deti universidade de aveiro
departamento de eletrónica,
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Raspberry Pi 4 Xilinx Zynq 7000 Nvidia Jetson Nano

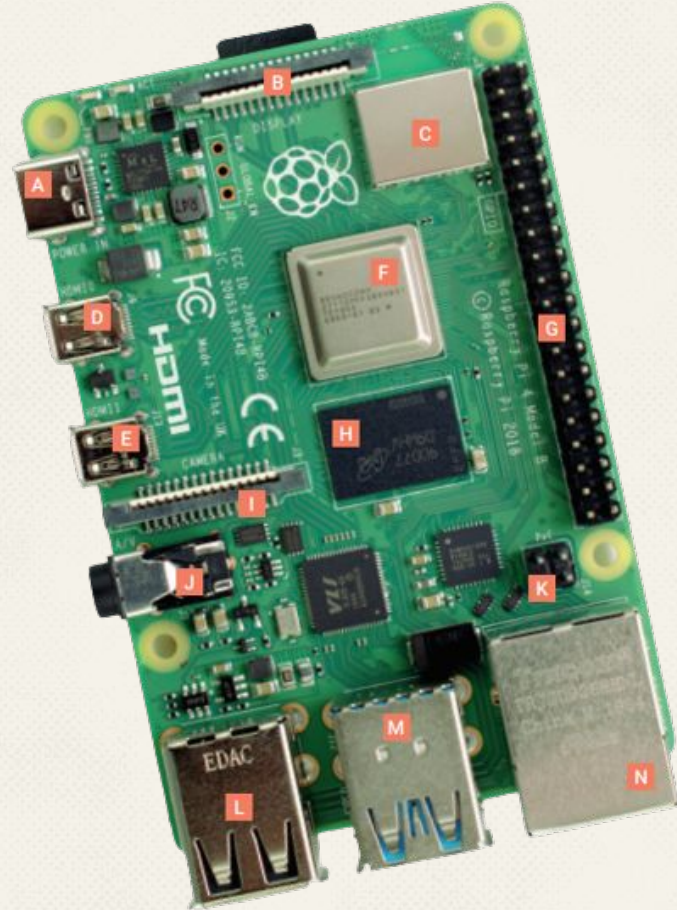ASE - Arquitetura de Sistemas Embutidos

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Raspberry Pi 4

Raspberry Pi 4 is capable of doing the same as a computer. It is possible to set up an operating system, and connect wires and circuits directly to its GPIO pins.

COMPONENTS

A USB Type-C power in

B DSI display port

C Wireless/Bluetooth

D Micro-HDMI 0

E Micro-HDMI 1

F System-on-Chip

G GPIO

H RAM

I CSI camera port

J 3.5mm AV

K PoE - Power over Ethernet

L 2 USB 2.0 ports

M 2 USB 3.0 ports

N Ethernet port

Specifications

The Processor

Broadcom BCM2711, a 64-bit quad-core Arm Cortex-A72 clocked at 1.5GHz

Memory

SDRAM LPDDR4-3200 of 1GB, 2GB, 4GB or 8GB

Video and sound

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

Connectivity

2.4 GHz and 5.0 GHz IEEE 802.11b/g/n/ac wireless LAN, Bluetooth 5.0, BLE Gigabit Ethernet, 2 × USB 3.0 ports and 2 × USB 2.0 ports

Specifications

Multimedia

H.265 (4Kp60 decode);

H.264 (1080p60 decode, 1080p30 encode);

OpenGL ES, 3.0 graphics

SD card support

Micro SD card slot for loading operating system and data storage

Input power

5V DC via USB-C connector (minimum 3A1), 5V DC via GPIO header (minimum 3A1), Power over Ethernet (PoE)

Xilinx Zynq 7000 PSoC

Xilinx Zynq 7000 PSoC 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.

COMPONENTS

1 Ethernet port
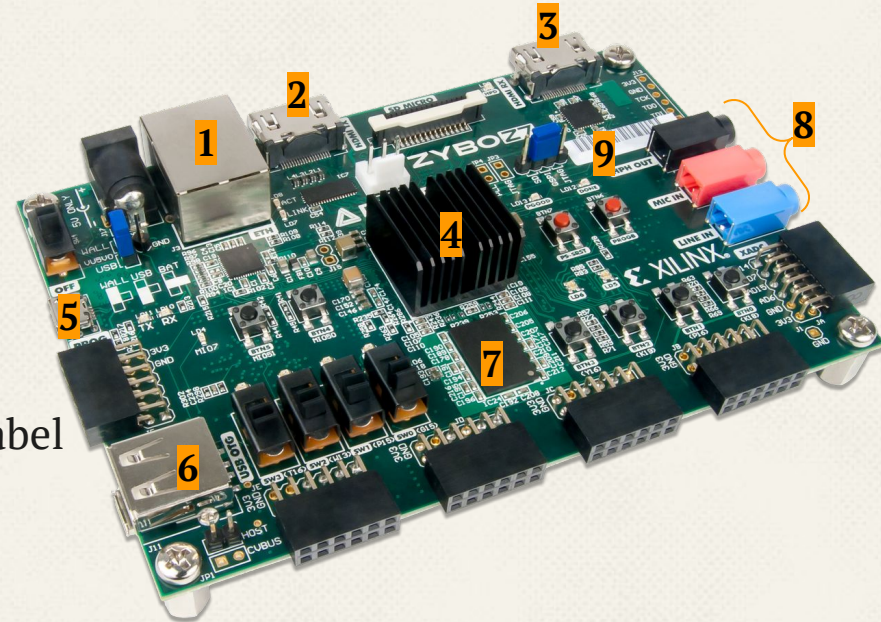
2 HDMI output port

3 HDMI input port

4 ZYNQ Processor

5 USB JTAG/UART port

6 USB 2.0

7 DDR3L Memory

8 Audio codec ports

9 Unique MAC address label

Specifications

ZYNQ Processor

667 MHz dual-core Cortex-A9 processor

DDR3L memory controller with 8 DMA channels and 4 High Performance AXI3 Slave ports

High-bandwidth peripheral controllers: 1G Ethernet, USB 2.0, SDIO

Low-bandwidth peripheral controllers: SPI, UART, CAN, I2C

Programmable from JTAG, Quad-SPI flash, and microSD card

Programmable logic equivalent to Artix-7 FPGA

Memory

1 GB DDR3L with 32-bit bus at 1066 MHz

16 MB Quad-SPI Flash with factory programmed 128-bit random number and 48-bit globally unique EUI-48/64™ compatible identifier microSD slot

Specifications

Power

Powered from USB or any 5V external power source

Audio and Video

Pcam camera connector with MIPI CSI-2 support; HDMI sink port (input) with/without* CEC; HDMI source port (output) with CEC; Audio codec with stereo headphone, stereo line-in, and microphone jacks

Switches, Push-buttons, and LEDs

6 push-buttons, 4 slide switches, 5 LEDs and 2 RGB LEDs

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.

COMPONENTS

1 microSD card slot for main storage

2 40-pin expansion header

3 Micro-USB port for 5V power input, or for Device Mode

4 Gigabit Ethernet port

5 4 USB 3.0 ports

6 HDMI output port

7 DisplayPort connector

8 DC Barrel jack for 5V power input

9 MIPI CSI-2 camera connectors
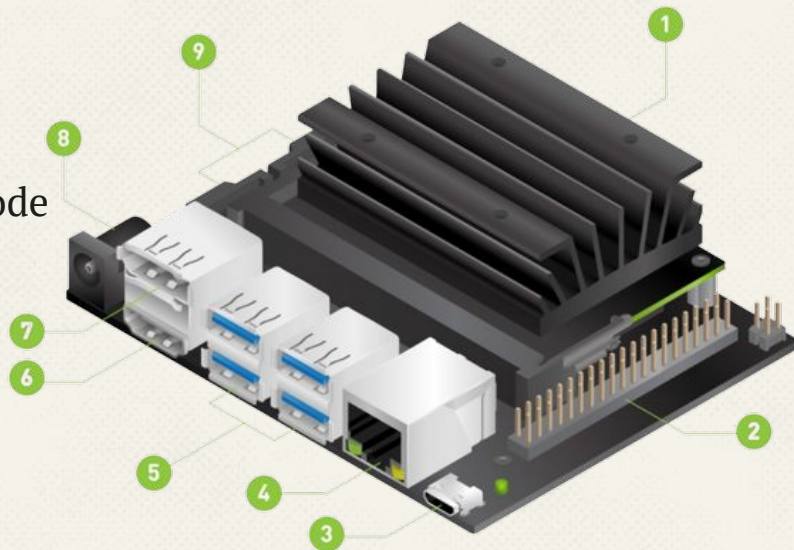
Specifications

GPU	128-core Maxwell
CPU	Quad-core ARM A57 at 1.43 GHz
Memory	4 GB 64-bit LPDDR4 25.6 GB/s
Storage	microSD
Video Encode	4K at 30 | 4x 1080p at 30 | 9x 720p at 30 (H.264/H.265)
Video Decode	4K at 60 | 2x 4K at 30 | 8x 1080p at 30 | 18x 720p at 30 (H.264/H.265)
Camera	2x MIPI CSI-2 DPHY lanes
Connectivity	Gigabit Ethernet
Display	HDMI and display port
USB	4x USB 3.0, USB 2.0 Micro-B
Others	Low-bandwidth peripheral controllers: I2C, I2S, SPI, UART

Comparison

	Raspberry Pi 4	Xilinx Zynq 7000	Nvidia Jetson Nano
Performance (Ethernet)	○ 943 Mbps	○ 1000 Mbps	○ 8 to 73 times faster than Raspberry Pi 4
Power Consumption	○ 3.8 W to 4.0 W	○ More power consumption-12.5W	○ 0.5W to 1.25W
Timing	○ Does not include a Real Time Clock module	○ Has Real Time Clock	○ Has Real Time Clock
Price	○ Lower cost	○ Higher cost	○ Higher than Raspberry Pi 4, lower than Xilinx Zynq 7000
Size	○ Bigger than Nvidia Jetson Nano and Smaller than Xilinx Zynq 7000	○ Biggest	○ Smallest