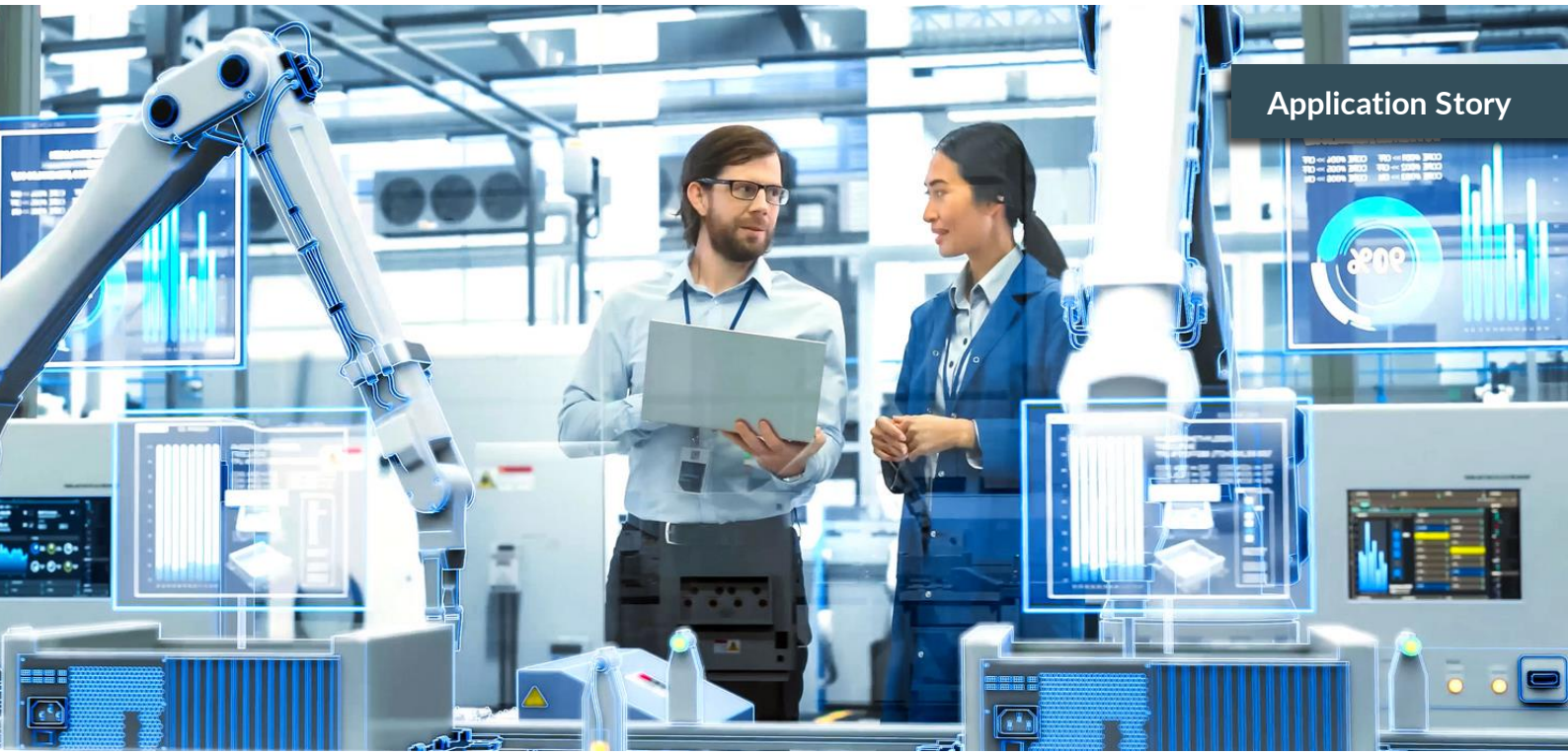
Unlocking Industrial Efficiency: The Role of Edge AI in Intelligent Factories



In today's industrial sites and manufacturing sectors, AI is widely applied in intelligent equipment. Edge AI enhances automation, safety, and decision-making capabilities, bringing significant benefits to factories. For example, edge AI can monitor production lines and equipment in real time, identifying potential issues early to prevent failures. This predictive maintenance reduces downtime and ensures smooth production operations. Edge AI computing is gradually integrating into the daily production processes of factories.

What is Edge AI?

Edge AI performs AI processing at the network edge, close to the data generation location. It collects information through connected sensors or IoT devices and conducts real-time data analysis and decision-making. This contrasts with traditional cloud server-based AI training, as it doesn't require data transmission to the cloud. This reduces data transmission, achieves minimal latency, and decreases bandwidth usage, making it an architecture that responds immediately and efficiently utilizes resources.

Edge AI in Factories

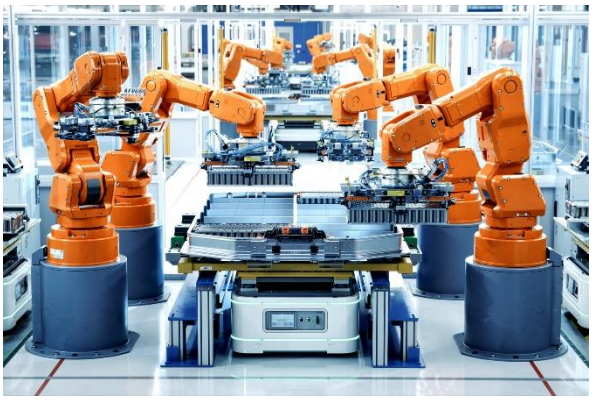
Edge AI has numerous applications in factory environments, particularly in enhancing real-time insights, automation, and agility. Here are some specific examples:

Automated Optical Inspection (AOI)
Edge AI can implement automatic detection of product quality in AOI systems, such as detecting defects, size, or shape anomalies, and immediately remove non-conforming products to ensure each product meets standards.

Predictive Maintenance
By analyzing equipment data, Edge AI can predict potential equipment failures and alert operators for maintenance, reducing downtime.

Automated Equipment Control
Edge AI processes equipment data in real-time and automatically adjusts machine operating parameters, such as speed, temperature, or pressure, to improve production efficiency.

Autonomous Robots
In industrial environments, Edge AI enables robots, robotic arms, or AMRs (Autonomous Mobile Robots) to receive sensor data in real-time, performing tasks such as assembly, welding, autonomous navigation, and material handling.



Safety Management
Edge AI is widely used in factory safety monitoring systems. Through computer vision and sensor technologies, it can monitor whether employees are correctly wearing protective gear or identify dangerous actions, promptly detecting and responding to potential risks.

How to Choose the Right Edge Hardware

When selecting an Edge AI computer for factory use, several factors need to be considered, such as:

Durability
To ensure reliable operation in harsh factory environments, the Edge AI computer must have a robust design, including a reinforced casing, shock and vibration resistance, and support for wide operating temperature ranges.

Industrial I/O and Expansion

The Edge AI computer needs to connect to sensors, controllers, PLCs, and other external devices. It may also require additional PCI expansion to facilitate comprehensive data collection and processing at the edge.

Network Connectivity
Factory equipment requires real-time communication, so the Edge AI computer should have stable connectivity options, including Wi-Fi, Ethernet, and 5G, to support big data transmission.

Machine Vision Processing
For machine vision tasks such as Automated Optical Inspection (AOI), the Edge AI computer needs to connect to cameras, light sources, frame grabber cards, and motor controllers. It may also require GPU expansion to accelerate the training and inference of machine learning models, as GPUs offer significant advantages for such imaging tasks.

Darveen's Edge AI Solutions

For AOI Defect Detection

MIC Series
The MIC series is a high-performance rugged edge AI computer that supports 10th/11th generation Intel® Core™ i3/i5/i7/i9 processors, providing powerful computing for complex industrial tasks.

Features:

- **High Performance:** Supports complex AI algorithms for real-time data processing.
- **Expandability:** Up to 4 PCIe/PCI expansion slots.
- **GPU:** Supports a 300W, 330mm long GPU card with a unique thermal design.
- **Connectivity:** Multiple I/O ports for flexible integration with systems and peripherals.

For Machine Vision

VBC Series
The VBC series is designed specifically for machine vision, supporting 8th/9th generation Intel® Core™ i3/i5/i7 processors, and up to 6 GigaLAN (4 PoE) and 4 PCIe expansion slots, suitable for machine vision and robot arms.

Features:

- **High Performance:** High-performance Intel® Core™ i processors.
- **Expandability:** Up to 4 PCIe/PCI expansion slots.
- **GPU:** Supports entry-level GPU cards with unique thermal design.
- **Connectivity:** Supports up to 6 GigaLAN (4 PoE) and various I/O ports.

For Security Surveillance

DIC Series

The DIC series is a rack-mounted industrial chassis compatible with various standard form factor motherboards, offering excellent expandability, thermal efficiency, and durability. Suitable for large-scale image recognition and data analysis.

Features:

- **Expandability:** Built-in up to 7 PCIe/PCI slots, supports GPU expansion (up to 2), frame grabbers, communication modules, and motion control cards.
- **Durability:** Precisely designed with efficient cooling capabilities.
- **Connectivity:** Multiple I/O ports for flexible integration with systems and peripherals.

For Data Acquisition

DBC Series

The DBC series is designed for industrial automation, IoT, and edge computing applications. With a compact, wall-mountable chassis and rich I/O, it is easy to integrate into space-limited industrial environments.

Features:

- **Compact Design:** Small form factor for quick installation in equipment interiors or enclosures.
- **High Performance:** Equipped with 11th/12th generation Intel Core U-series high-performance, low-power processors.
- **Connectivity:** Multiple I/O ports for multi-sensor data acquisition.

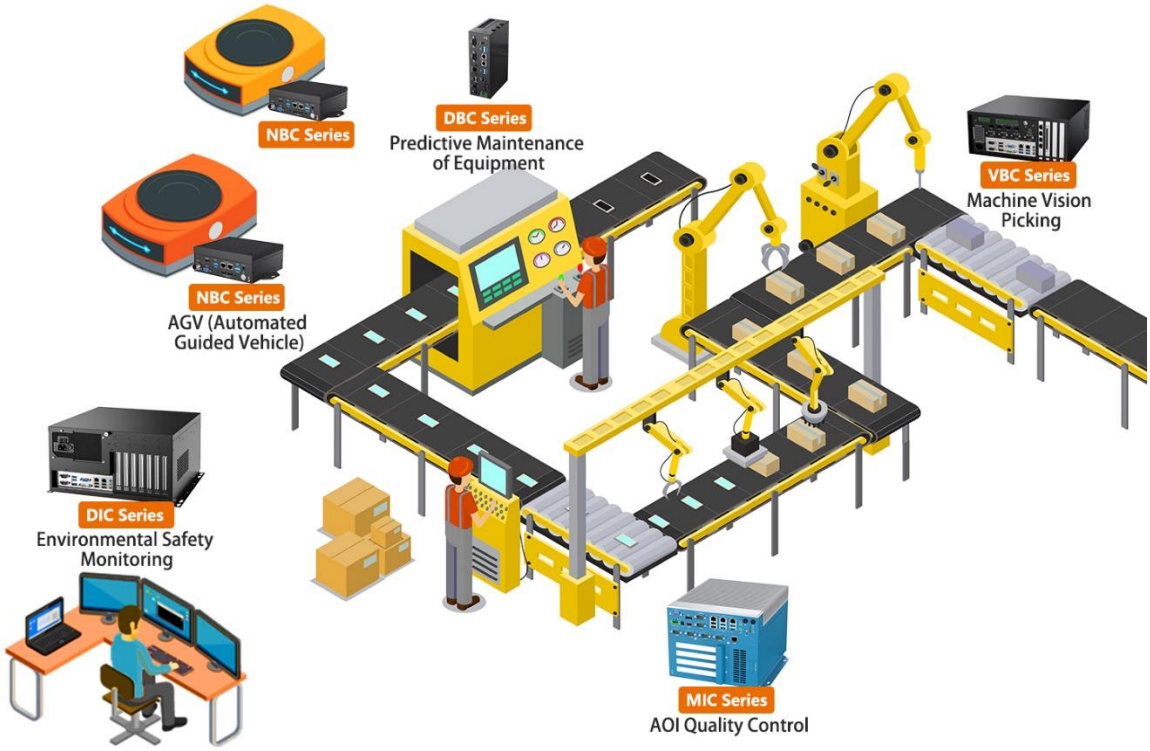
For AGV

NBC Series

The NBC series features a compact and lightweight design, making it easy to integrate into the tight spaces of AGVs for efficient mobility.

Features:

- **Compact Design:** Suitable for industrial automation and AGVs.
- **High Performance:** 11th/12th generation Intel® Core™ U-series low-power processors, ideal for continuous AGV operation.
- **Connectivity:** Supports multiple sensors and communication modules for AGV data collection and control.



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