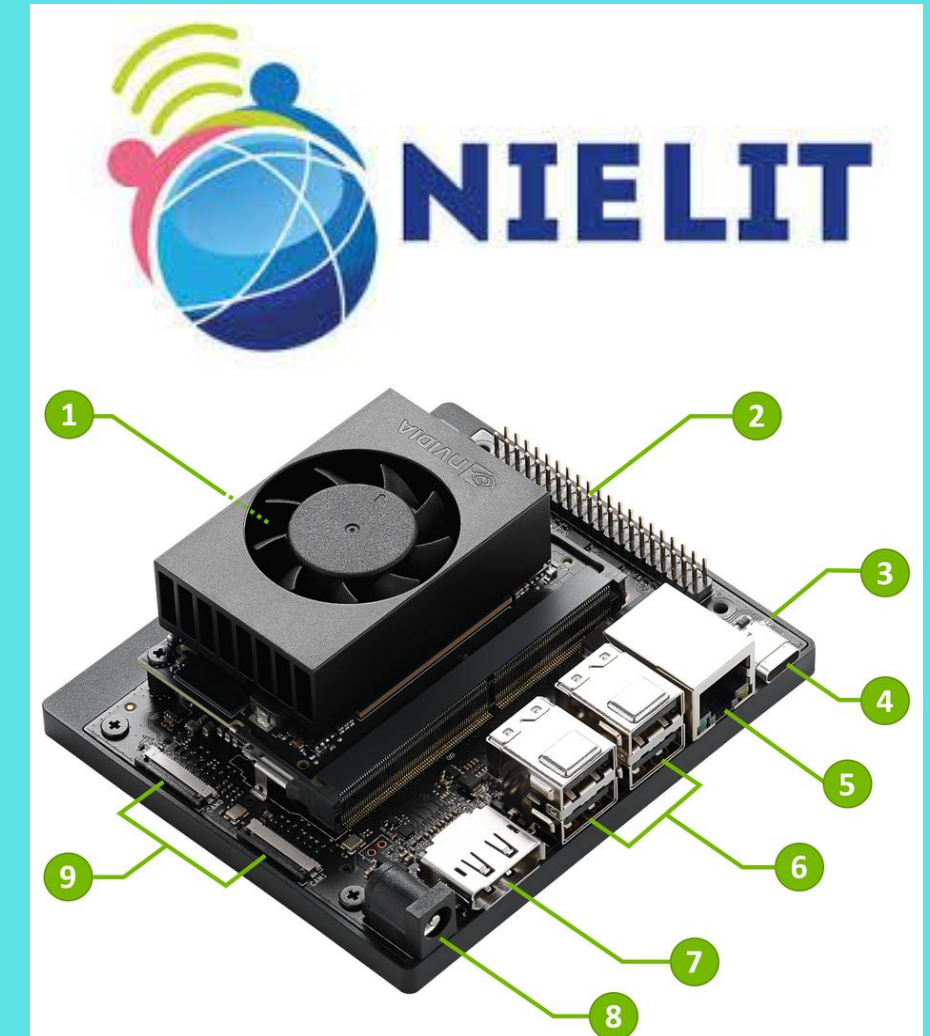


JETSON NANO ORIN

The Jetson Nano Orin is a powerful embedded AI computer tailored for developers and companies aiming to deploy sophisticated AI applications at the edge with constraints on size, power, and latency.

Its modern Ampere GPU with Tensor Cores and advanced CPU architecture enable it to run demanding AI workloads locally, bypassing the need for cloud computing — which is vital for real-time and privacy-sensitive applications



WHAT IS JETSON NANO ORIN?

The Jetson Nano Orin is an advanced embedded AI computing platform by NVIDIA, part of the Jetson Orin family, designed for edge AI applications. It is a successor to the original Jetson Nano, featuring significantly more computing power, better energy efficiency, and modern AI hardware accelerators.



Meet Jetson Orin Nano

Launch year: 2023

Form factor: Same as Jetson Nano

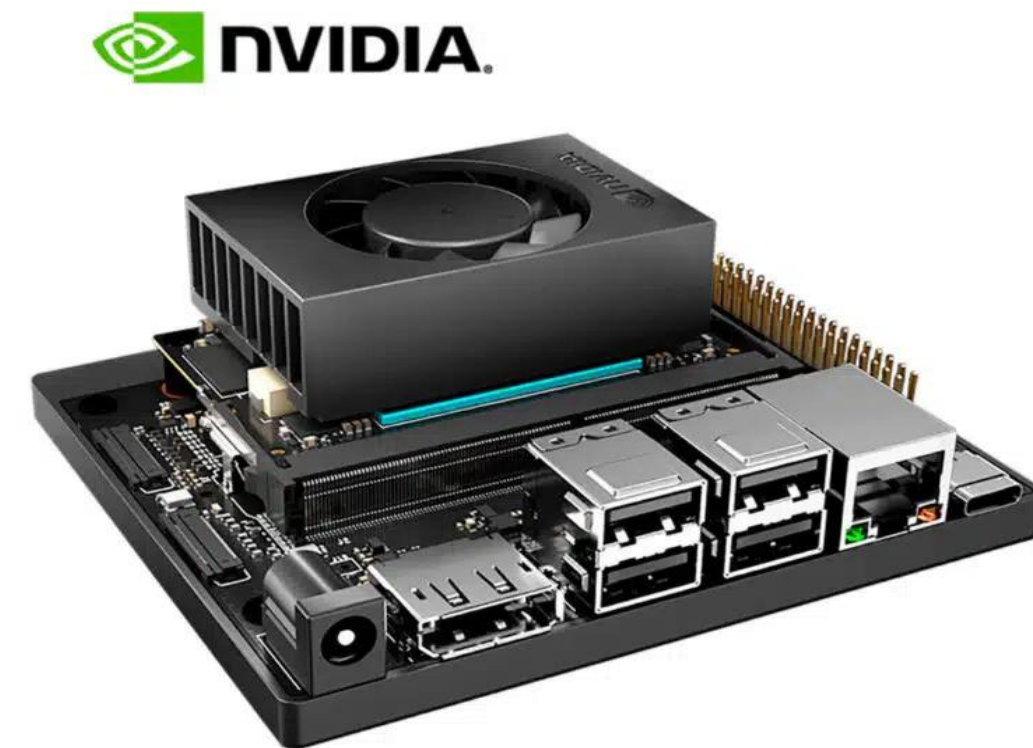
Focus: Affordable edge AI with high performance

Target: Robotics, drones, smart cameras, industrial AI

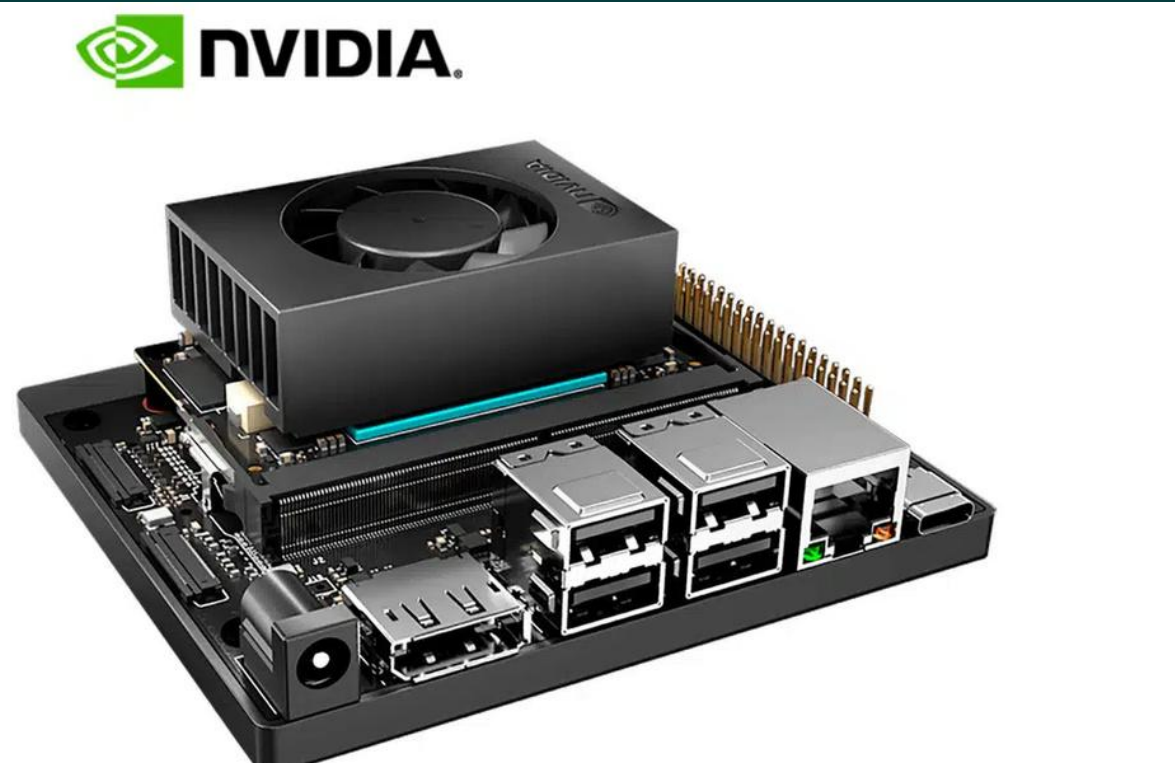
AI at the edge. Power in your pocket. Jetson Nano."

KEY HIGHLIGHTS

- **Target:** Edge AI, robotics, autonomous machines, computer vision, and AI IoT devices.
- **Form factor:** Small, compact embedded module for easy integration.
- **Compute:** Powerful GPU + CPU cores designed specifically for AI workloads.
- **Power consumption:** Optimized for low power embedded use.
- **AI performance:** Orders of magnitude faster than the original Jetson Nano.



ARCHITECTURE AND HARDWARE SPECIFICATIONS



Feature

Jetson Nano Orin

Processor (CPU)

ARM Cortex-A78AE CPU cores (typically 6-core CPU)

GPU

NVIDIA Ampere architecture GPU with Tensor Cores

AI Performance

Up to 40 TOPS (Tera Operations Per Second) of AI throughput

Memory

LPDDR5 RAM (8 GB typical)

Storage

eMMC / NVMe / microSD

Connectivity

Gigabit Ethernet, optional Wi-Fi/BT (via add-on)

Video

4K60 video encode/decode support

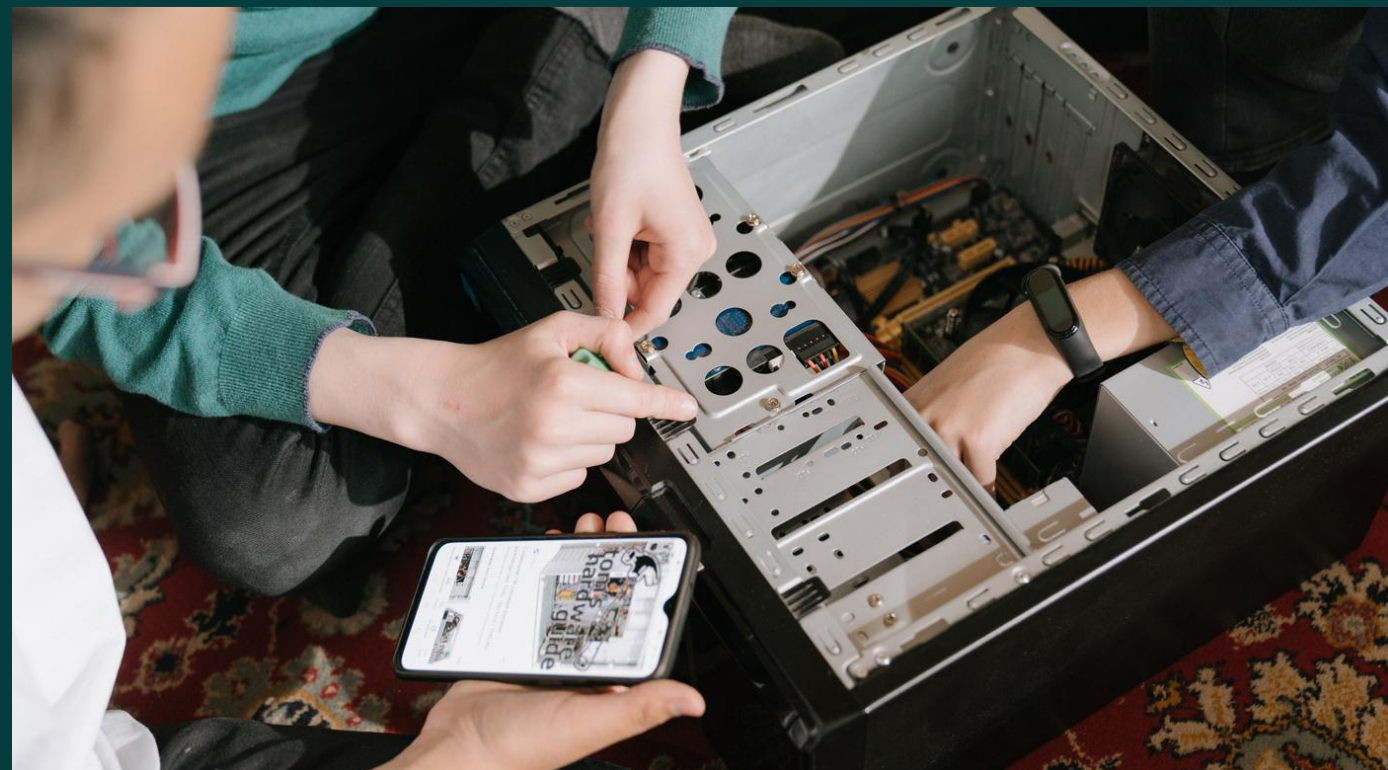
Power consumption

Configurable (typical 10W-15W)

I/O Interfaces

USB 3.1, PCIe Gen 4, MIPI CSI camera inputs, GPIOs

MAIN COMPONENTS EXPLAINED



1. ARM Cortex-A78AE CPU Cores

- High-performance, energy-efficient ARM cores designed for automotive and edge AI.
- Provide strong general-purpose processing.
- Supports multi-threaded applications and real-time tasks.

2. NVIDIA Ampere GPU with Tensor Cores

- GPU based on NVIDIA's Ampere architecture (the same architecture powering RTX 30-series GPUs).
- Includes dedicated Tensor Cores specialized for deep learning matrix math.
- Enables real-time AI inference and training on edge devices.

3. AI Performance (TOPS)

- Tensor Operations Per Second (TOPS) is a common metric for AI compute.
- Jetson Nano Orin delivers up to 40 TOPS, massively outperforming the original Nano (which had ~0.5 TOPS).
- This allows running complex neural networks for vision, speech, and sensor fusion locally without cloud dependency.

4. Memory

- LPDDR5 RAM provides high bandwidth for AI model processing.
- Large RAM size (typically 8GB) helps load and execute larger neural networks efficiently.

5. Connectivity & I/O

- Supports Gigabit Ethernet for high-speed networking.
- PCIe Gen 4 interface for fast expansion with NVMe SSDs or other peripherals.
- Multiple MIPI CSI lanes for connecting multiple high-resolution cameras for vision applications.
- USB 3.1 ports for peripherals like external storage, sensors, or custom devices.

6. Video Encode/Decode

- Hardware acceleration for 4K video encoding and decoding.
- Enables real-time video streaming and processing in AI video analytics or autonomous robots.

SOFTWARE AND ECOSYSTEM

- JetPack SDK: NVIDIA's unified SDK that includes: Linux OS (Ubuntu based)
- CUDA Toolkit for GPU programming
- cuDNN and TensorRT for optimized AI inference
- Vision libraries (OpenCV, GStreamer, VPI)
- DeepStream SDK for video analytics pipelines
- Support for popular AI frameworks like TensorFlow, PyTorch, ONNX
- NVIDIA Isaac SDK: Robotics-focused software stack enabling robot control, simulation, and AI perception.
- Developer Tools: Nsight tools, container support (Docker/Podman), and SDK Manager to flash and manage the device.





USE CASES FOR JETSON NANO ORIN

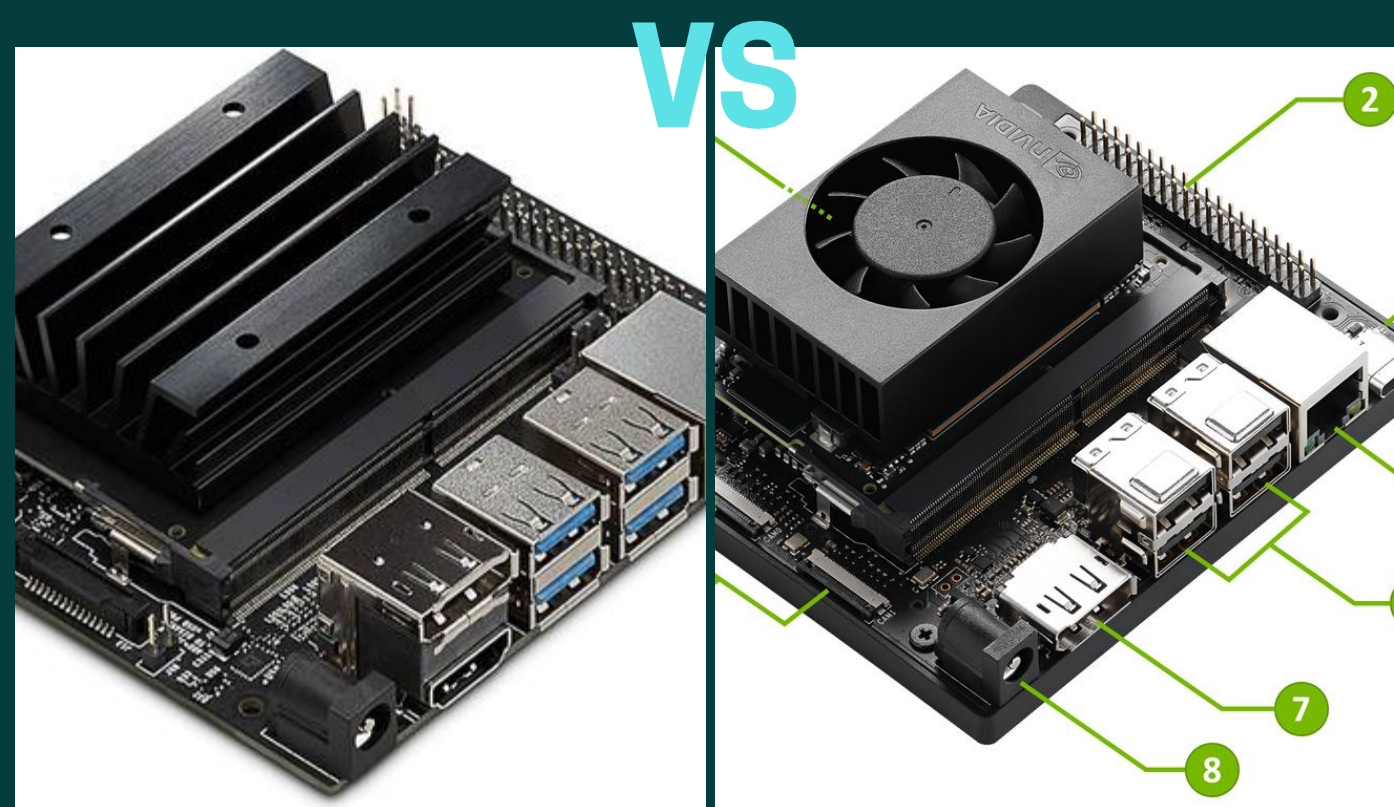
- **Robotics:** Autonomous navigation, obstacle detection, path planning using AI perception.
- **Smart Cameras:** Real-time object detection, facial recognition, video analytics on edge.
- **Drones:** AI-enabled flight control and object tracking.
- **Industrial IoT:** Predictive maintenance, quality inspection with AI vision.
- **Smart Cities:** Traffic monitoring, public safety using real-time AI inference.
- **Healthcare:** AI-assisted diagnostics using embedded vision.
- **Retail:** Customer analytics, checkout-free stores using AI cameras.



Demos and Projects

- Real-time YOLOv5 object detection
- AI-powered people counting
- Gesture control using computer vision
- Voice and NLP-based edge agents
- Integration with ROS2, camera modules, and LIDAR

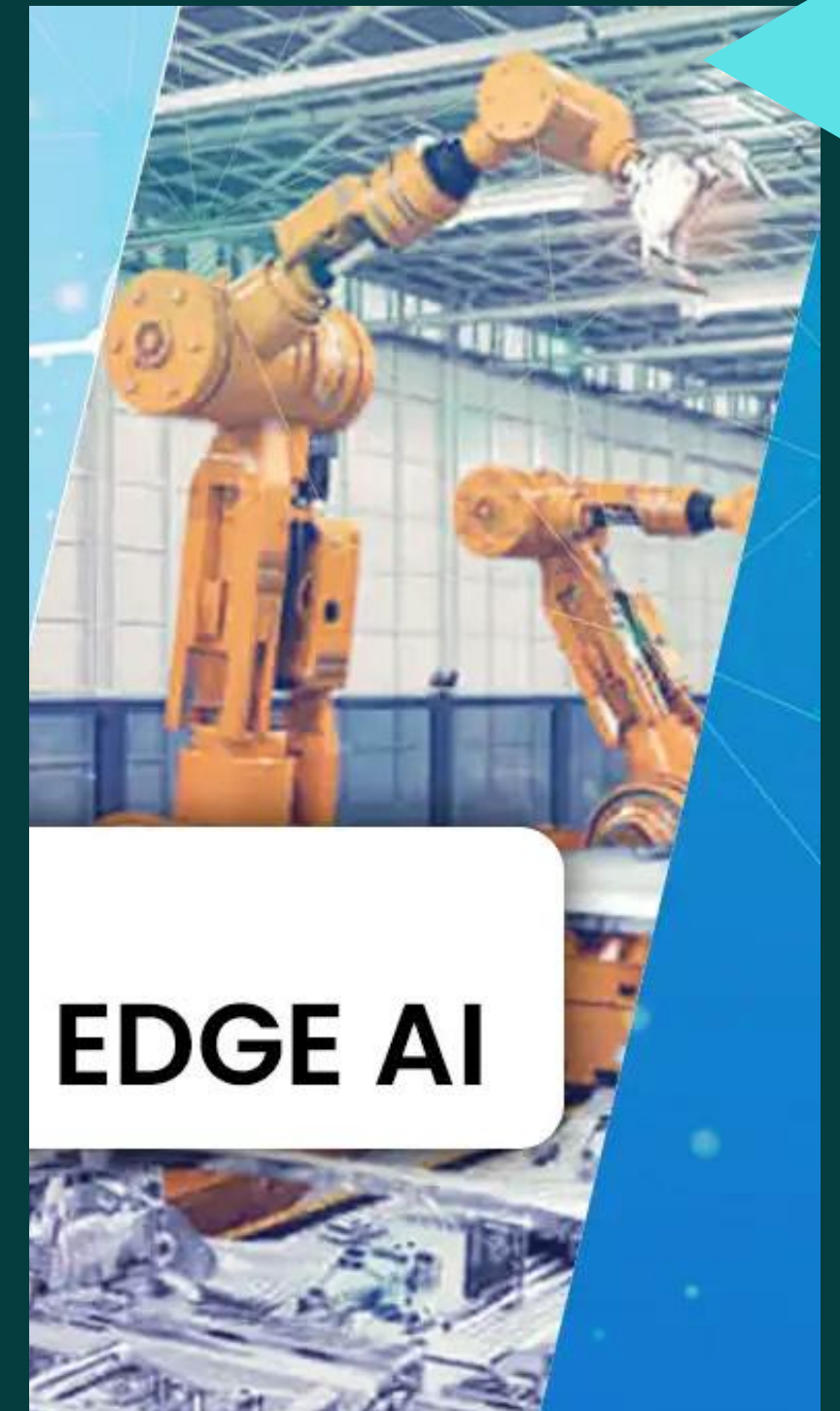
COMPARISON: JETSON NANO VS JETSON NANO ORIN



Aspect	Jetson Nano	Jetson Nano Orin
AI Performance	~0.5 TOPS	Up to 40 TOPS
CPU	Quad-core ARM Cortex-A57	Hexa-core ARM Cortex-A78AE
GPU Architecture	Maxwell	Ampere (with Tensor Cores)
RAM	4GB LPDDR4	8GB LPDDR5
Video Processing	4K30 encode/decode	4K60 encode/decode
Power Efficiency	~10W	10W-15W (configurable)
Use Case	Entry-level AI & robotics	Advanced edge AI and robotics

THANKYOU

AI at the edge. Power in your pocket. Jetson Nano."



EDGE AI