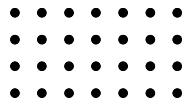




WINMATE



WHITEPAPER

**INTELLIGENCE AT THE EDGE:
NVIDIA JETSON SOFTWARE DEVELOPMENT
WITH WINMATE'S INDUSTRIAL AI PLATFORM**

Winmate – Your Best-Mate in Rugged Solutions

EXECUTIVE SUMMARY

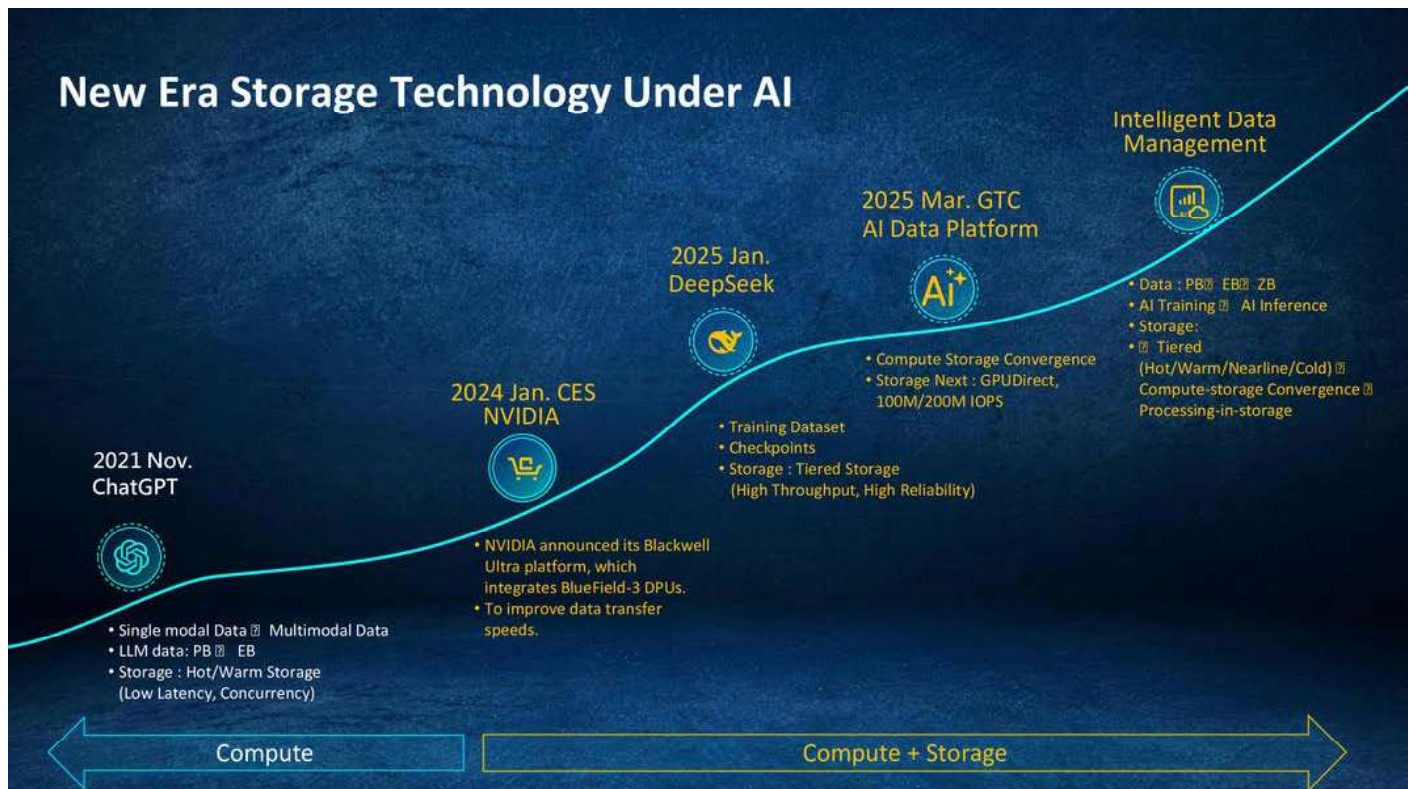
NVIDIA Jetson has become one of the world’s leading platforms for edge AI computing, offering a unified software stack optimized for robotics, computer vision, autonomous systems, and industrial intelligence. With JetPack, CUDA, TensorRT, DeepStream, and Isaac frameworks integrated into a single ecosystem, Jetson enables developers to build high-performance AI applications that run efficiently at the edge without relying on cloud-based processing.

While Jetson delivers the core AI acceleration and development environment, real-world deployment requires more than a software stack. Industrial customers need ruggedized hardware, stable thermal engineering, extended lifecycle support, and flexible integration options that match the demands of harsh environments and mission-critical operations. This is where Winmate strengthens the Jetson ecosystem.

Winmate enhances Jetson deployment through a full portfolio of industrial-grade AI Panel PCs (AI PPC) and AI Rugged Laptops engineered specifically for field,

factory, maritime, defense, and logistics applications. These platforms combine Jetson or GPU-accelerated computing with durable enclosures, wide-temperature designs, multi-camera interfaces, industrial I/O, and 24/7 reliability. Winmate’s engineering capabilities—including custom carrier board design, BSP tuning, camera integration, GMSL/CSI optimization, and AI-focused thermal management—ensure that Jetson systems can meet the performance, regulatory, and environmental requirements of demanding industrial scenarios.

This whitepaper outlines the Jetson software architecture and describes the complete AI/ML workflow from model training to TensorRT optimization and edge deployment. It also demonstrates how Winmate accelerates time-to-market by providing hardware customization, AI pipeline optimization, manufacturing scalability, and long-term product lifecycle support. With the combination of NVIDIA Jetson and Winmate’s industrial AI platforms, enterprises can deploy reliable, high-performance AI solutions that are production-ready, scalable, and future-proof.



INTRODUCTION TO NVIDIA JETSON SOFTWARE DEVELOPMENT

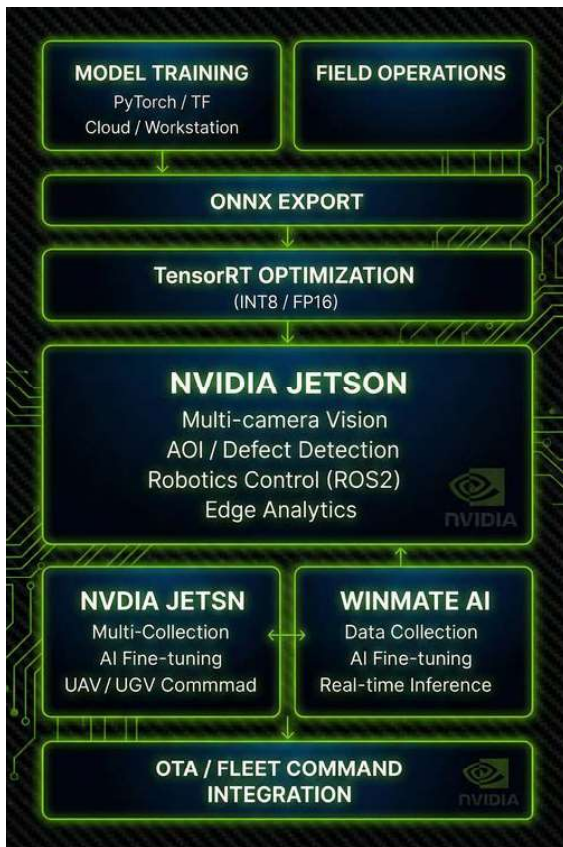
NVIDIA Jetson integrates high-performance GPU computing with an optimized, end-to-end AI software stack designed specifically for robotics, industrial automation, autonomous machines, and embedded AI workloads. As the edge computing landscape evolves, Jetson has become a foundational platform for developers seeking real-time inference, multi-sensor processing, and low-latency decision-making in environments where cloud connectivity is limited or impractical.

At the core of the Jetson ecosystem is JetPack SDK, which unifies Linux for Tegra (L4T), CUDA Toolkit, cuDNN, TensorRT, DeepStream, and Isaac frameworks into a cohesive software environment. This provides developers with a streamlined path to build, optimize, and deploy AI applications on devices ranging from compact robotics controllers to high-performance industrial systems. Jetson accelerates a wide range of AI tasks—including object detection, SLAM, motion planning, and multi-camera video analytics—making it ideal for next-generation autonomous and intelligent systems.

With robust support for ROS/ROS2, ONNX, GStreamer, and industry-standard machine learning frameworks, the Jetson platform enables developers to train models on cloud or workstation environments and then deploy optimized inference engines directly to edge devices. The combination of GPU acceleration, modular software libraries, and long-term NVIDIA support ensures that Jetson remains a stable and scalable platform for both rapid prototyping and mass-deployed industrial applications.



JETSON SOFTWARE STACK OVERVIEW



The NVIDIA Jetson software stack is built around the JetPack SDK, a unified development environment that delivers all essential components required to run high-performance AI at the edge. JetPack includes Linux for Tegra (L4T)—an Ubuntu-based operating system with NVIDIA-optimized kernel modules and drivers that provide deep integration with Jetson hardware. Alongside the OS foundation, JetPack includes GPU-accelerated libraries such as the CUDA Toolkit, enabling parallel computing for machine learning, computer vision, and scientific workloads.

For deep learning inference, JetPack incorporates cuDNN and TensorRT, two of NVIDIA’s most powerful acceleration engines that optimize neural networks for FP32, FP16, and INT8 precision, significantly boosting throughput and reducing latency. For vision and image processing, JetPack includes VPI and OpenCV, enabling developers to build real-time perception pipelines with hardware-accelerated operators.

For more complex AI applications such as multi-camera analytics, sensor fusion, or video processing, the DeepStream SDK provides a highly efficient streaming framework designed to run multiple AI models simultaneously on edge devices. For robotics, automation, and autonomous systems, JetPack integrates Isaac SDK and Isaac ROS, which offer pre-built GEMs, SLAM components, and motion-planning algorithms optimized for Jetson.

Together, these components form a complete, production-ready software ecosystem that allows developers to train, optimize, deploy, and scale AI workloads with maximum efficiency. JetPack ensures that Jetson devices perform reliably in robotics, industrial automation, smart factories, transportation, healthcare, and mission-critical edge AI environments.

DEVELOPMENT ENVIRONMENT OPTIONS

NVIDIA Jetson supports a flexible development model that allows teams to choose the workflow that best matches their tools, infrastructure, and project maturity. Developers can start quickly on an Ubuntu host PC, using the officially supported JetPack SDK, cross-compilation toolchains, and familiar build systems such as CMake, Bazel, and ROS/ROS2 build tools. This host-based approach is ideal for larger projects where source code management, CI/CD pipelines, and collaborative development are already in place.

For teams that prefer reproducible environments, Docker-based development is fully supported. Containerized toolchains encapsulate dependencies, CUDA libraries, and AI frameworks, ensuring that the same image can be used for local development, integration testing, and production deployment on Jetson devices. This greatly reduces “it works on my machine” issues and simplifies integration with DevOps workflows.

Jetson also works seamlessly with VS Code remote development, allowing engineers to edit, debug, and profile applications on the Jetson target while working from their primary workstation. This setup combines the convenience of a desktop IDE with the realism of on-target execution.

Finally, developers can adopt a full on-device workflow, writing and running code directly on the Jetson platform itself. With Python, CUDA, TensorRT, and DeepStream available on the device, teams can prototype, benchmark, and optimize AI applications in the exact environment where they will ultimately run—shortening the debug cycle and helping to fine-tune performance for real-world conditions.



AI / ML WORKFLOW ON JETSON

A typical AI/ML workflow targeting NVIDIA Jetson follows a structured, repeatable pipeline that spans from cloud-based training to fleet-wide edge deployment. Models are usually trained on a workstation or cloud GPU environment using frameworks such as PyTorch or TensorFlow, where large datasets, extensive experimentation, and hyperparameter tuning can be performed efficiently. Once a model reaches the desired accuracy and robustness, it is exported to an interchange format such as ONNX, creating a portable representation that can be consumed by NVIDIA’s inference tooling.

The exported ONNX model is then optimized with TensorRT, which performs layer fusion, precision calibration (FP32 → FP16 or INT8), kernel auto-tuning, and memory optimization to maximize throughput on Jetson’s integrated GPU. This optimization stage is critical for meeting real-time constraints in

robotics, multi-camera vision, and industrial inspection workloads where milliseconds matter.

After optimization, the resulting TensorRT engine is deployed to Jetson-based edge devices, such as Winmate AI Panel PCs or Jetson-powered embedded systems. Applications integrate the engine into DeepStream, ROS2, or custom C++/Python runtimes for live inference. In the field, devices are managed using OTA update mechanisms or Fleet Command-style orchestration, enabling remote rollout of new models, bug fixes, and security patches. This closed-loop workflow—Train → Export ONNX → TensorRT Optimization → Jetson Deployment → OTA/Fleet Updates—ensures that AI applications running on Jetson remain performant, maintainable, and continuously improvable over the entire product lifecycle.

Edge AI Evolution: From PC to Humanoid Robot



Essential Storage Needs for Edge AI

- Performance & Efficiency
- Lower Power Consumption
- Trust & Security
- Cross-platform compatibility

Edge AI Market Expands Rapidly Amid Surging Demand



JETSON ROBOTICS & EDGE-AI ECOSYSTEM

The NVIDIA Jetson platform integrates seamlessly into a mature and rapidly evolving ecosystem for robotics, autonomous systems, and edge AI. Built to handle real-time perception, sensor fusion, motion planning, and multi-camera vision processing, Jetson provides the foundational compute required for modern robotic workloads.

A key part of this ecosystem is support for ROS and ROS2, the most widely used middleware in robotics research and commercial development. Jetson offers hardware-accelerated nodes, ROS2 packages optimized with CUDA, and the Isaac ROS GEMs library, which delivers high-performance modules for stereo depth estimation, visual SLAM, object detection, tracking, and navigation—all tuned specifically for Jetson GPUs.

For perception and multimedia applications, Jetson fully supports GStreamer pipelines, enabling zero-copy, hardware-accelerated video processing with multiple high-resolution

camera streams. Developers can integrate CSI and USB cameras, industrial imaging sensors, depth cameras, and synchronized multi-camera rigs for factory automation, AMRs/AGVs, drone vision, and inspection tasks.

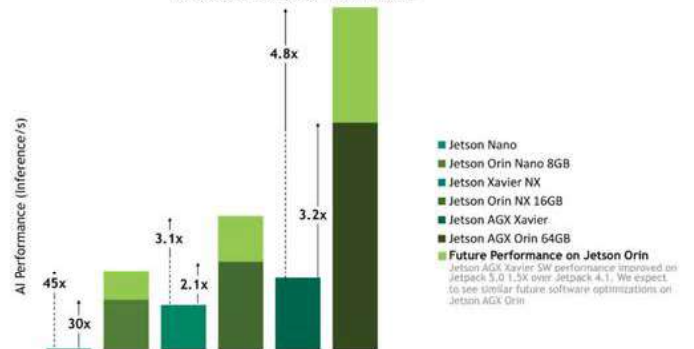
On the control and connectivity side, Jetson integrates directly with CAN bus, GPIO, I2C, SPI, and UART interfaces, enabling low-latency communication with motor controllers, IMUs, LiDARs, ToF cameras, and robotic actuators. This allows complex sensor fusion modules to run entirely on-device, reducing reliance on external PCs or cloud connectivity.

Together, these components form a robust robotics and edge-AI ecosystem—one in which Jetson serves as the computational “brain,” capable of running real-time AI inference, SLAM pipelines, multi-camera analytics, and autonomous navigation algorithms for next-generation intelligent machines.

NVIDIA Jetson Orin platform

Specification	Jetson Orin Nano	Jetson AGX Orin
CPU	6-core Arm Cortex-A78AE	12-core Arm Cortex-A78AE
GPU	1024-core NVIDIA Ampere 32 Tensor Cores @ 1020 MHz	2048-core NVIDIA Ampere 64 Tensor Cores @ 1.3 GHz
Memory	4GB or 8GB LPDDR5	32GB or 64GB LPDDR5
AI Performance	Up to 34-67 TOPS	Up to 275 TOPS
Power	7W-25W	15W-60W

GIANT LEAP IN PERFORMANCE FOR NEXT GEN AI Accelerated Computer Vision Models



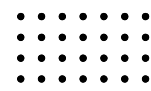
Digital Defense-
Ground Control Station

Maritime Control

Weapon Vision Control

TECHNICAL COMPARISON TABLE: JETSON VS X86 GPU PLATFORMS VS ARM SOC

Category	NVIDIA Jetson	x86 + Discrete GPU	ARM SoC (Non-Jetson)
Architecture	ARM-based CPU + integrated NVIDIA GPU	x86 CPU with external NVIDIA/AMD GPU	Low-power ARM CPU with integrated basic GPU
AI Performance	High AI throughput with CUDA, TensorRT, DeepStream optimized for edge	Highest AI performance but with high power and thermal overhead	Limited AI acceleration; relies on CPU or lightweight NPU
Power Consumption	5–30 W (ultra-efficient for edge)	60–350+ W depending on GPU model	1–10 W, extremely low
Size / Form Factor	Compact, module-based; ideal for embedded systems	Bulky; requires large cooling and PCIe GPU	Very compact; suitable for IoT, not for heavy AI
Thermal Requirements	Moderate; supports fanless or semi-fanless designs	High; requires active cooling with large heatsinks or fans	Very low; supports full fanless
AI Framework Support	CUDA, cuDNN, TensorRT, DeepStream, VPI, Isaac ROS	CUDA, cuDNN, TensorRT (GPU-dependent)	Limited ML frameworks; often CPU-bound
Computer Vision Performance	Excellent multi-camera handling with hardware-accelerated ISP	Good but requires additional hardware for multi-camera sync	Basic; often insufficient for industrial CV
Robotics Ecosystem	Strongest—Isaac ROS, ROS2 acceleration, SLAM modules	Moderate; depends on GPU and middleware	Weak; minimal robotics acceleration
Industrial I/O Support	CSI cameras, GPIO, I2C, SPI, UART, CAN	Requires additional interface cards	Only basic I/O; limited real-time capability
Deployment Environment	Designed for edge AI, AMR/AGV, drones, industrial robotics	Best for servers, high-end PCs, industrial GPU workstations	Best for low-power IoT endpoints
Edge Deployment Ease	High—small, efficient, deployable anywhere	Low—large power draw and cooling limits deployment	High—but performance not sufficient for AI
Cost Efficiency	Excellent performance per watt & per dollar	Expensive (CPU + GPU + power + cooling)	Cheapest solution but lowest AI capability
Best Use Cases	Robotics, autonomous systems, machine vision, industrial AI	Workstations, cloud inference, heavy AI training	IoT sensors, gateways, simple ML tasks

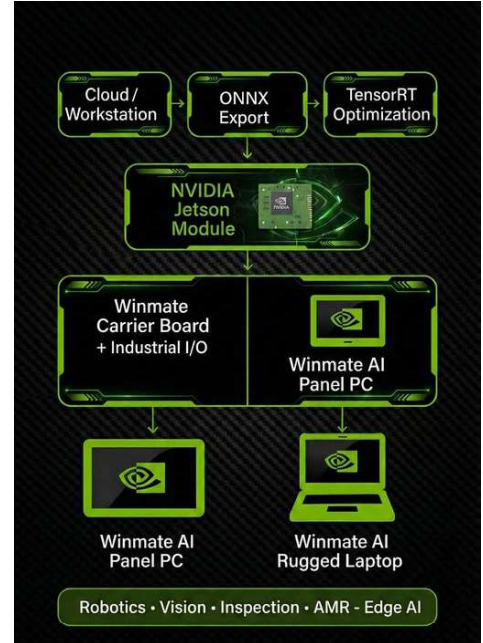


WINMATE'S CAPABILITIES AS A JETSON PLATFORM PROVIDER

Winmate delivers a comprehensive suite of engineering and manufacturing capabilities that enable customers to fully leverage the power of NVIDIA Jetson in real-world industrial, robotics, and mission-critical deployments. Beyond providing ruggedized hardware platforms, Winmate offers deep technical integration services that ensure Jetson modules operate at peak performance under demanding environmental and operational conditions.

Winmate's engineering expertise includes custom carrier board design, enabling tailored I/O layouts, power delivery architectures, high-speed interfaces, and multi-camera synchronization to match application-specific requirements. Through BSP customization and kernel-level integration, Winmate ensures compatibility with specialized peripherals, industrial sensors, and proprietary communication protocols while maintaining long-term stability across JetPack releases.

To support advanced perception and inspection workloads, Winmate provides camera tuning and image optimization, including CSI/USB camera bring-up, ISP configuration, GMSL/GMSL2 camera integration, and multi-camera real-time streaming using hardware-accelerated pipelines. Winmate's AI engineering team further enhances system performance through CUDA optimization, TensorRT model acceleration (FP16/INT8), and DeepStream pipeline tuning, ensuring minimal latency and maximum throughput for edge AI inferencing.





On the system level, Winmate delivers full-stack integration, including ROS/ROS2 configuration for robotics, GStreamer-based multimedia pipelines, thermal and power optimization, and secure boot enablement. Winmate also supports enterprise deployment at scale with mass-production workflows, factory flashing solutions, automated functional testing, and lifecycle management—ensuring consistent quality and long-term availability across global deployments.

Together, these capabilities position Winmate as a trusted Jetson platform provider capable of supporting the entire product lifecycle, from early development and system design to large-scale manufacturing and field deployment.



WHY JETSON + WINMATE = A COMPLETE EDGE AI PLATFORM

Combining NVIDIA Jetson's powerful edge AI compute capabilities with Winmate's industrial-grade hardware and system integration expertise results in a fully optimized platform purpose-built for real-world deployment. Jetson provides the high-efficiency GPU acceleration, AI-optimized software stack, and production-ready inference tools needed for robotics, machine vision, and autonomous systems. Winmate enhances this foundation with ruggedized enclosures, wide-temperature operation, industrial I/O expansion, and long-lifecycle support—ensuring the hardware can operate reliably in harsh, space-constrained, or mission-critical environments.

Beyond hardware durability, Winmate adds value through custom carrier board engineering, BSP and driver optimization, thermal design, and multi-camera industrial imaging integration. These capabilities ensure that Jetson modules run at peak performance while meeting the demands of factory automation, AGVs/AMRs, UAV ground stations, security systems, and inspection equipment. Winmate's AI Panel PCs and Rugged Laptops further extend Jetson's reach

by providing turnkey platforms for on-device inference, field data collection, model validation, and real-time decision-making.

Together, Jetson and Winmate form a complete edge-to-deployment ecosystem: cloud-trained models can be optimized with TensorRT, deployed seamlessly to Winmate devices, managed remotely via OTA or Fleet Command workflows, and scaled across global industrial operations. This integrated approach shortens development cycles, reduces deployment risk, and delivers a stable, repeatable framework for building the next generation of intelligent edge systems.

“Jetson and Winmate together deliver a fully optimized, industrial-grade edge AI platform ready for real-world deployment.”
Winmate IoT Dept. VP/ Vincent Wang



RECOMMENDED WINMATE AI PRODUCTS FOR JETSON AND EDGE AI DEPLOYMENTS

Winmate offers a portfolio of industrial-grade AI computing platforms designed to complement and extend the capabilities of NVIDIA Jetson in demanding real-world environments. The two flagship categories—Winmate AI Panel PCs (AI PPC) and Winmate AI Rugged Laptops—provide robust, reliable endpoints for edge inference, machine vision, robotics control, and field AI operations.

Winmate AI Panel PCs integrate Jetson or GPU-accelerated computing directly into a sealed, industrial HMI form factor with wide-temperature operation, IP65-rated front panels, and support for multi-camera input via CSI, USB, or GMSL interfaces. These systems are ideal for machine vision inspection, AMR/AGV navigation, industrial automation, and human-machine collaboration scenarios where durability and low-latency AI performance are critical. Optional custom carrier boards, extended I/O, and thermal-optimized enclosures allow seamless integration into production lines, robotics platforms, and manufacturing equipment.

Winmate AI Rugged Laptops provide a portable, field-ready AI workstation for data collection, model validation, UAV/UGV command and control, and real-time inference in outdoor or mission-critical environments. With MIL-STD durability, long battery life, and high-performance CPU/GPU options, these devices enable engineers to perform on-site AI tuning, edge deployment testing, and multi-sensor data acquisition without the need for external computing infrastructure.

Together, these Winmate AI platforms offer scalable, production-ready hardware solutions that make Jetson-powered applications easier to deploy, maintain, and expand. Whether mounted on a robot, installed on a factory line, or carried into the field, Winmate's AI PPCs and Rugged Laptops ensure consistent performance, industrial reliability, and long-term lifecycle support for Jetson-based edge AI systems.

	WNAI-E600	NTDRW100	S101NT	WNAI-E800
Product Type	Box PC	AI DIN Rail Box PC	10.1 Edge AI Rugged Tablet	Industrial Edge AI Computer
CPU	AMD Orin 32GB, 8-core Arm® Cortex® A78AE CPU, AMD Orin 64GB, 12-core Arm® Cortex® A78AE CPU (Optional)	NVIDIA Jetson Orin Nano AI 50M (40 TOPS) / Super Mode (67 TOPS)	NVIDIA Jetson Orin Nano AI 50M (40 TOPS) / Super Mode (67 TOPS)	Intel® Core i7-14700T (up to 5.2 GHz) (Optional), Intel® Core i9-14950T (up to 5.5 GHz) (Optional)
GPU	32 GB 1792 CUDA core NVIDIA Ampere® GPU with 50 Tensor Cores, 64 GB 3584 CUDA core NVIDIA Ampere architecture GPU with 46 Tensor Cores	1024 core NVIDIA Ampere GPU with 32 Tensor Cores	1024 core NVIDIA Ampere GPU with 32 Tensor Cores	NVIDIA® RTX series Graphic Card (Optional), NVIDIA® GeForce RTX series Graphic Card (Optional)
GPU Performance	32GB 200 TOPS / 64GB 275 TOPS	AI 50M (40 TOPS) / Super Mode (67 TOPS)	AI 50M (40 TOPS) / Super Mode (67 TOPS)	N/A

SYSTEM ARCHITECTURE: JETSON + AI PPC + AI LAPTOP

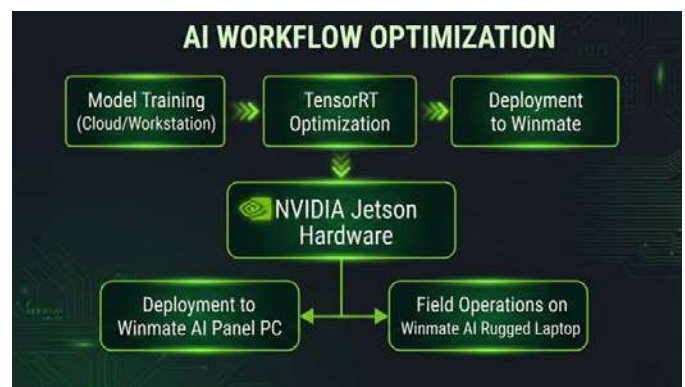
The integrated system architecture combining Jetson, Winmate AI Panel PCs, and Winmate AI Rugged Laptops creates a robust edge AI pipeline that spans cloud training, model optimization, device deployment, and field operations. The workflow begins in the cloud or workstation environment, where developers train deep learning models using frameworks such as PyTorch or TensorFlow and perform iterative tuning with large datasets. Once validated, models are exported to the ONNX format, ensuring portability and compatibility with NVIDIA's inference toolchain.

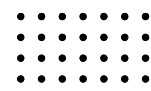
The ONNX model is then optimized using TensorRT, where precision calibration, kernel fusion, and graph optimization significantly improve inference latency and throughput on Jetson hardware. The resulting TensorRT engine becomes the deployable artifact that runs on Winmate's Jetson-powered AI Panel PCs (AI PPCs). These industrial devices act as fixed edge inference endpoints, supporting real-time machine vision, robotic navigation, and multi-sensor analytics within production lines, autonomous machines, and smart infrastructure.

Complementing the AI PPC, the Winmate AI Rugged Laptop functions as a mobile AI platform for field operations. Engineers and operators use it to collect data, validate models, run diagnostics, and perform real-time evaluations in dynamic

environments such as warehouses, construction sites, transportation hubs, or mission-critical outdoor deployments. The laptop also enables rapid OTA model updates, on-site debugging, and condition-based tuning of Jetson applications.

Together, this architecture establishes a complete edge AI deployment loop—from cloud training to ONNX export, TensorRT optimization, AI PPC deployment for fixed installations, and AI Rugged Laptop operations for mobile or field-based use cases. This unified system enables fast iteration, high reliability, and scalable deployment across industrial and autonomous environments.





WHY WINMATE AI PRODUCTS STRENGTHEN JETSON DEPLOYMENT

Winmate elevates Jetson-based systems from development prototypes to fully deployable industrial AI solutions by delivering the mechanical, electrical, and operational capabilities required for long-term reliability in harsh edge environments. While Jetson provides the powerful AI compute core, Winmate ensures that the platform can be mounted, cooled, protected, connected, and maintained at the level demanded by factories, autonomous machines, defense applications, and field robotics.

Winmate's industrial-grade enclosures, IP-rated front panels, and ruggedized chassis designs provide durability against shock, vibration, dust, moisture, and temperature extremes, enabling Jetson modules to operate stably in manufacturing floors, outdoor installations, logistics yards, or mission-critical mobile platforms. Through advanced thermal engineering—including passive heat spreaders, custom heatsinks, and optimized airflow—Winmate ensures Jetson's GPU and CPU can maintain maximum performance without thermal throttling, even during heavy multi-camera inference or continuous 24/7 operation.

Additionally, Winmate offers extended industrial I/O and custom carrier board options, supporting interfaces such as GPIO, CAN bus, RS-232/422/485, GMSL/CSI cameras, LAN expansion, and isolated power inputs that are essential for real-world robotics, automation, and inspection systems. Winmate's AI Rugged Laptops and AI Panel PCs also serve as field engineering tools, enabling operators to collect data, fine-tune AI models, run diagnostics, and validate performance directly at the deployment site.

Finally, Winmate's value extends beyond hardware with production lifecycle management, including factory flashing, functional testing, environmental validation, documentation, and long-term availability. This ensures that Jetson-based products can be manufactured consistently at scale and supported throughout multi-year deployment cycles.

Together, these capabilities transform Jetson from a powerful AI module into a complete, reliable, and industry-ready edge AI platform, accelerating time-to-deployment and reducing operational risk for enterprise and industrial customers.

AI Future Architecture: Distributed & Decentralized

Full Size Graphic Card

Rugged Server and Workstation

MXM Graphic Processor

Jetson SOM

WNAI-E600

NDRW100

S101NT

AI Accelerated Computing (2000+ TOPS):

- Model Training & Simulation
- Cyber-Physical System (CPS) / Digital Twin
- NVIDIA Blackwell B200
- NVIDIA H200
- AMD MI325X (2,614 TOPS)

Edge AI Computing (100- 500 TOPS):

- Co-Pilot Intelligent Agent
- Generative AI Companion
- NVIDIA DGX Spark 1 Petaflop (2K TOPS)
- NVIDIA Jetson AGX Orin (200 - 300 TOPS)
- Qualcomm QCS9100 100 TOPS +

Edge Devices with On-Device AI (20 - 50 TOPS):

- Autonomous AI
- Autonomous Mobile Robot (AMR)
- Self-Driving Intelligence
- AMD Ryzen AI 300 Series 50 TOPS
- NVIDIA Jetson Orin NX/Nano 20 - 40 TOPS
- Qualcomm QCS8550 48 TOPS
- Qualcomm QCS6490 13 TOPS

Processor	Jetson AGX Orin Series		Jetson Orin Nano Series	
	Jetson AGX Orin 64GB	Jetson AGX Orin 32GB	Jetson Orin Nano 8GB	Jetson Orin Nano 4GB
Specs				
AI TOPS	275 TOPS	200 TOPS	40 TOPS	20 TOPS



THE WINMATE RUGGED EDGE AI FULL-STACK ARCHITECTURE

Deploying Artificial Intelligence at the industrial edge demands more than raw GPU power; it requires a cohesive ecosystem engineered for stability in harsh environments. Winmate offers a vertically integrated software stack optimized for the NVIDIA Jetson platform, bridging the gap between rugged hardware and advanced AI applications. This full-stack approach eliminates hardware-software compatibility issues, enabling developers to prioritize innovation over low-level system debugging.

The Winmate Jetson solution is built upon four critical architectural layers:

- **Hardware Platform Layer – The Rugged Foundation** Serving as the physical cornerstone, this layer combines NVIDIA Jetson’s high-performance computing with Winmate’s industrial-grade ruggedization. Designed for extreme conditions—including shock, vibration, and temperature fluctuations—it features certified thermal management and specialized I/O interfaces to ensure reliability in industrial, vehicular, and defense applications.
- **System Layer (OS & Custom BSP) – The Optimized Core** Winmate provides a deeply customized Board Support Package (BSP) and optimized Linux operating system to bridge hardware and software. Beyond generic kernels, this layer includes proprietary drivers for precise control of specialized peripherals like CAN Bus and PoE. It ensures seamless hardware integration and long-term system stability.
- **Acceleration Layer – Unleashing Performance** To maximize Jetson’s potential, this layer integrates the NVIDIA JetPack SDK’s core acceleration libraries, including CUDA for parallel computing and TensorRT for inference optimization. Pre-validated against Winmate’s BSP, this standardized environment ensures developers can leverage full hardware acceleration immediately without compatibility hurdles.
- **Application Layer – Flexible Deployment** At the summit of the stack lies the user’s AI solution. Supporting modern containerization technologies like Docker, this layer allows AI models and computer vision applications to be packaged as lightweight, portable containers. This architecture facilitates rapid deployment, streamlined updates, and scalable migration across edge devices.



CONCLUSION

NVIDIA Jetson delivers high-efficiency AI acceleration that is exceptionally well-suited for robotics, computer vision, autonomous systems, and mission-critical edge workloads. However, achieving consistent real-world performance requires more than raw compute. Winmate provides the industrial engineering, rugged hardware platforms, system integration expertise, and lifecycle management necessary to transform Jetson from a development module into a fully deployable edge AI solution.

Through rugged AI Panel PCs, mobile AI Rugged Laptops, custom carrier boards, thermal optimization, industrial I/O expansion, and field-proven durability, Winmate ensures that Jetson-based systems can operate reliably under harsh environmental conditions and continuous 24/7 workloads. Combined with support for TensorRT-optimized deployment, multi-camera vision pipelines, and OTA/Fleet Command update workflows, Winmate enables enterprises to scale AI across factories, logistics hubs, fleets, and autonomous machines with confidence.

Together, Jetson and Winmate form a complete edge AI ecosystem—one that accelerates development, simplifies deployment, and delivers a robust, scalable foundation for the next generation of intelligent industrial and autonomous systems.



About Us

With over 30 years of industry experience, Winmate is a global leader in rugged computing and intelligent edge solutions. From rugged tablets and rugged laptops to panel PCs, industrial displays, Edge AI systems, and robotic controllers, our products are built to support demanding environments across industries. We specialize in providing tailored solutions and hardware customizations to meet the unique needs of customers in sectors such as industrial automation, defense, logistics, automotive, and more. Backed by in-house testing laboratories and a strong global distribution network, Winmate ensures reliable performance, long-term support, and proven durability.

For more information about Winmate, please visit our website: www.winmate.com

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