



Highlights and comparison between Raspberry Pi 4, Nvidia Jetson Nano and Xilinx Zynq 7000

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universidade
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Raspberry Pi 4

Raspberry Pi is the name of a series of single board computers. They provide access to the on-chip hardware i.e. GPIOs (general purpose I/O) for developing an applications.

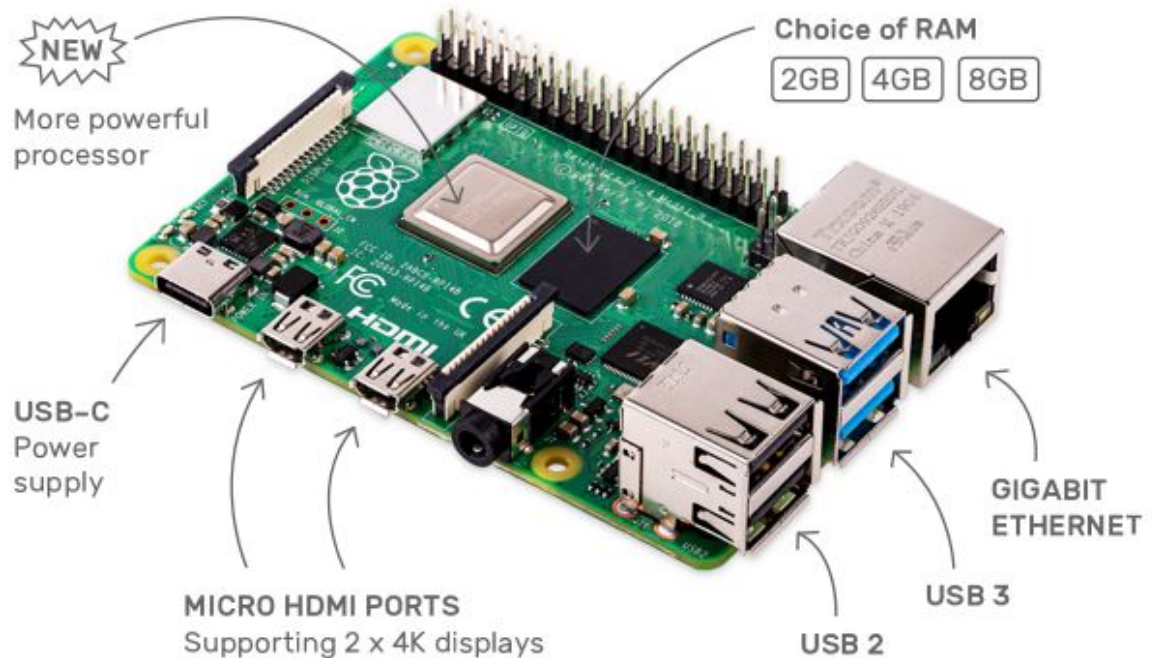
By accessing GPIO (general purpose I/O), we can connect devices like LED, motors, sensors, etc and can control them too.

Raspberry Pi 4 is latest version of the series of single board computers and it offers groundbreaking increases in processor speed, multimedia performance, memory, and connectivity compared to the prior-generations while retaining backwards compatibility and similar power consumption.

The Raspberry Pi runs Linux and its main operating system (Pi OS) is open source.

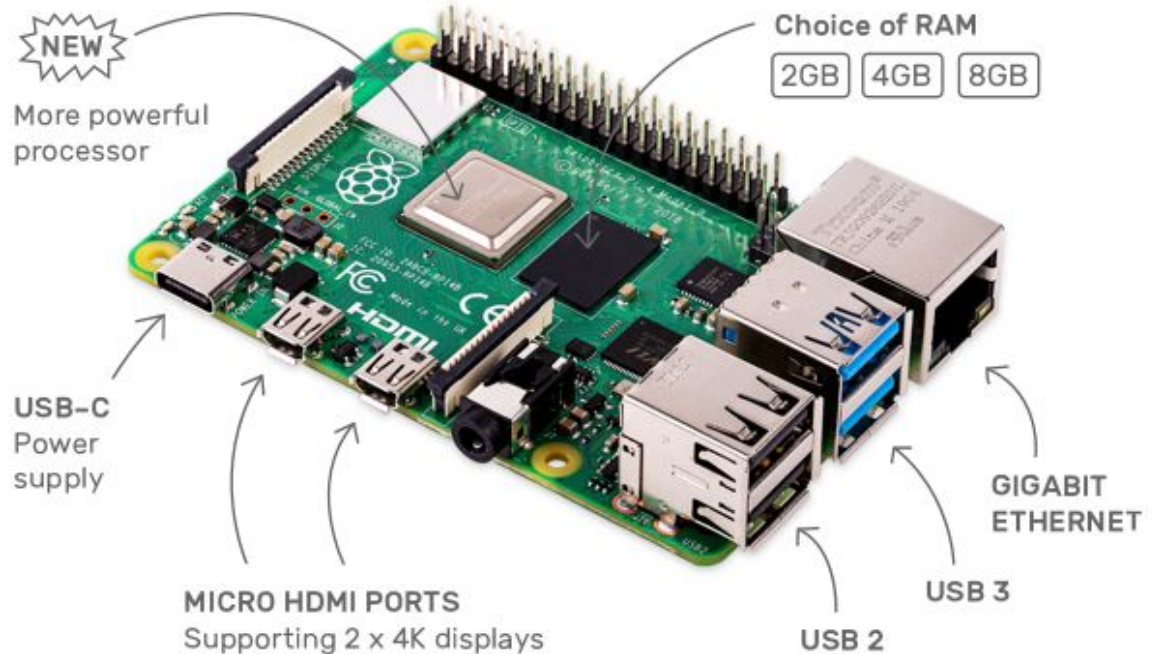
Raspberry Pi 4

- **Processor:** Broadcom BCM2711, quad-core Cortex-A72 (ARM v8), 64-bit SoC @ 1.5GHz
- **Memory:** 1GB, 2GB, 4GB or 8GB LPDDR4 (depending on model)
- **Connectivity:**
 - Gigabit Ethernet;
 - 2 × USB 3.0 ports, 2 × USB 2.0 ports;
 - 2.4 GHz and 5.0 GHz IEEE 802.11b/g/n/ac wireless;
 - LAN, Bluetooth 5.0, BLE
- **GPIO:** Standard 40-pin GPIO header



Raspberry Pi 4

- **Voice & Video Support:**
 - 2 × micro HDMI ports (up to 4Kp60 supported)
 - 2-lane MIPI DSI display port
 - 2-lane MIPI CSI camera port
 - 4-pole stereo audio and composite video port
- **Multimedia:**
 - H.265 (4Kp60 decode)
 - H.264 (1080p60 decode, 1080p30 encode);
 - OpenGL ES, 3.0 graphics
- **SD card support**
- **Power: USB-C**





NVIDIA Jetson Nano

NVIDIA Jetson Nano is a small, powerful computer that lets you run multiple neural networks in parallel for applications like image classification, object detection, segmentation, and speech processing. Jetson is a low-power system and is designed for accelerating machine learning applications.

The Jetson Nano uses a microSD card as a boot device and for main storage. It's important to have a card that's fast and large enough for your projects; the minimum recommended is a 32 GB UHS-1 card. NVIDIA GPU support (CUDA, VisionWorks, OpenCV).

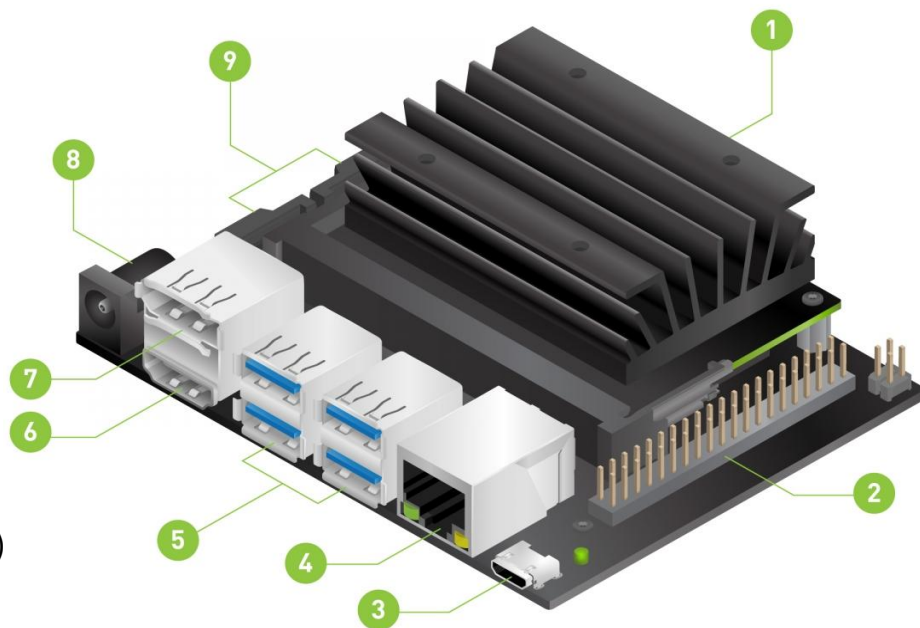
NVIDIA Jetson Nano

- **Processor:**
 - Quad-core ARM A57 @ 1.43 GHz
- **Memory:**
 - 4 GB 64-bit LPDDR4 25.6 GB/s
- **Storage:**
 - microSD card
- **GPU:**
 - 128-core Maxwell
- **Power:**
 - Either Micro-USB or DC power supply
- **Camera:**
 - 2x MIPI CSI-2 DPHY lanes
- **Connectivity:**
 - Gigabit Ethernet(physical),
 - M.2 Key E(wireless card(wi-fi/bluetooth))



NVIDIA Jetson Nano

- **Video Encode:**
 - 4K @ 30 | 4x 1080p @ 30
 - 9x 720p @ 30 | (H.264/H.265)
- **Video Decode:**
 - 4K @ 60 | 2x 4K @ 30
 - 8x 1080p @ 30 | 18x 720p @ 30 | (H.264/H.265)
- **Display:**
 - HDMI and Display port
- **USB:**
 - 4x USB 3.0
 - 2.0 Micro-USB
- **GPIO:**
 - 40-pin expansion header
 - (power + interface signal pins)



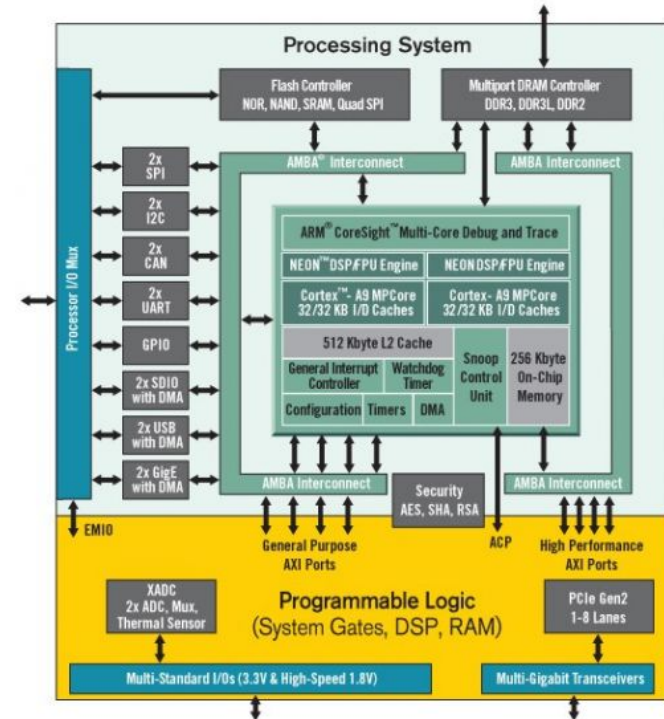
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| 1 microSD card slot for main storage | 5 USB 3.0 ports (x4) |
| 2 40-pin expansion header | 6 HDMI output port |
| 3 Micro-USB port for 5V power input, or for Device Mode | 7 DisplayPort connector |
| 4 Gigabit Ethernet port | 8 DC Barrel jack for 5V power input |
| | 9 MIPI CSI-2 camera connectors |

Diligent Zybo Z7 (Xilinx Zynq 7000)

The Zynq 7000 SoC family integrates the software programmability of an ARM-based processor with the hardware programmability of an FPGA, enabling key analytics and hardware acceleration while integrating CPU, DSP, ASSP, and mixed signal functionality on a single device.

The PL is nearly identical to a Xilinx 7-series Artix FPGA, except that it contains several dedicated ports and buses that tightly couple it to the PS.

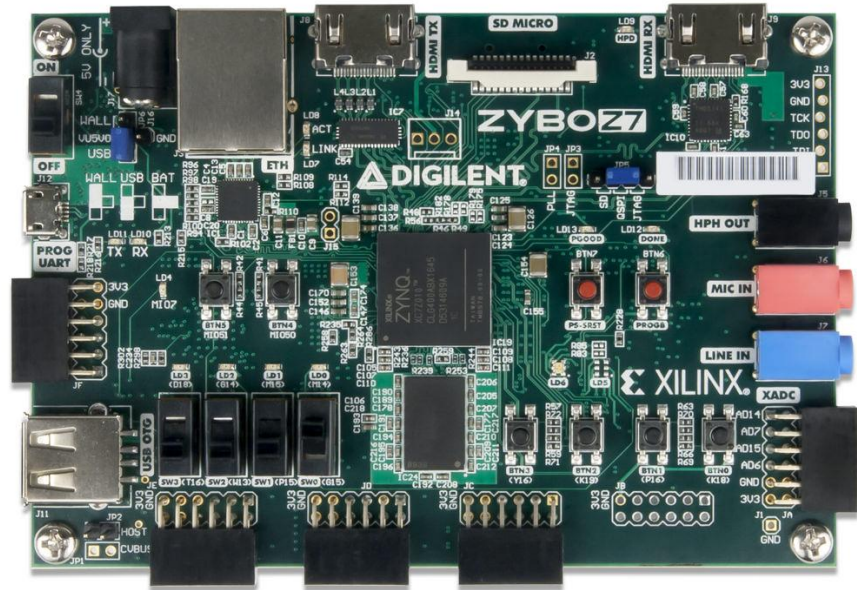
The PS consists of many components, including the Application Processing Unit (APU, which includes 2 Cortex-A9 processors), Advanced Microcontroller Bus Architecture (AMBA) Interconnect, DDR3 Memory controller, and various peripheral controllers with their inputs and outputs.



Diligent Zybo Z7 (Xilinx Zynq 7000)

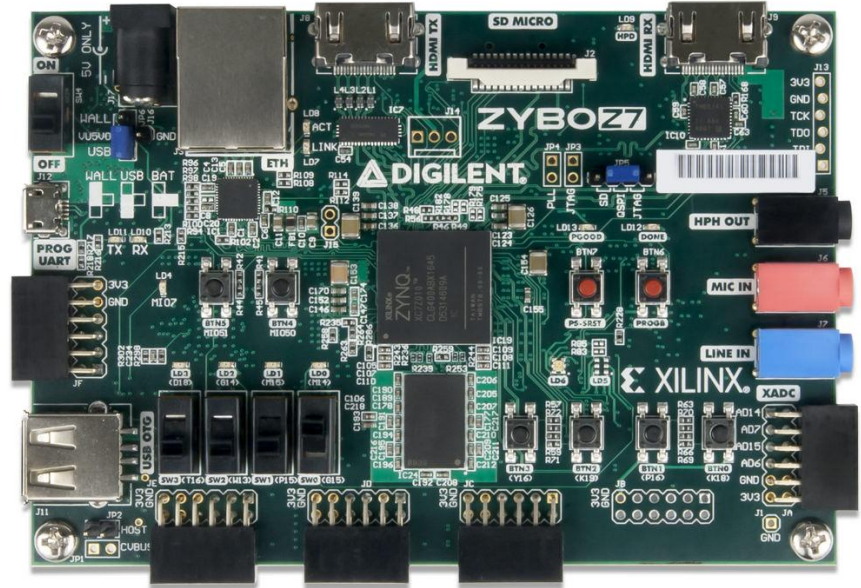
The Zybo Z7 is a feature-rich, ready-to-use embedded software and digital circuit development board built around the Xilinx Zynq-7000 family.

- **Processor:**
 - 667MHz dual-core ARM Cortex-A9 processor
 - Low-bandwidth peripheral controller: SPI, UART, CAN, I2C
- **Memory:**
 - 1 GB DDR3L with 32-bit bus @ 1066 MHz
 - microSD slot
- **Power:** from USB or any 5V external power source



Diligent Zybo Z7 (Xilinx Zynq 7000)

- **Audio and Video:**
 - HDMI sink port (input) and HDMI source port (output)
 - Audio codec with stereo headphone, stereo line-in, and microphone jacks
- **Switches, Push-buttons, and LEDs**
 - 6 push-buttons, 4 slide switches
 - 5 LEDs, 2 RGB LED



	Raspberry Pi 4	Nvidia Jetson Nano	Diligent Zybo z7 (Xilinx Zynq 7000)
Applications	Build hardware projects, implementing Kubernetes clusters and edge computing or in industrial applications.	Run multiple neural networks in parallel for applications like image classification, object detection, segmentation, and speech processing.(computação visual, e machine learning por causa da computação paralela)	Industrial IoT applications, small cell base stations, multi camera drivers assistance systems, machine vision for industrial automation, medical endoscopy, and 4K2K Ultra-HDTV.
Processor	Quad-core ARM Cortex-A72, 1.5GHz Arch: Armv8-A	Quad-core ARM A57, 1.43 GHz Arch: Armv8-A	Dual-core ARM Cortex-A9, 667MHz (0.667GHz) Arch: Armv7-A
Memory	1 GB, 2GB or 4GB 64-bit LPDDR4 Supports 1.1V	4 GB 64-bit LPDDR4 Supports 1.1V	1 GB 32-bit DDR3L Supports 1,2 V
SD Card Slot	contains	contains	contains
Internet Connection	Gigabit Ethernet PHY Bluetooth 5.0, BLE, 2.4 GHz and 5.0 GHz IEEE 802.11	Gigabit Ethernet PHY Slot M.2 for Bluetooth or Wifi	Gigabit Ethernet PHY
Cost	Around 35 \$	Around 109\$	Around 249 \$

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