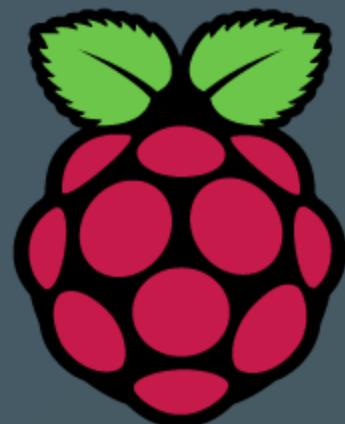


# Introduction to Raspberry Pi 🥧

By: Hedron Hackerspace



# Raspberry Pi

# What is a Single Board Computer (SBC)?

**Technical definition:**

*A computer that is entirely contained on one single PCB*

**Common characteristics:**

- ARM or RISC-V SoC (can contain x86)
- Broken out GPIO header pins (26-pin or 40-pin is standard)
- Runs some distribution of Linux (ie. Debian, Ubuntu, etc.)

# What are SBC's typically used for?

**Short answer:** Pretty much anything

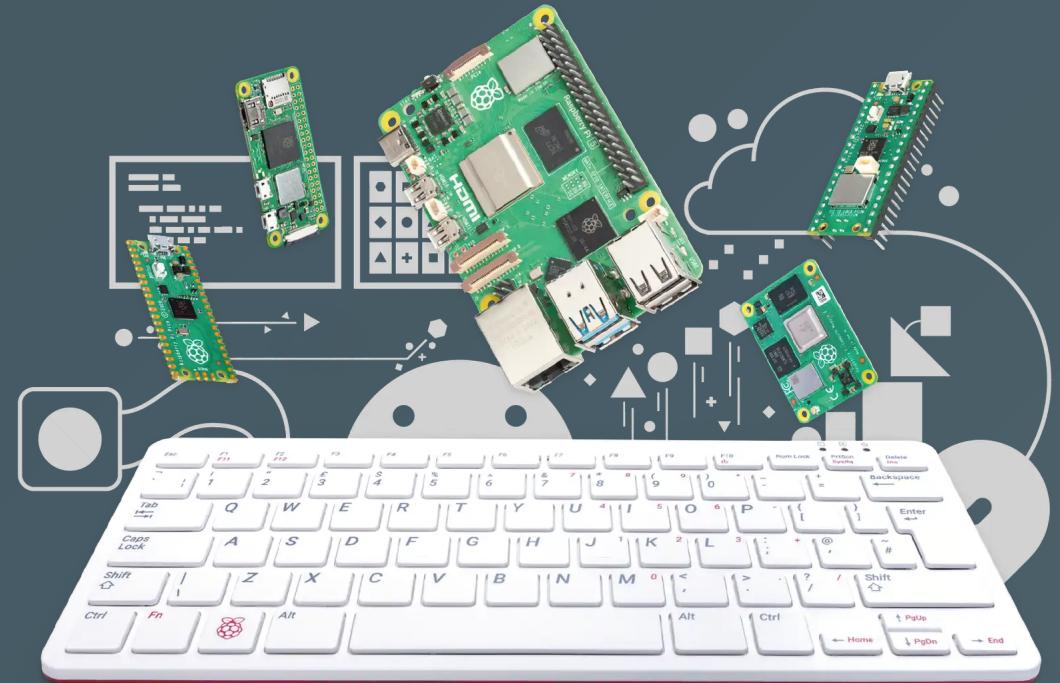
- Home computing
- Software development
- Retro gaming
- Server host
- Security
- Homelabs/NAS
- Robotics
- Edge AI/ML
- 3D printer manager
- Home automation

***And much, much more...***

Touchscreen device, overclocking, ...

# Why the Raspberry Pi?

- Community and support
- Documentation
- Open source
- Efficient (<10W when stress tested)
- Cheap hardware\*



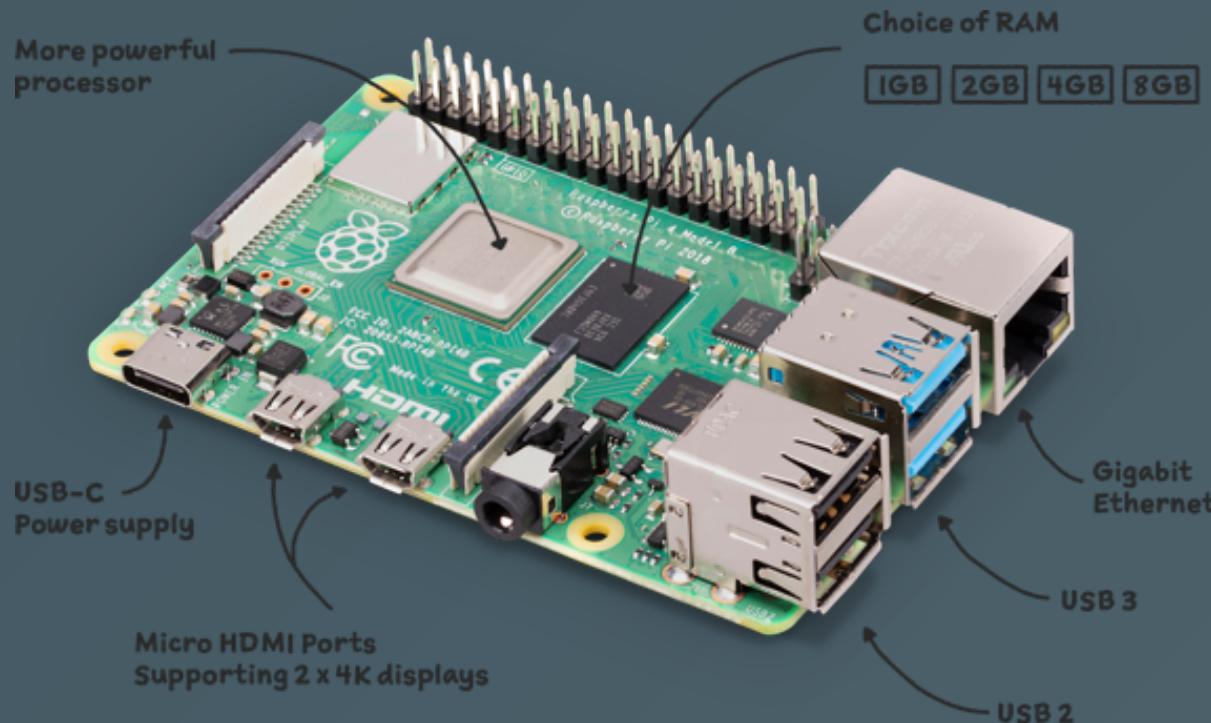
\* - Cheap when in stock

# Who is the Raspberry Pi Foundation?

- UK based company, only 1 official Pi store in the Netherlands
- Named 'Raspberry Pi' in congruence with other fruit based companies
- "Computing for everyone"
- Specialize in low cost, educational computers
- Became *the* company for Linux/ARM SBCs
- Make SBCs, MCUs, and accessories (and magazine)
- Most recent Raspberry Pi 5 started preorders this October

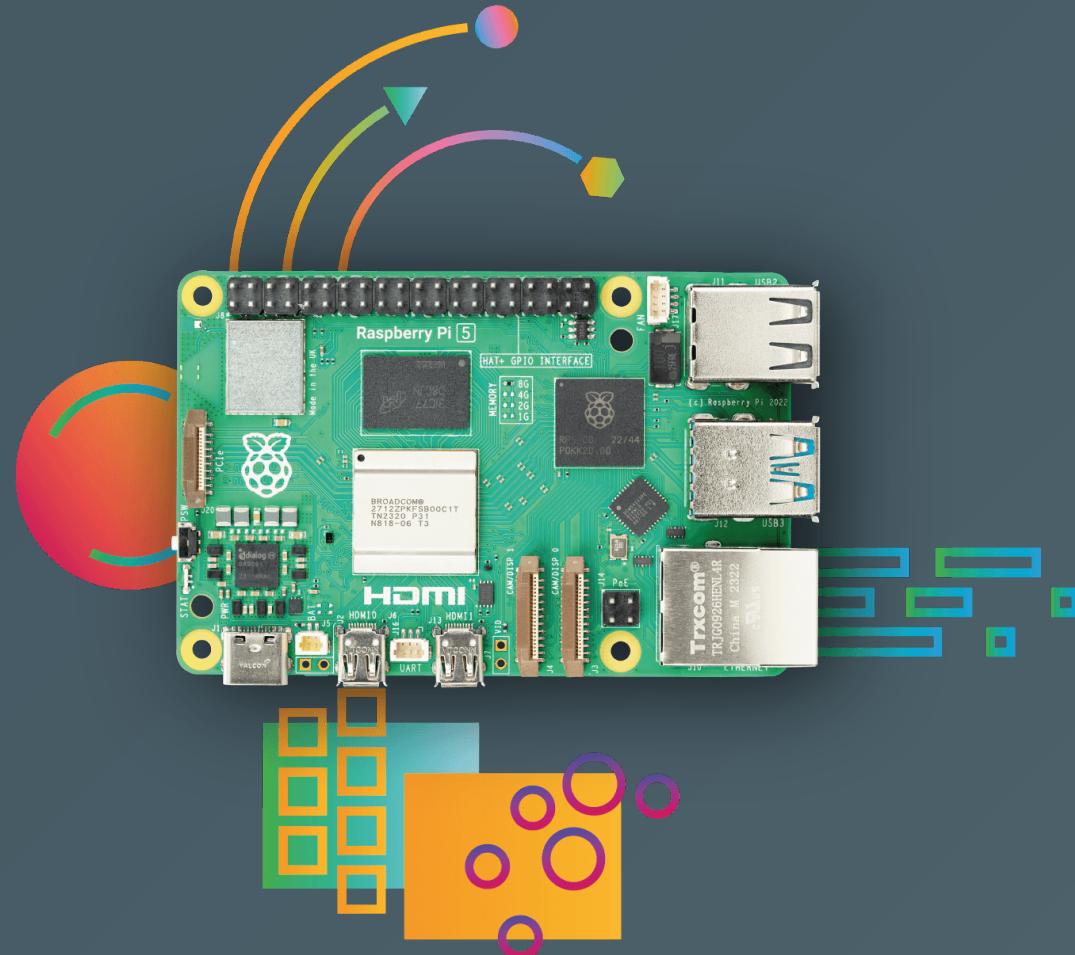
# Raspberry Pi 4 Model B Specs

- CPU: BCM2711
  - 4x Cortex-A72 cores @ 1.5GHz
- GPU: VideoCore VI
  - 500MHz base
- RAM: 1GB, 2GB, 4GB, 8GB
- 40-pin GPIO header
- 2-lane MIPI CSI/DSI ports



# Raspberry Pi 5 Specs

- CPU: BCM2712
  - 4x Cortex-A76 cores @ 2.4GHz
  - Cryptography extensions
- GPU: VideoCore VII
  - 800MHz base
- RAM: 4GB and 8GB
- A **TON** of other peripherals



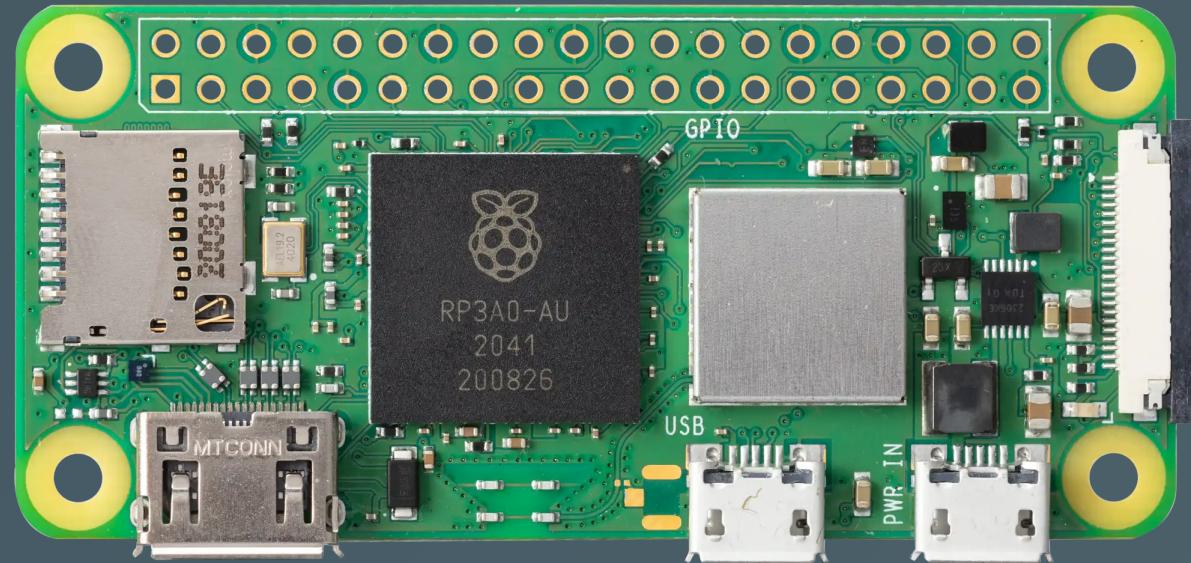
# Raspberry Pi Zero W Specs

- CPU: BCM2835 (32-bit)
  - 1x ARM11 core @ 1GHz
- GPU: VideoCore IV
  - 250MHz base
- RAM: 512MB
- 40-pin GPIO header
- WiFi 2.4/5GHz, BT 4.1/BLE
- MIPI CSI camera connector



# Raspberry Pi Zero 2W Specs

- CPU: RP3A0-AU
  - 4x Cortex-A53 cores @ 1GHz
- GPU: VideoCore IV
- RAM: 512MB (unfortunately)
- WiFi 2.4GHz, BT 4.2/BLE
- MIPI CSI camera connector



# Why is the Pi Pico/W not listed?

- Pico is a microcontroller board
  - Fundamentally different
  - Does not run Linux (or any kind OS)
  - Runs single Python or C++ programs
- Learn more in the upcoming Arduino/Microcontroller classes
  - Hosted by yours truly

# Other SBC Brands and Vendors

## SBC Brands:

- Orange/Mango/Banana Pi
- BeagleBone
- Nvidia
- Coral
- Asus
- Khadas
- FriendlyElec
- Milk-V

## Vendors:

- Adafruit
- SparkFun
- PiShop.us
- PiHut
- Pimironi
- Chicago Electronics
- CanaKit
- Vilros

# What is Linux ?

- Free and open source OS
- Supports many different ISAs (instruction set architectures)
  - x86
  - ARM
  - RISC-V
- Very different from Windows
  - Terminal is almost a necessity
  - Much less application compatibility
  - Significantly less bloat/background activity

# Time to setup the Pi

## You will need:

1. Your Pi of choice (>3B or Zero W)
2. MicroSD card and adapter (recommended >=32GB)
3. Power adapter for your Pi (5-25W)
4. Computer or laptop with Pi Imager installed
  - GUI setup: Monitor, keyboard, and mouse
  - Headless setup: Ethernet or USB data cable to computer