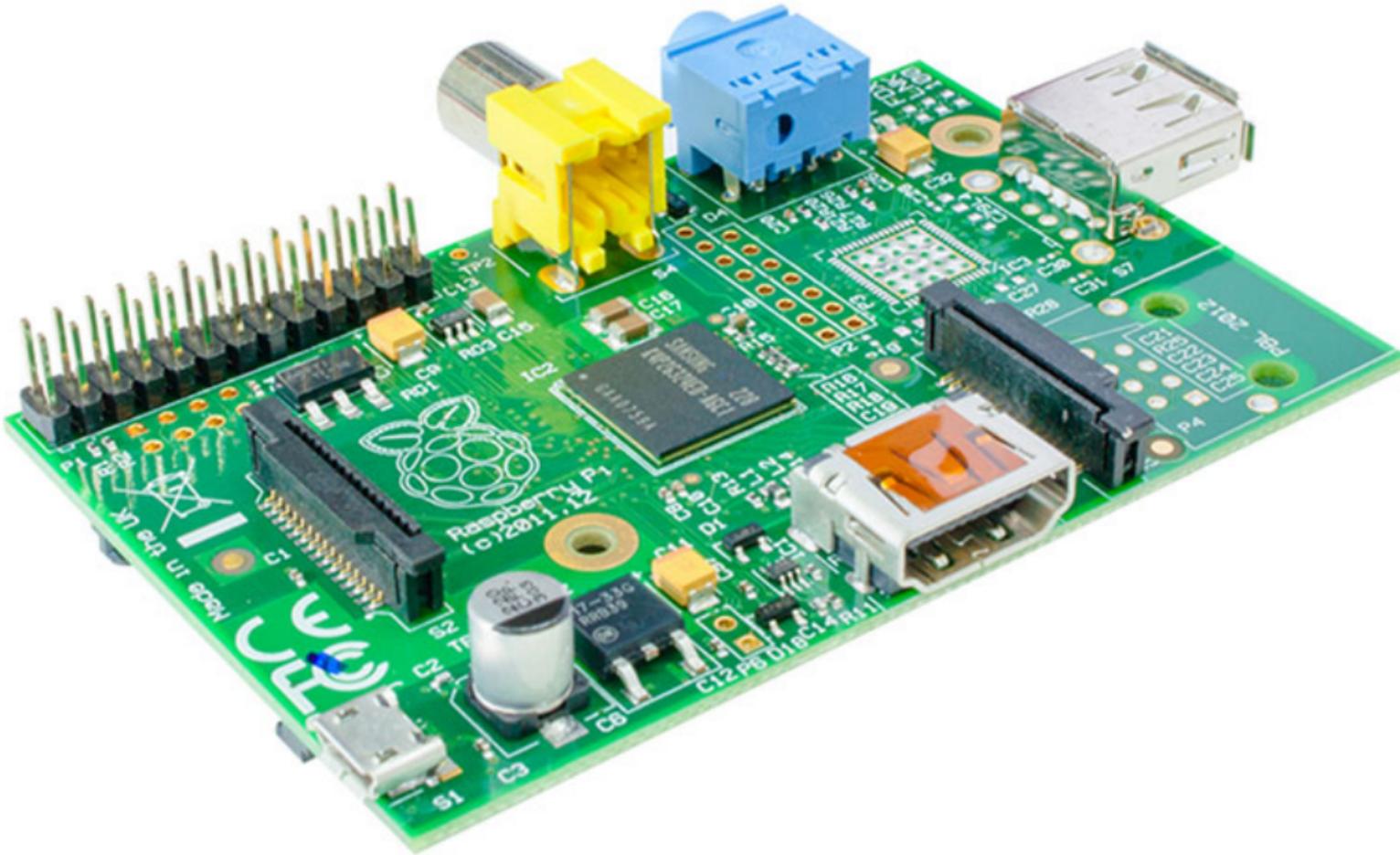
## Raspberry Pi 3 Model B

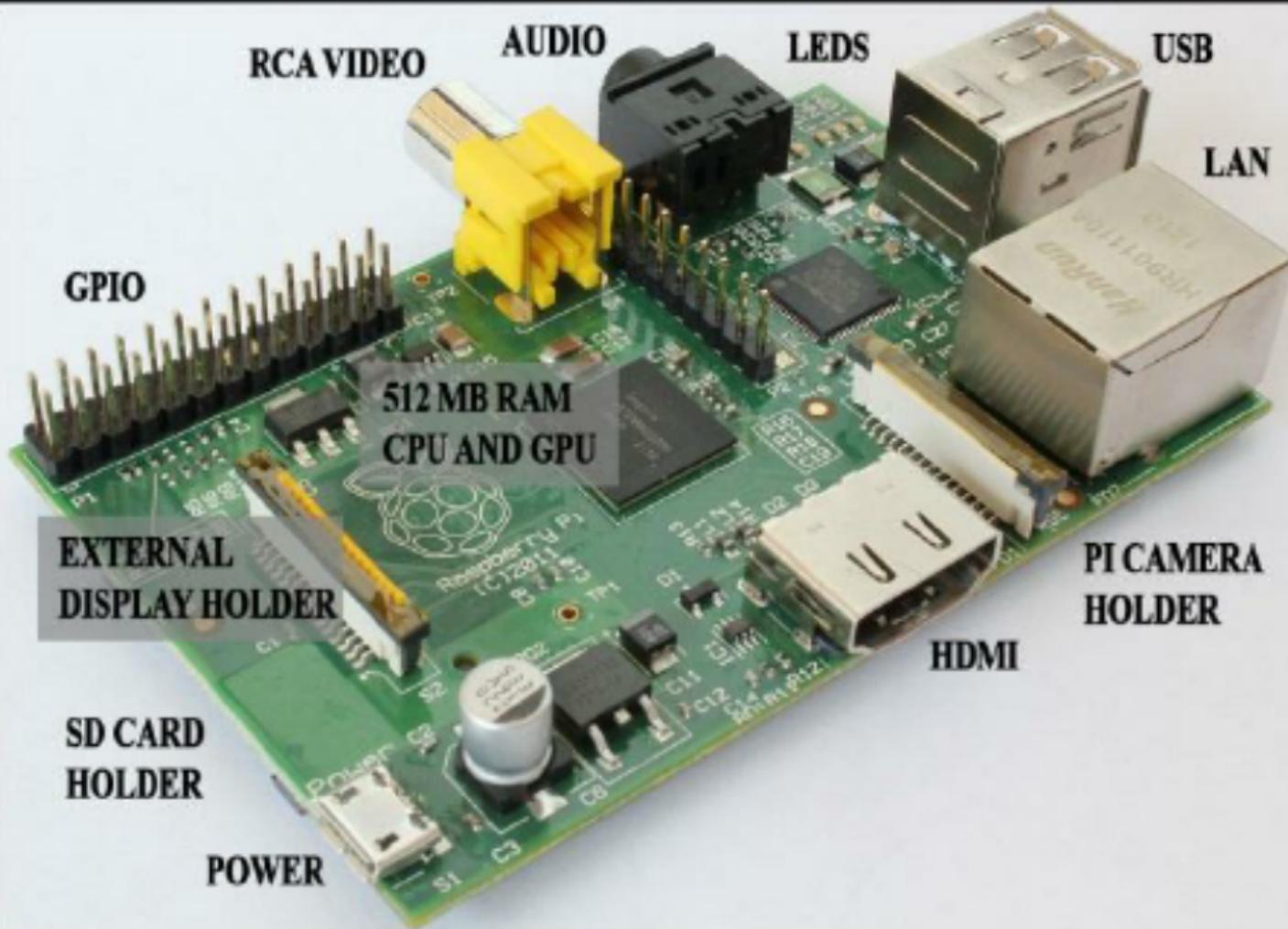


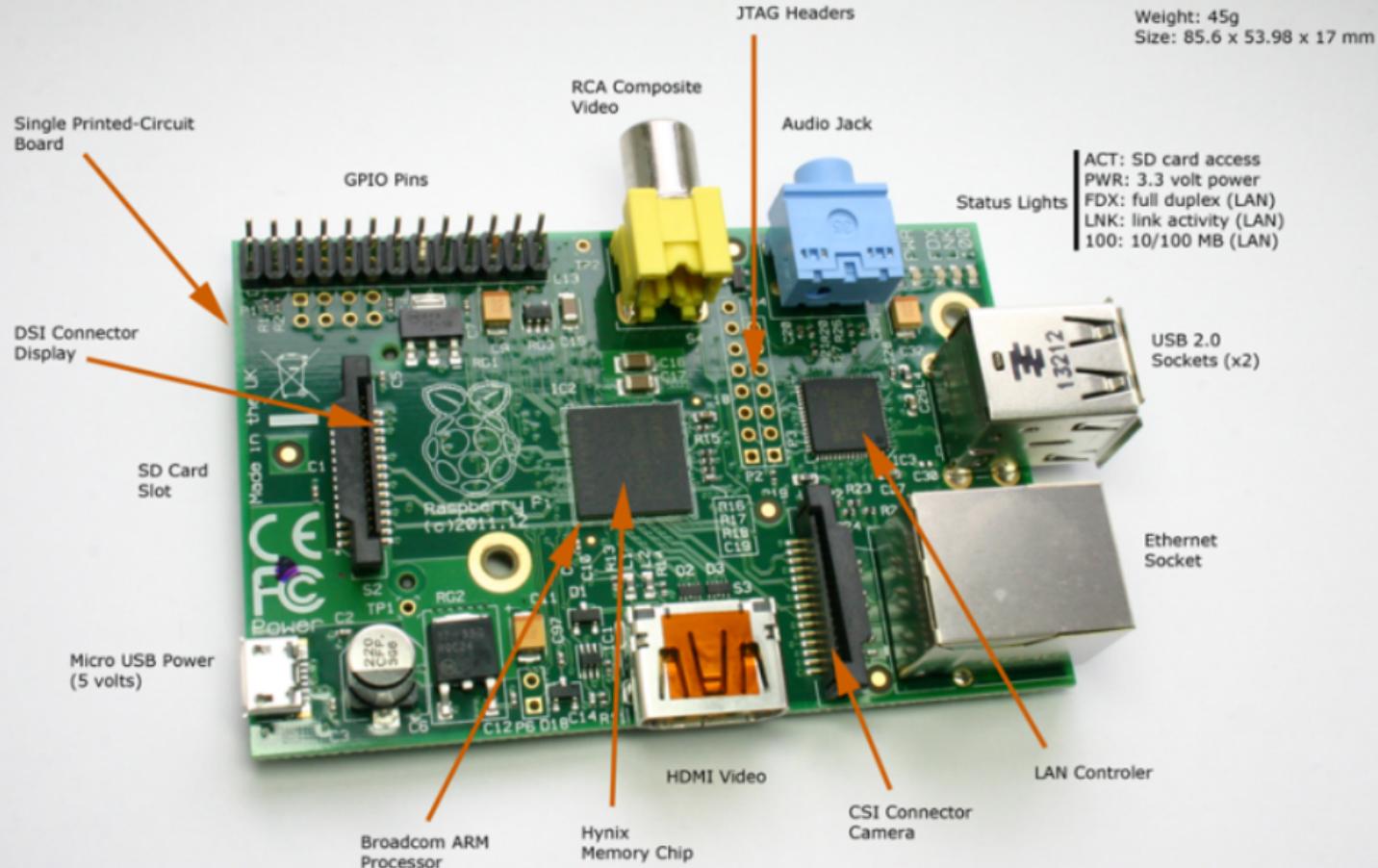
## Raspberry Pi 4 Model B



# Raspberry Pi Model B Rev. 2

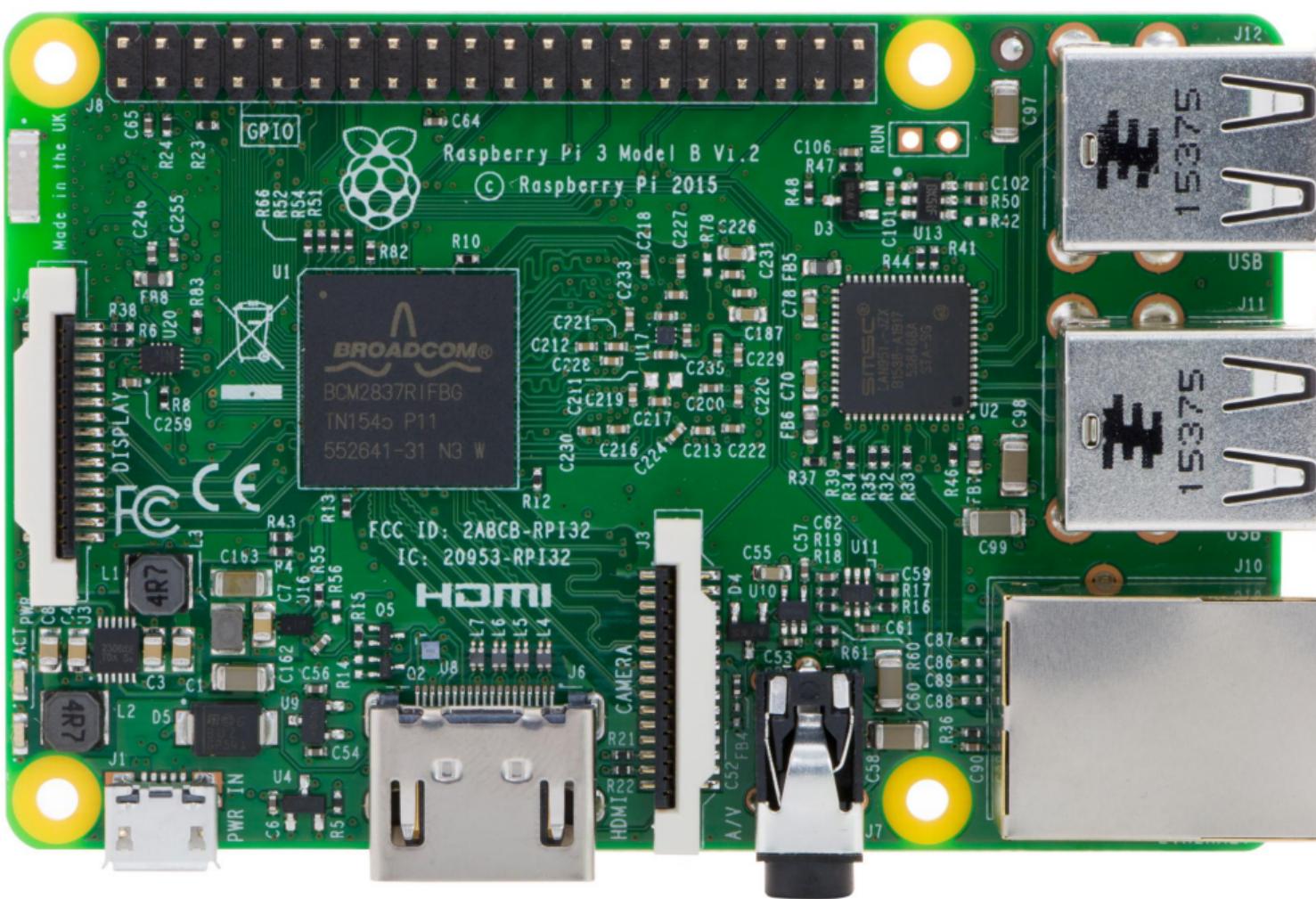








# Raspberry Pi 3 Model B



# Raspberry Pi 3 Model B+

2.4GHz and 5GHz IEEE  
802.11.b/g/n/ac wireless LAN,  
Bluetooth 4.2, BLE

Broadcom BCM2837B0, Cortex-A53  
64-bit SoC @ 1.4GHz  
with 1GB LPDDR2 SDRAM

Extended 40-pin GPIO header

Power over Ethernet (PoE) header  
(requires separate PoE HAT)

MIPI DSI display port

56mm

4 × USB 2.0 ports and  
Faster Ethernet over USB 2.0  
(maximum throughput 300Mbps)

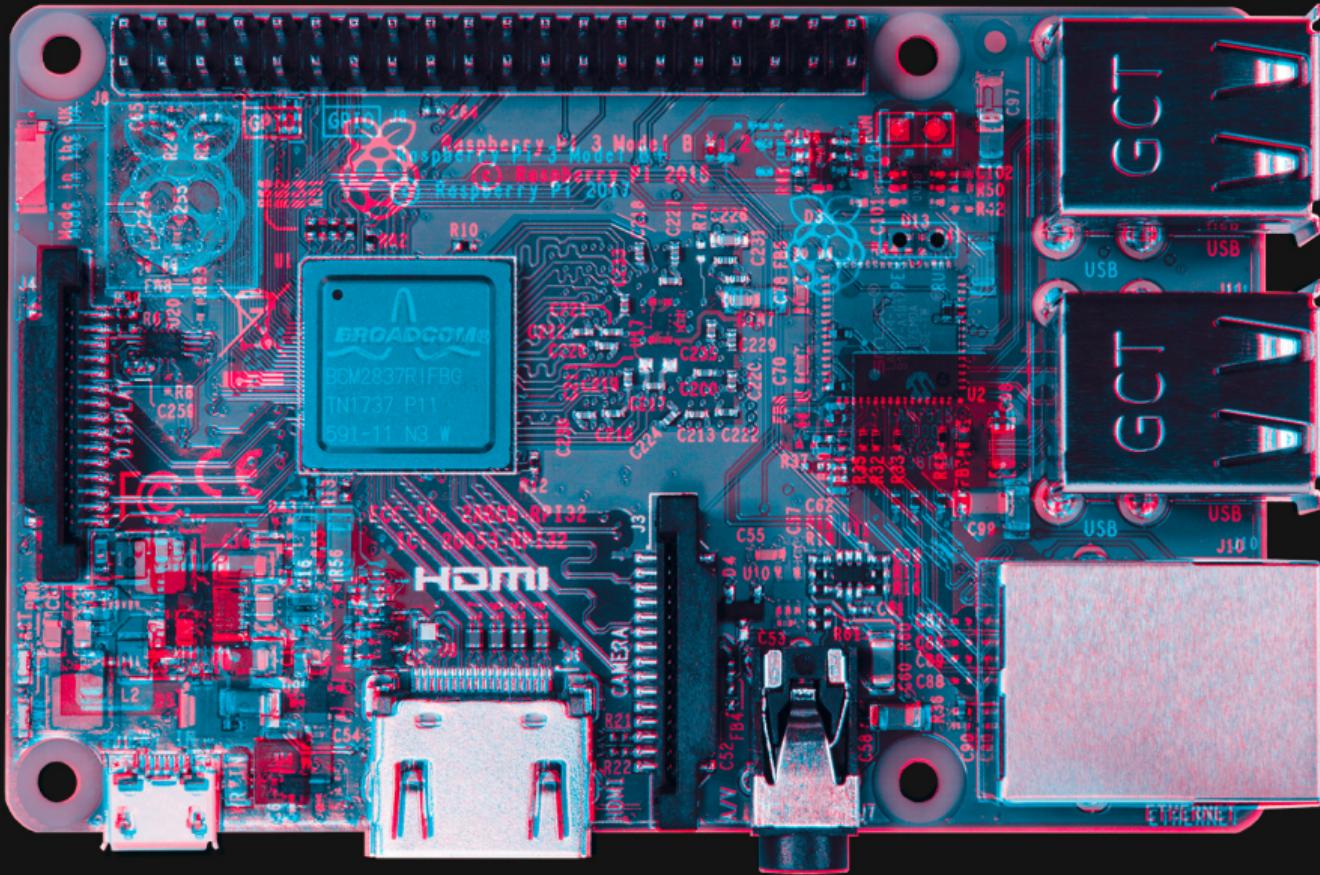
MIPI CSI camera port

5V/2.5A DC via micro  
USB connector

Full size HDMI

85mm

4 pole stereo output and composite video port



# Raspberry Pi 3 Model B: Features

- All models feature a Broadcom system on a chip (SoC), which includes an ARM compatible central processing unit (CPU) and an on-chip graphics processing unit (GPU, a VideoCore IV).
- CPU speed ranges from 700 MHz to 1.2 GHz for the Pi 3 and on board memory range from 256 MB to 1 GB RAM.
- Secure Digital (SD) cards are used to store the operating system and program memory in either the SDHC or MicroSDHC sizes.

# Raspberry Pi 3 Model B: Features

- Most boards have between one and four USB slots, HDMI and composite video output, and a 3.5 mm phono jack for audio.
- Lower level output is provided by a number of GPIO pins which support common protocols like I2C.
- The B-models have an 8P8C Ethernet port and the Pi 3 and Pi Zero W have on board Wi-Fi 802.11n and Bluetooth.

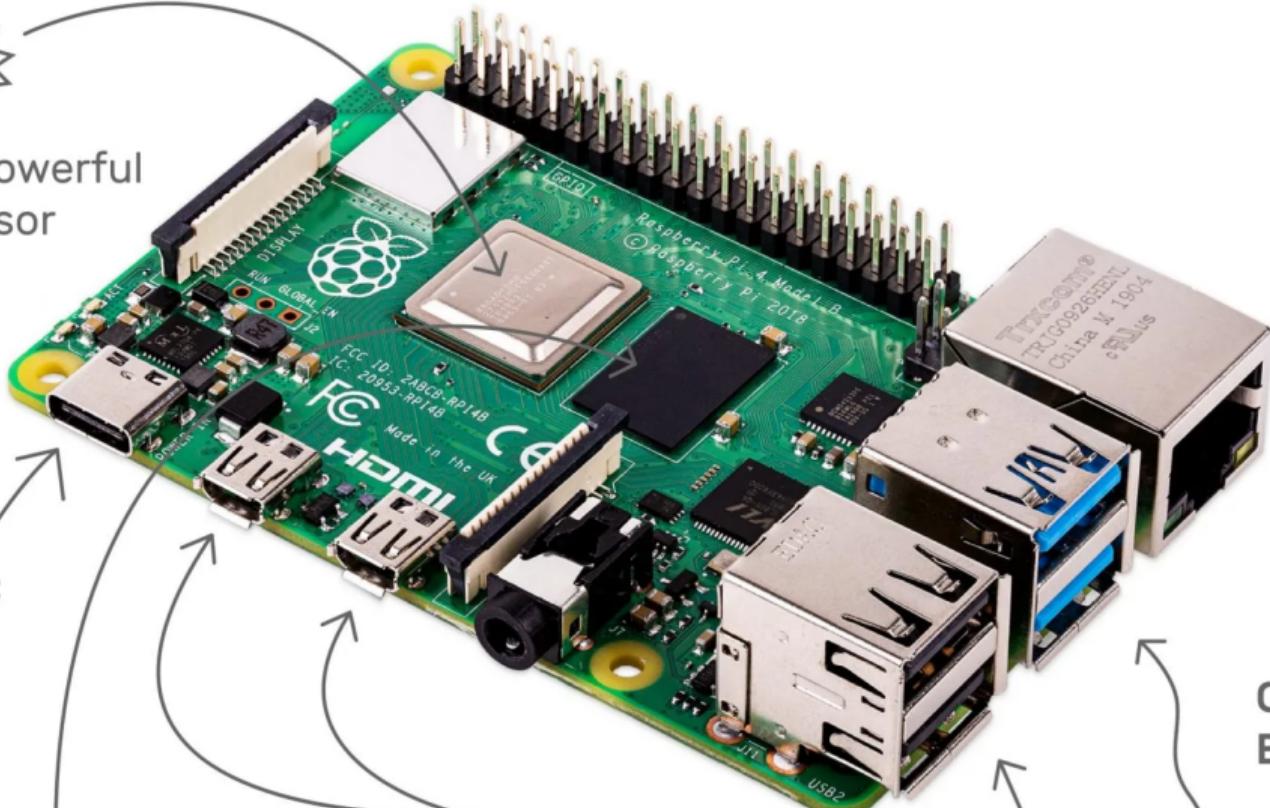


Product	SoC	Speed	RAM	USB Ports	Ethernet	Wireless	Bluetooth
Raspberry Pi Model A+	BCM2835	700MHz	512MB	1	No	No	No
Raspberry Pi Model B+	BCM2835	700MHz	512MB	4	100Base-T	No	No
Raspberry Pi 2 Model B	BCM2836/7	900MHz	1GB	4	100Base-T	No	No
Raspberry Pi 3 Model B	BCM2837A0/B0	1200MHz	1GB	4	100Base-T	802.11n	4.1
Raspberry Pi 3 Model A+	BCM2837B0	1400MHz	512MB	1	No	802.11ac/n	4.2
Raspberry Pi 3 Model B+	BCM2837B0	1400MHz	1GB	4	1000Base-T	802.11ac/n	4.2
Raspberry Pi 4 Model B	BCM2711	1500MHz	1GB	2xUSB2, 2xUSB3	1000Base-T	802.11ac/n	5.0
Raspberry Pi 4 Model B	BCM2711	1500MHz	2GB	2xUSB2, 2xUSB3	1000Base-T	802.11ac/n	5.0
Raspberry Pi 4 Model B	BCM2711	1500MHz	4GB	2xUSB2, 2xUSB3	1000Base-T	802.11ac/n	5.0
Raspberry Pi Zero	BCM2835	1000MHz	512MB	1	No	No	No
Raspberry Pi Zero W	BCM2835	1000MHz	512MB	1	No	802.11n	4.1
Raspberry Pi Zero WH	BCM2835	1000MHz	512MB	1	No	802.11n	4.1

# Raspberry Pi 4



More powerful processor



Choice of RAM

1GB

2GB

4GB

MICRO HDMI PORTS

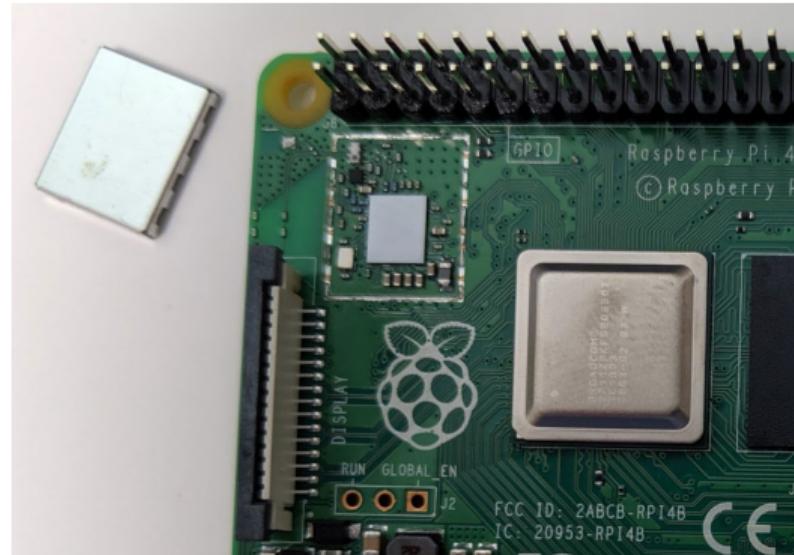
Supporting 2 x 4K displays

USB 3

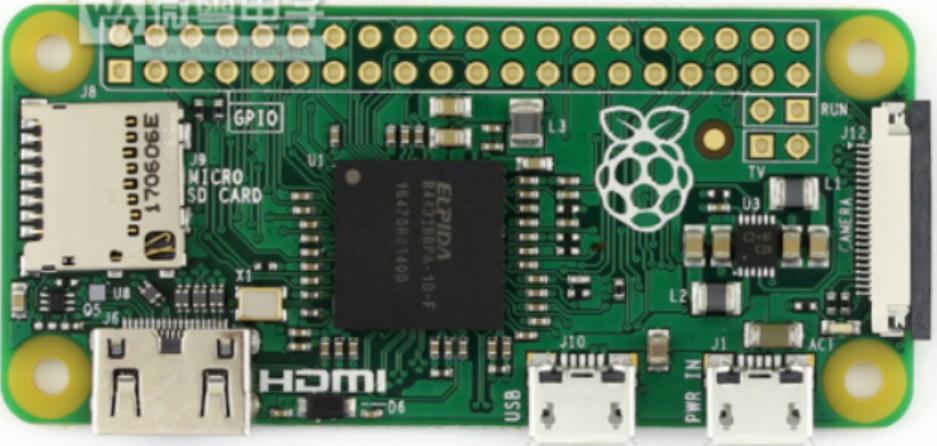
USB 2

# List of ICs found on Pi 4

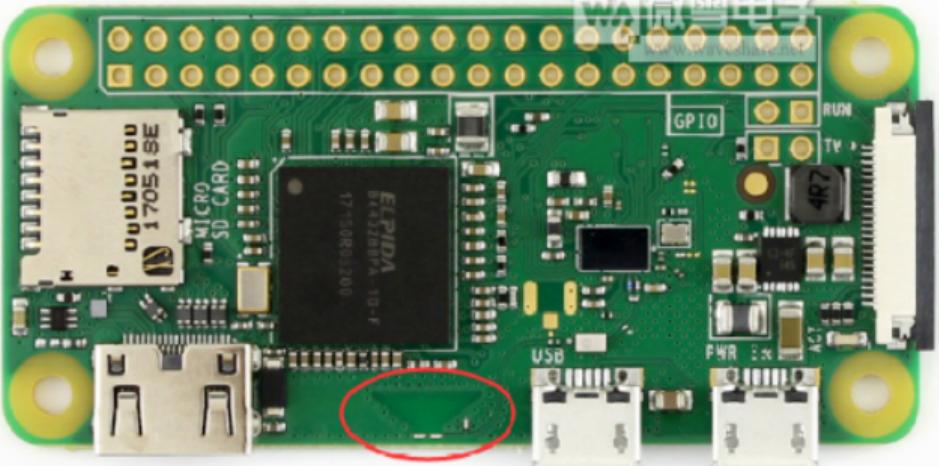
- Broadcom BCM2711 (2711ZPKFSB0660T)
- Samsung LPDDR4 RAM, K4F6E3S4ZHMMGCJ
- Broadcom BCM54213PE gigabit Ethernet transceiver
- VIA Labs Inc. VL805 USB 3.0 host controller
- Inside the metal cover, Cypress CYW43455 wifi/Bluetooth transceiver
- MXL7704 power management IC



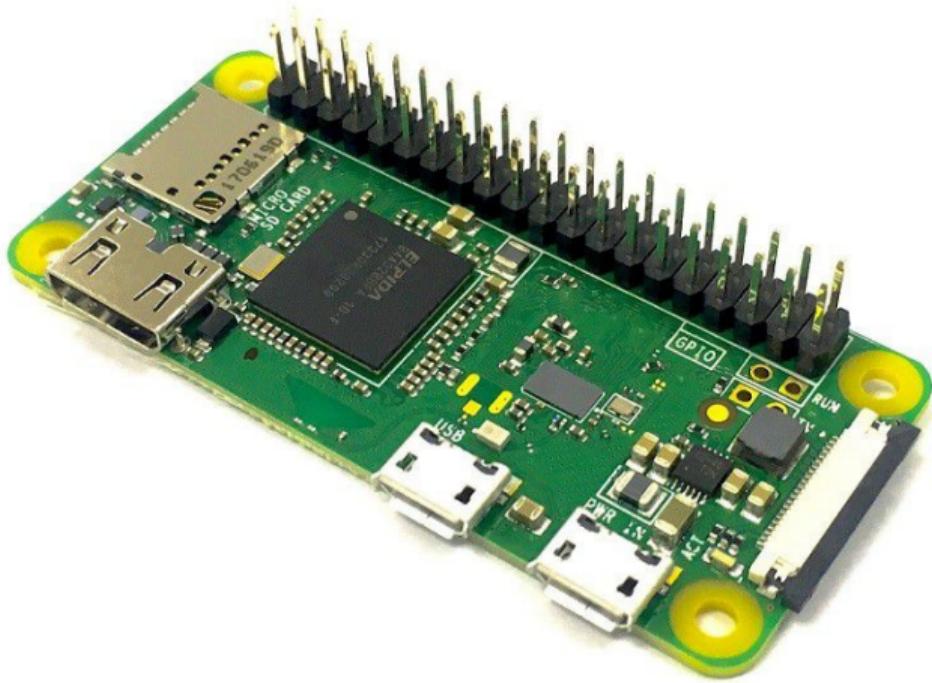
# Raspberry Pi Zero

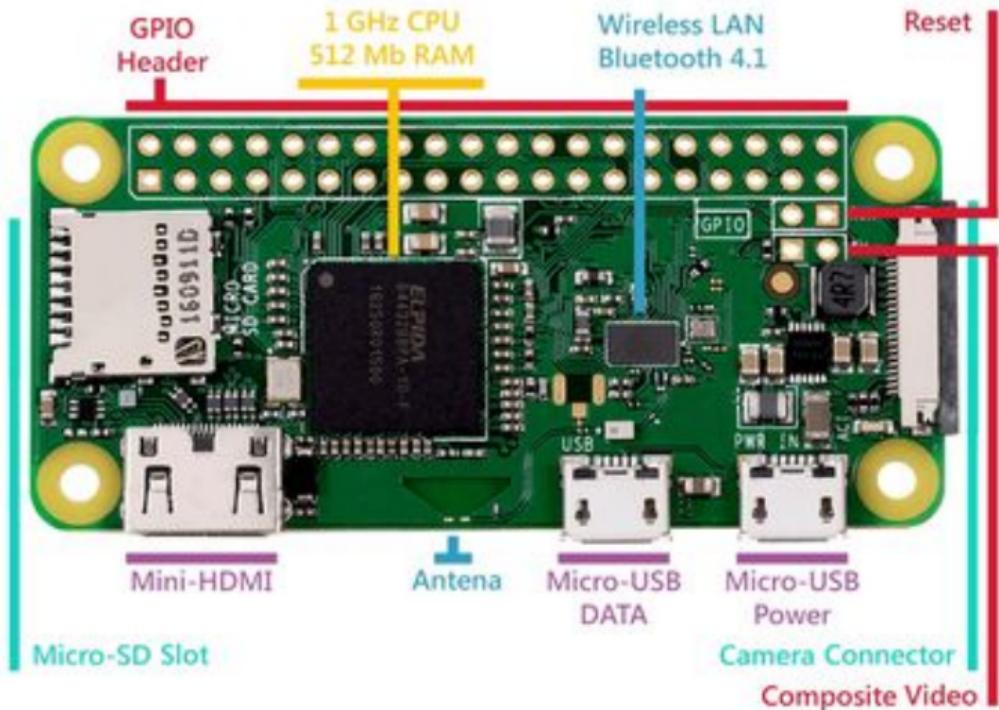


Zero

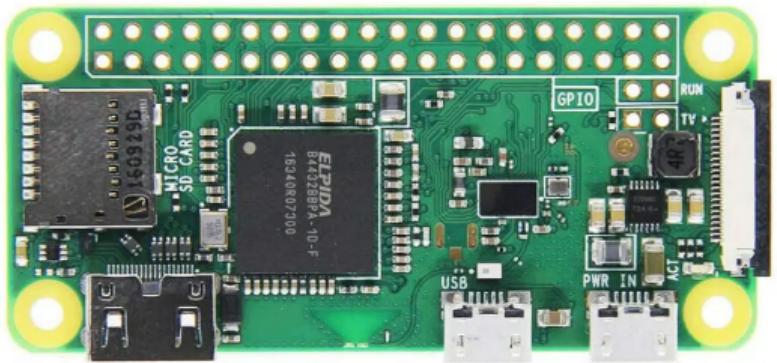


Zero W

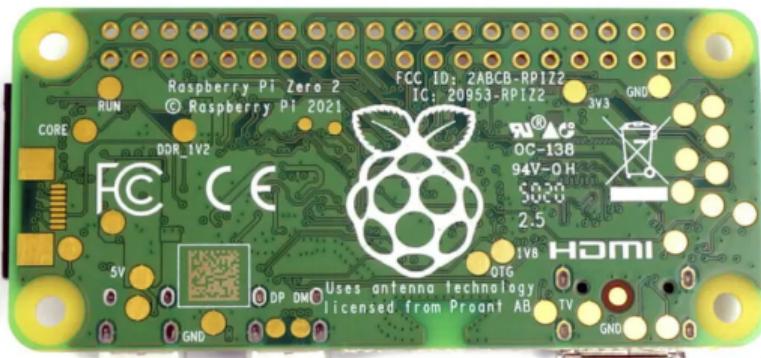
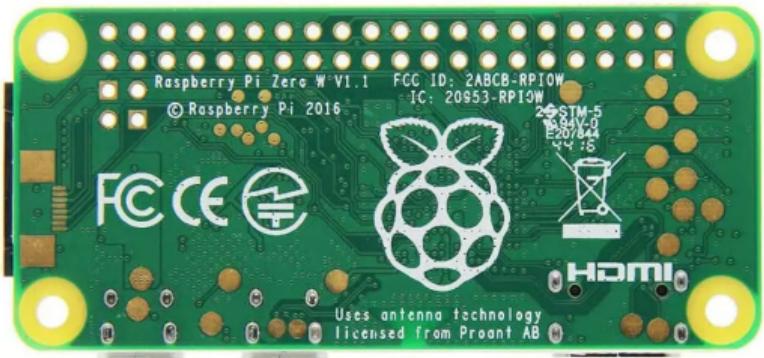
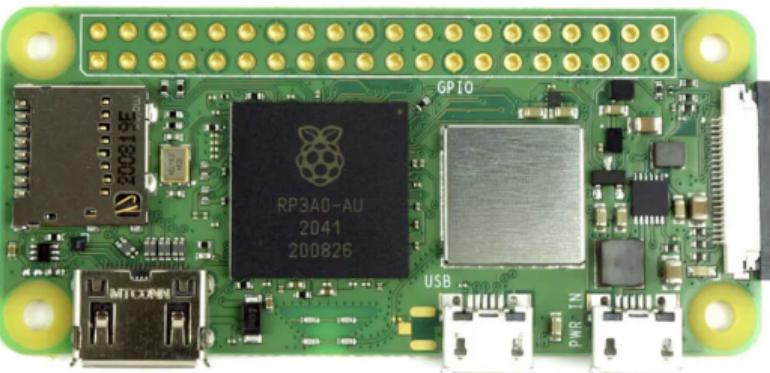


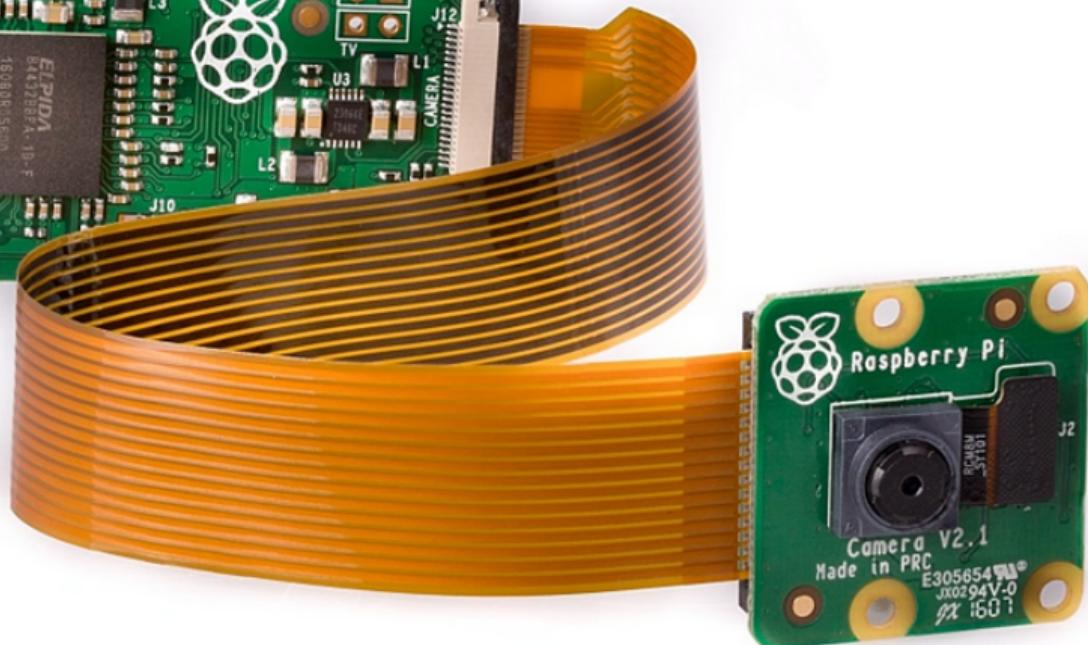
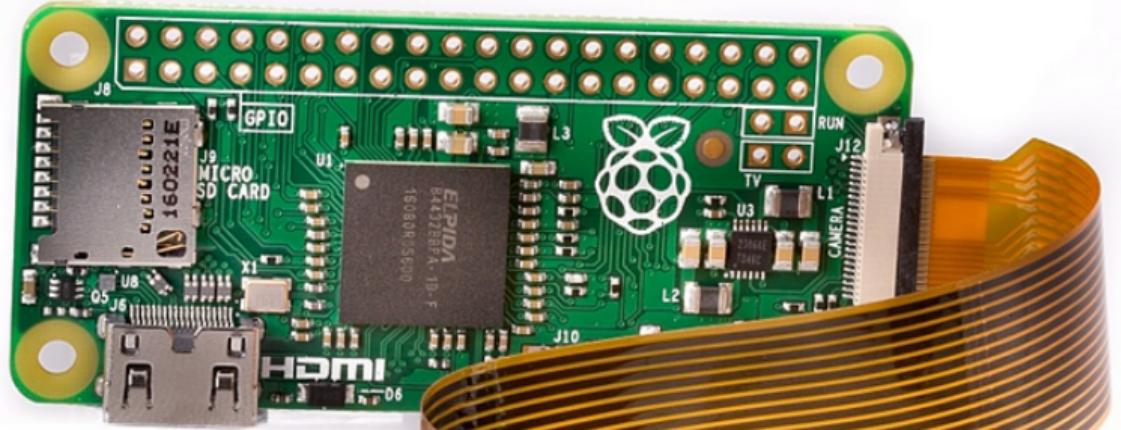


# Raspberry Pi Zero W



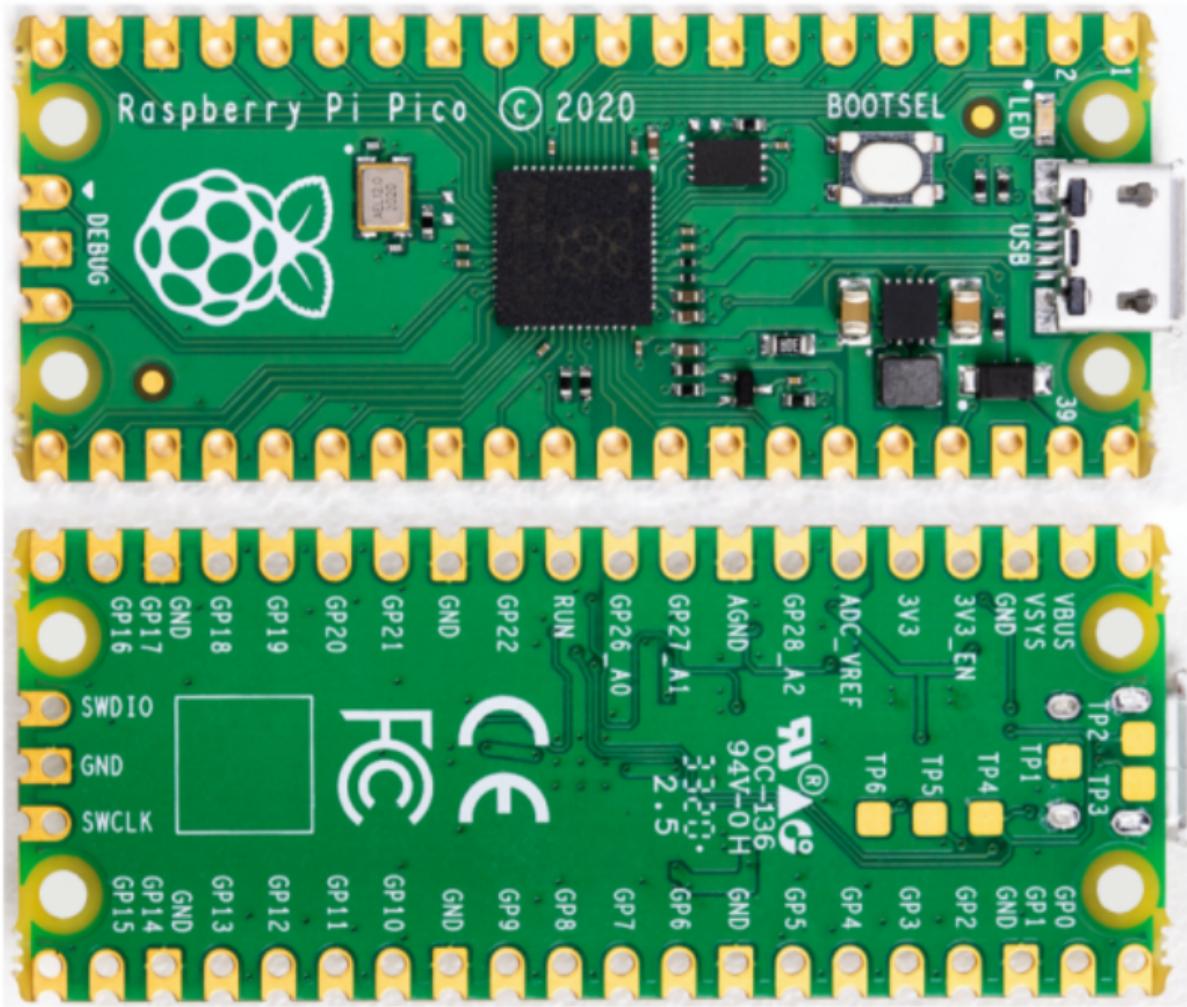
# Raspberry Pi Zero 2 W

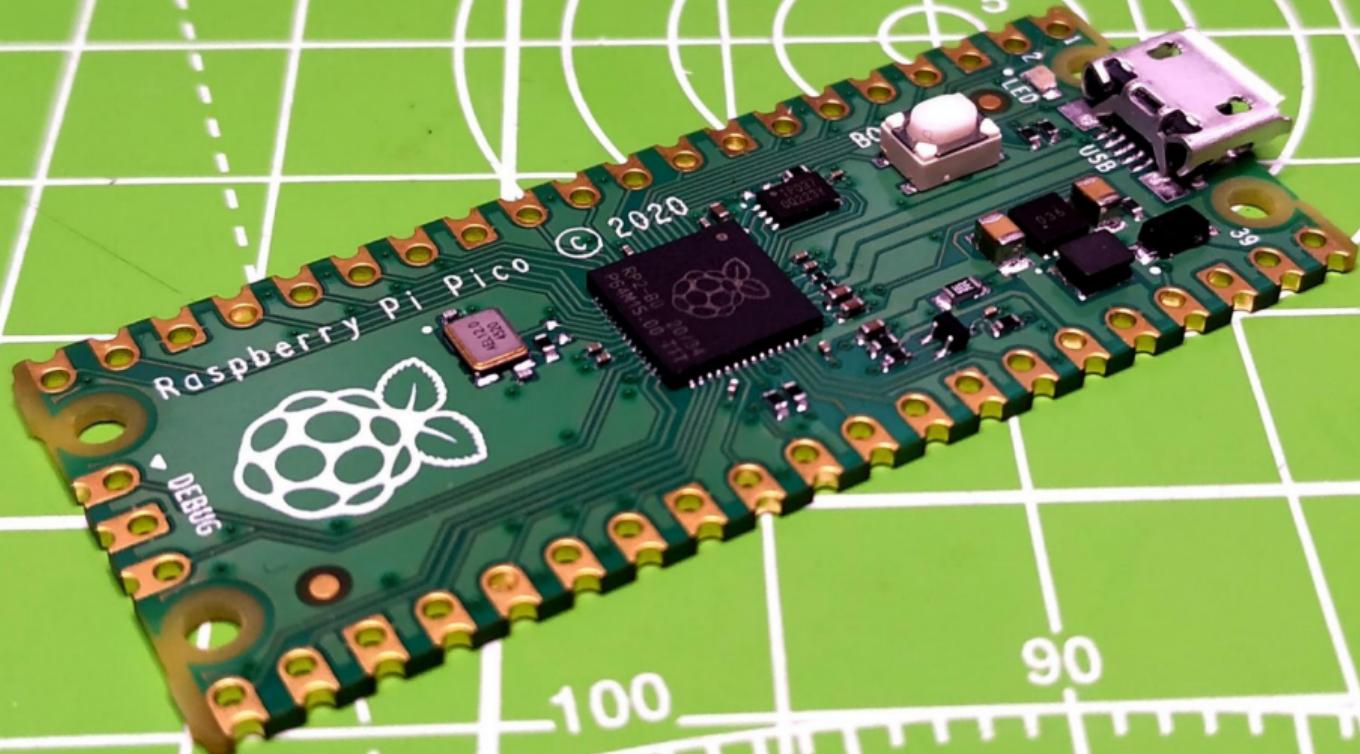


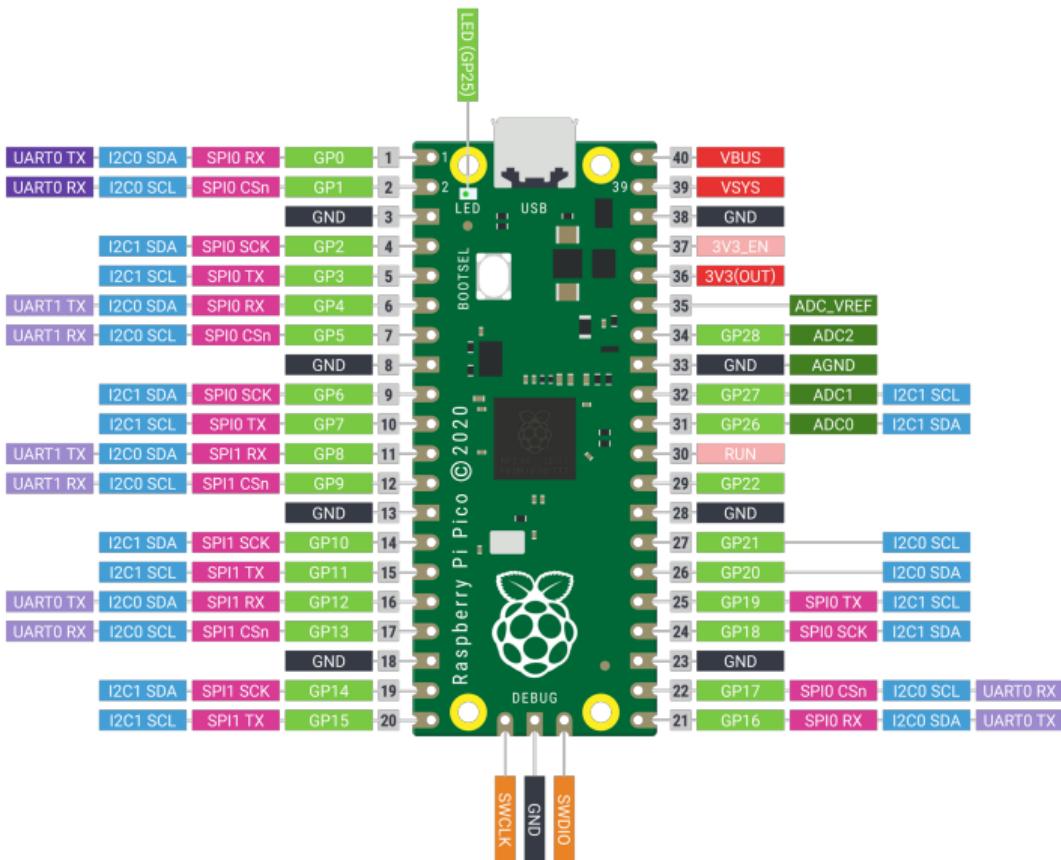


# Raspberry Pi Pico

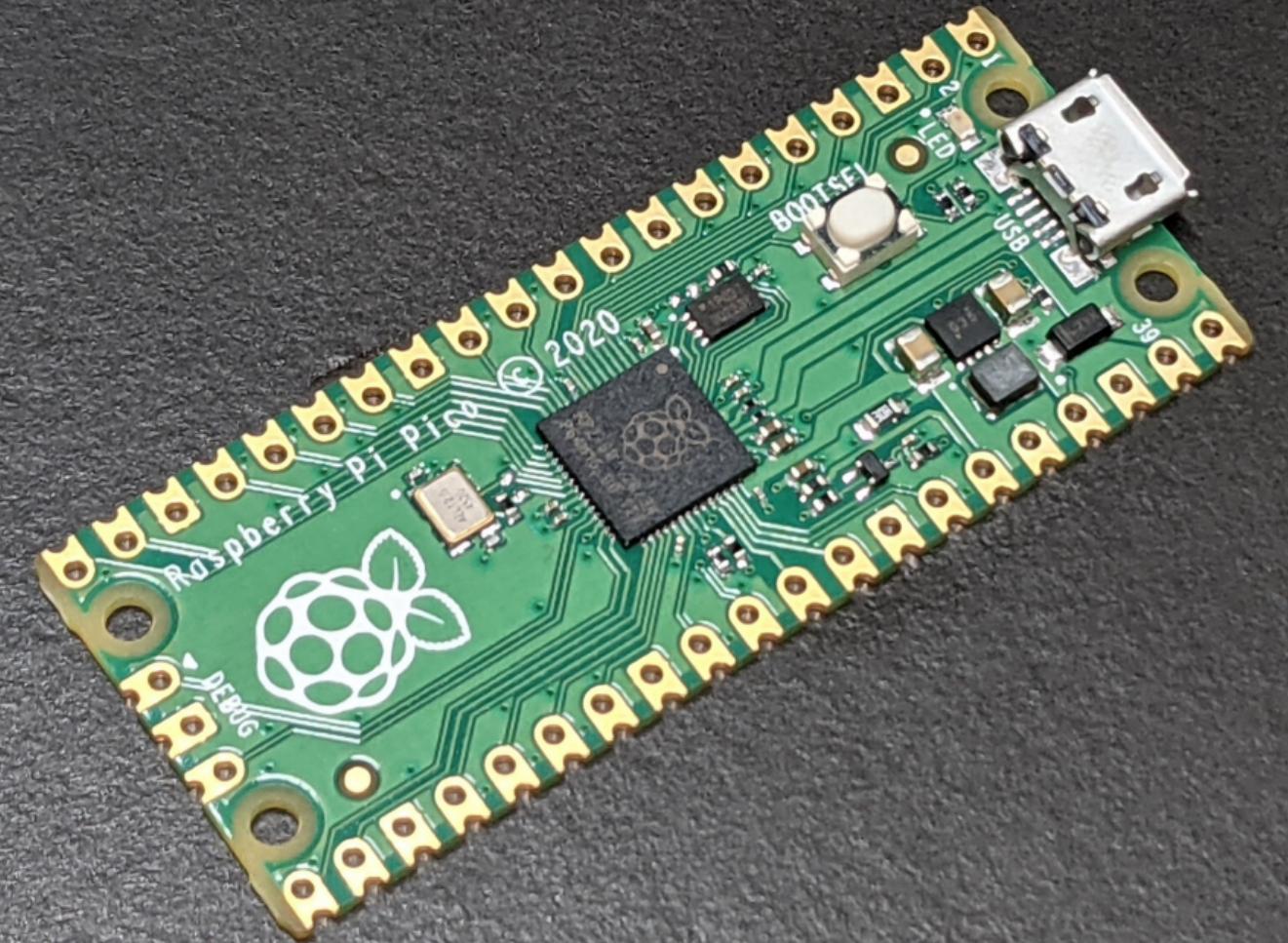


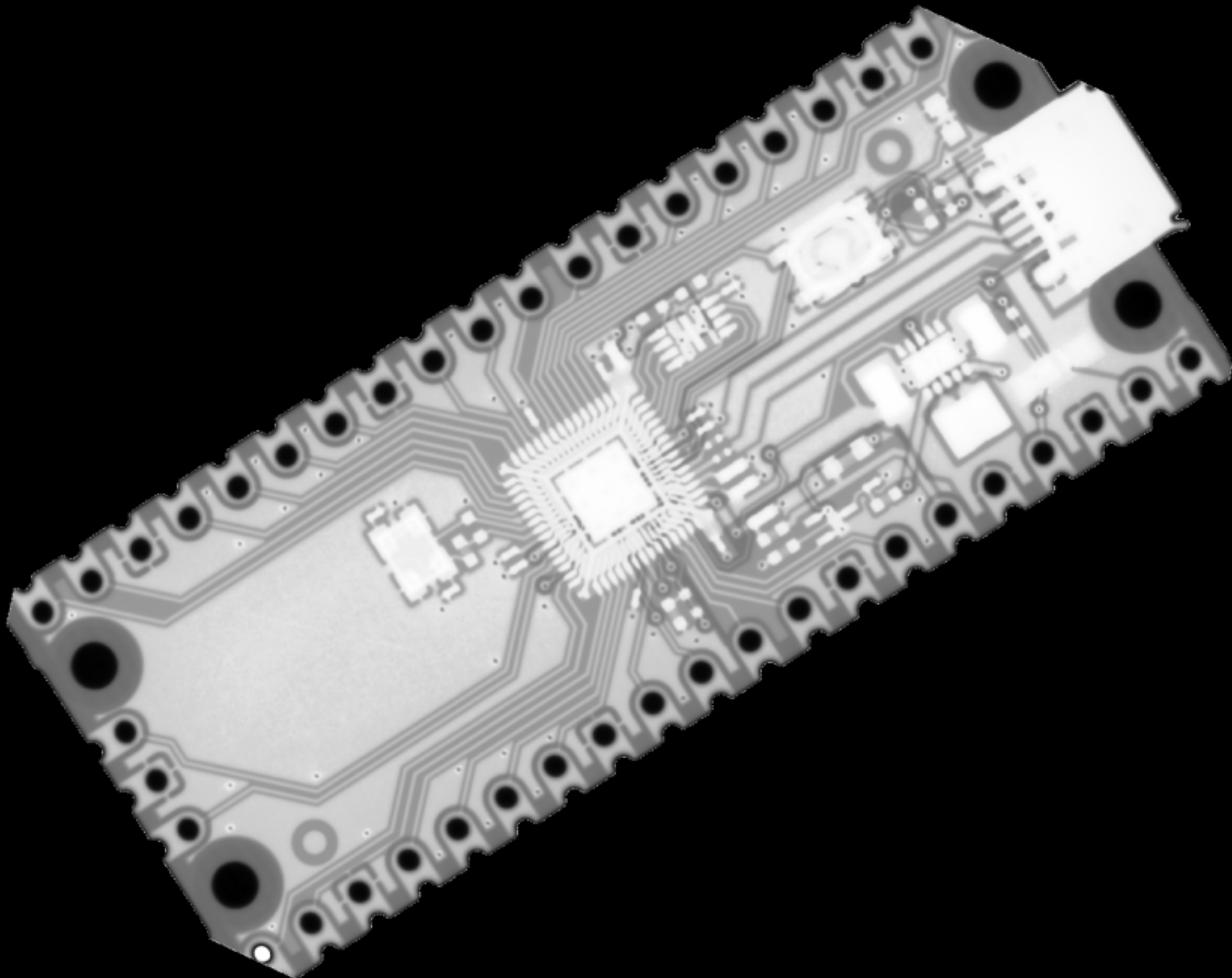


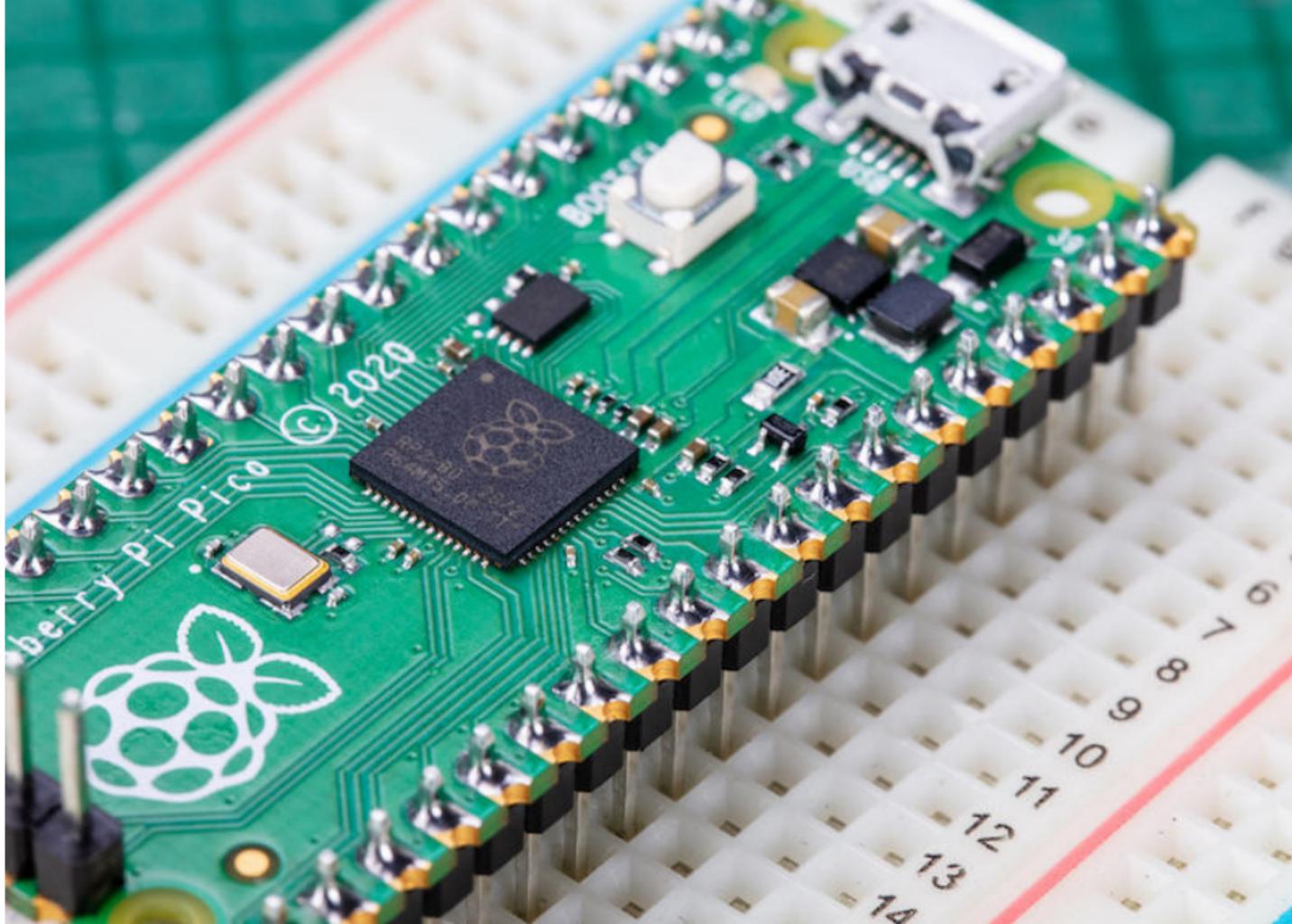




■ Power	■ Ground	■ UART / UART (default)	■ GPIO, PIO, and PWM	■ ADC	■ SPI	■ I2C	■ System Control	■ Debugging
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# Hardware

# RAM

- The Raspberry Pi 2 and the Raspberry Pi 3 have 1 GB of RAM.
- The Raspberry Pi Zero and Zero W have 512 MB of RAM.

# Networking

# Networking

- The Model A, A+ and Pi Zero have no Ethernet circuitry and are commonly connected to a network using an external user-supplied USB Ethernet or Wi-Fi adapter.
- On the Model B and B+ the Ethernet port is provided by a built-in USB Ethernet adapter using the SMSC LAN9514 chip.
- The Raspberry Pi 3 and Pi Zero W (wireless) are equipped with 2.4 GHz WiFi 802.11n (150 Mbit/s) and Bluetooth 4.1 (24 Mbit/s) based on Broadcom BCM43438 FullIMAC chip with no official support for Monitor mode but implemented through unofficial firmware patching and the Pi 3 also has a 10/100 Ethernet port.

# Operating System

# Operating System

- The Foundation provides Raspbian, a Debian based Linux distribution for download, as well as third party Ubuntu, Windows 10 IOT Core, RISC OS, and specialised media center distributions.
- It promotes Python and Scratch as the main programming language, with support for many other languages.
- The default firmware is closed source, while an unofficial open source is available.



UBUNTU MATE



SNAPPY UBUNTU CORE



WINDOWS 10 IOT CORE



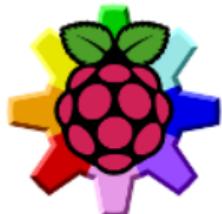
OSMC



LIBREELEC



PINET



RISC OS



WEATHER STATION



IDLE  
Python Games



Midori



WiFi Config



LXTerminal



Shutdown



OCR  
Resources



IDLE 3



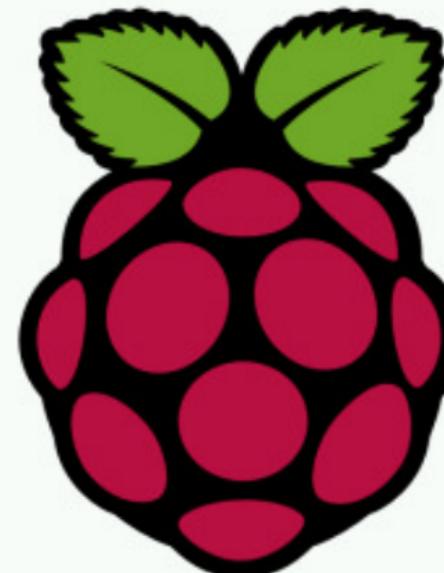
Scratch



Pi Store



Debian  
Preference





**OS  
TO  
SD**

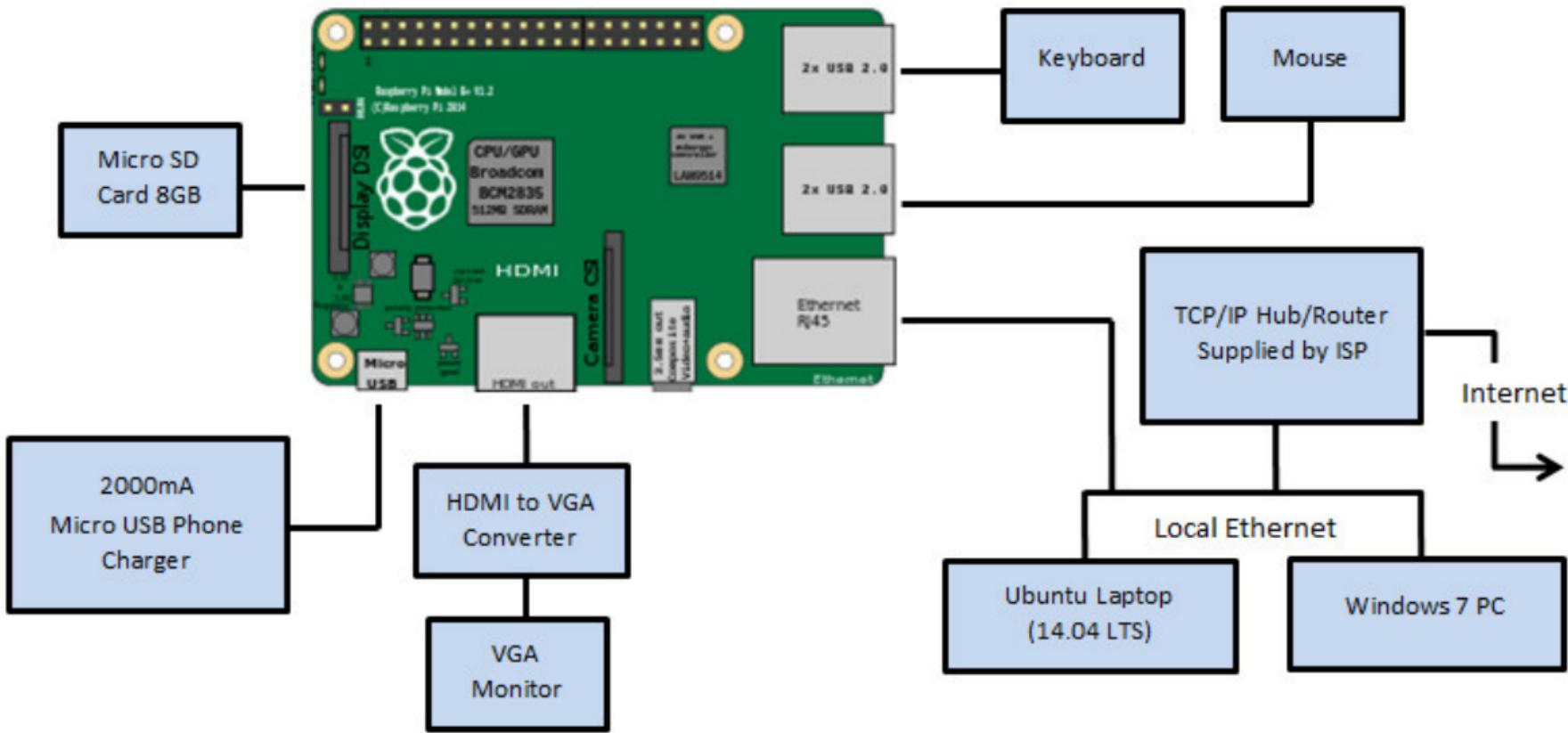
**EASY**



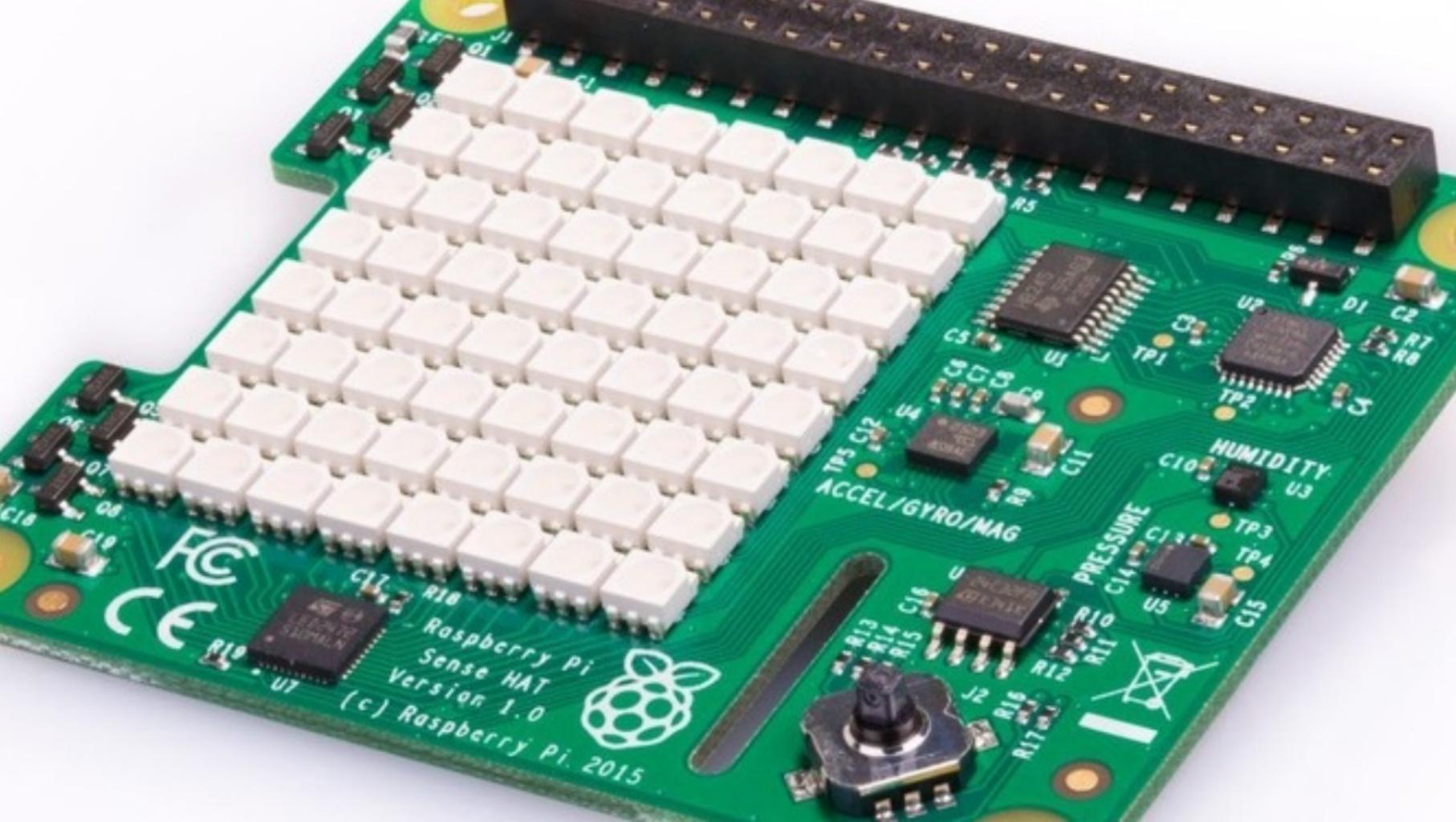


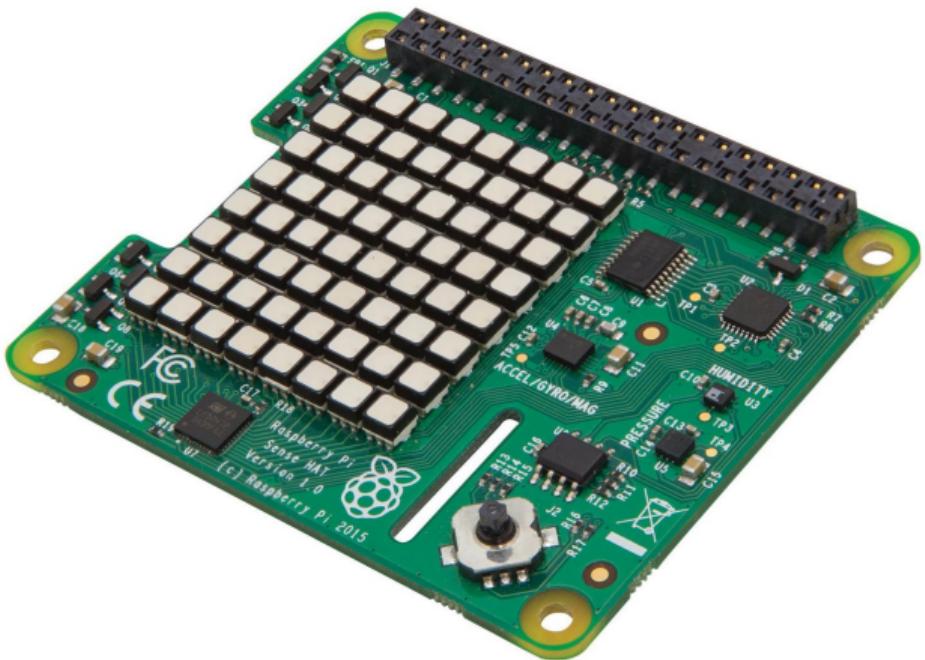
# Others











# ¡Muchas gracias por su atención!

*¿Preguntas?*



**Contacto:** Marco Teran  
**webpage:** [marcoteran.github.io/](http://marcoteran.github.io/)