Raspberry Pi 5 and Camera Details

Raspberry Pi 5

The Raspberry Pi 5 is a high-performance single-board computer used as the main controller for automation, vision, and monitoring systems. It manages input/output operations, communicates via GPIO, and interfaces with cameras and sensors for data acquisition and control tasks. GPIO Pin Explanation: The Raspberry Pi 5 has a 40-pin GPIO header compatible with older Raspberry Pi models. Each pin serves a specific purpose in power delivery, communication, or control. 3.3V Power Pins (1, 17): Provide 3.3 volts used to power logic-level components such as sensors and ICs. 5V Power Pins (2, 4): Supply 5 volts directly from the USB-C power input, suitable for powering modules that require higher voltage. GND Pins: Ground pins serve as the common electrical reference for all circuits. GPIO Pins: These general-purpose input/output pins can be configured as input or output to read sensors or control relays and motors. I2C Pins (3, 5): Used for two-wire communication with I2C-compatible devices such as displays or environmental sensors. SPI Pins (19, 21, 23, 24, 26): Allow high-speed data transfer between the Pi and SPI-enabled components like ADCs or motor controllers. UART Pins (8, 10): Provide serial communication channels for connecting devices such as RS-485 converters or GPS modules. PWM Pins (12, 32, 33): Generate pulse-width modulation signals for motor speed control or analog simulation. ID_SD and ID_SC (27, 28): Reserved for automatic detection of HAT boards (Hardware Attached on Top). Other GPIO pins (22, 23, 24, 25, 27, etc.) are available for digital control, switching, and input monitoring. Specifications: • CPU: 64-bit Quad-Core ARM Cortex-A76 @ 2.4GHz • GPU: VideoCore VII supporting dual 4K HDMI displays • RAM: 4GB or 8GB LPDDR4X • USB: 2 × USB 3.0, 2 × USB 2.0 • Storage: microSD (UHS-I) • Connectivity: Gigabit Ethernet, Wi-Fi 802.11ac, Bluetooth 5.0 • GPIO: 40-pin header, 3.3V logic • Camera Support: Dual CSI connectors • Power: 5V / 5A via USB-C • Operating System: Raspberry Pi OS (64-bit Linux) • Dimensions: 85.6mm × 56.5mm

USB Camera (Logitech C270 / C310 Series)

The USB camera is used with the Raspberry Pi 5 for image capture, visual inspection, and monitoring applications. It connects directly via a USB port and is fully compatible with OpenCV for computer vision tasks such as object recognition, barcode reading, and automation feedback. Specifications: • Resolution: 720p HD (1280×720) • Frame Rate: 30 frames per second • Interface: USB 2.0 Plug & Play • Focus: Fixed focus (optimized from 40 cm to infinity) • Lens Type: Plastic optical lens • Microphone: Built-in noise-reduction microphone • Compatibility: Raspberry Pi OS, Linux, Windows • Power: 5V via USB port