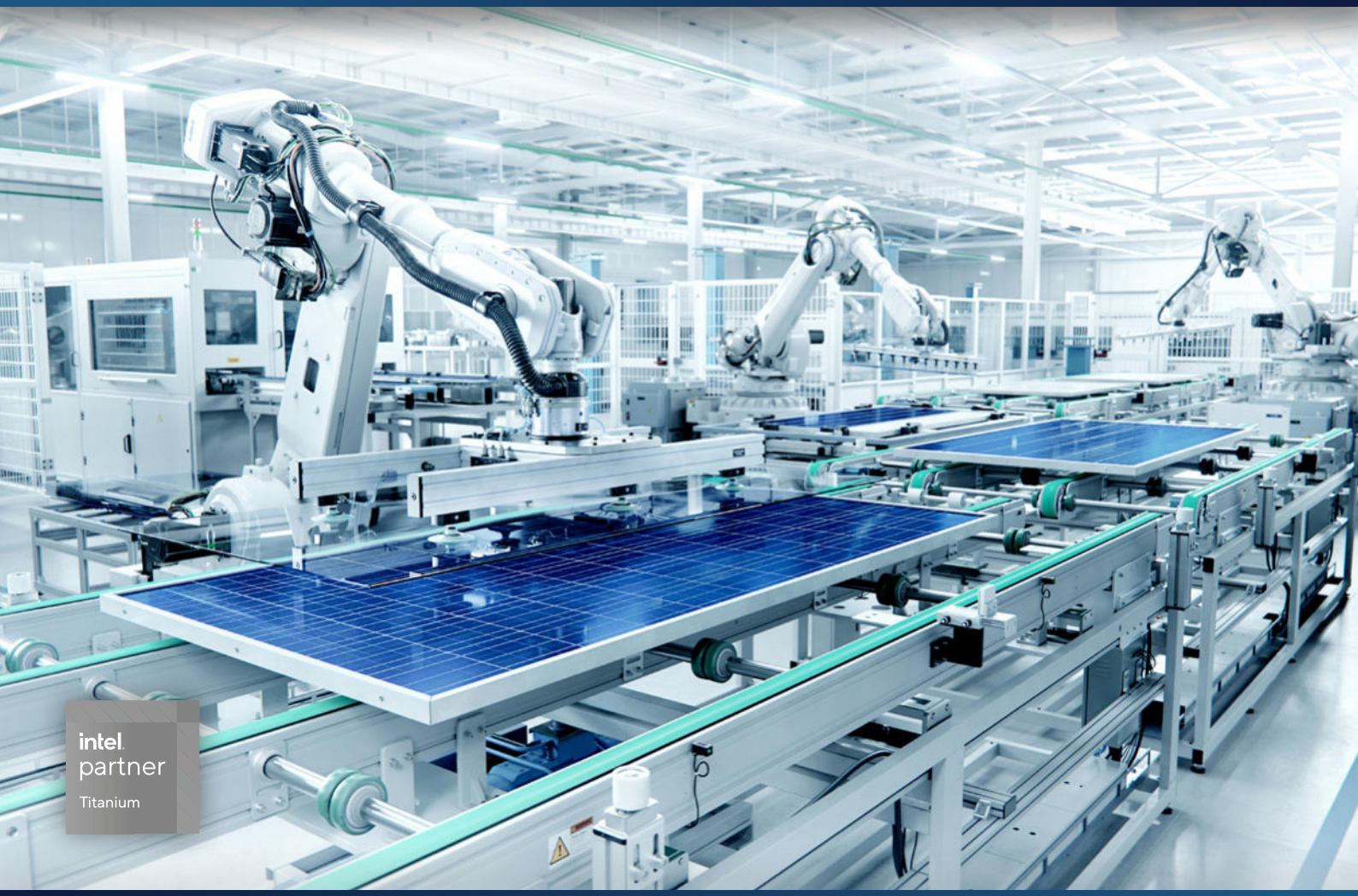
CASE STUDY




# AI Computer Vision in Factory Automation

# Introduction

Robot arms have become the go-to choice for factories looking to accelerate production and raise product quality. However, robot manufacturers know that safety is a leading concern for plant managers, who are cautious of personnel working in close proximity to robot arms. Robot manufacturers also worry about possible self-inflicted damage to the robot arm caused by incorrect sensor readings or other irregularities. So, they need an external system to monitor the movement of the robot arm to protect it and the personnel working around it, from harm.

IEI provided the TANK-XM811 AI inference-ready computer to enable real-time computer vision and AI to monitor and protect the robot arm and personnel. The TANK-XM811 is built from the ground up with the computer hardware needed to seamlessly integrate into the factory environment and monitor the movements of the robot arm and the people moving around the factory floor.

# Challenges

Real-time insights and data analysis at the edge are non-negotiable for companies using automation in their manufacturing processes. Possible insights include data for the MES and insights that can assist in altering SOPs for greater safety and efficiency. Due to limited staff resources, identifying and solving operational and security issues often take too long in the fast-paced production environment.
Robot arms provide all these benefits on the production line, but introduce new hazards that must be addressed. Robot arm manufacturers must take proactive and protective measures to ensure product and personnel safety by monitoring danger zones and robot arm movements.

### Hazardous area

Robot arms can cause injuries if they make contact with personnel. To prevent accidents, factories with restricted workforce use visual cues like hazardous area markings or warning signs. However, relying on visual cues alone can be risky. It would be safer if the robot had safety systems to alert personnel or automatically shut down to prevent accidents.

**Robot arm protection**
Sensor discrepancies, control box errors, lost messages, and incorrect real-time status messages can degrade robot performance or cause damage. To keep the robot arm running smoothly and prevent downtime, external monitoring is necessary. Checking for discrepancies, communication errors, and correct arm movement helps optimize performance and prevent expensive repairs or replacements.

Developments in computer vision and AI provide solutions to both of these issues, but a computer with enough speed and power is required to handle the continuous computing load.

# *Solution*

Plant managers can continue to enjoy the efficiency, interoperability, centralized management, and easy deployment of robot arms while being safe in the knowledge that their employees and robot assets are protected with the latest in computer vision and AI technology.

**Powerful platform:**
Smooth inference starts with the CPU, and the 12th gen Intel® platform supplies the responsiveness needed for a computer operating machine vision applications. 12/13th Gen Intel® processors feature a hybrid architecture designed that integrates two types of cores: Performance-cores (P-cores) that provide high performance and raw speed for single-thread operations, and Efficient-cores (E-cores) that deliver efficient multi-thread performance for background tasks.

**Fast inference:**
The GPU is the key to fast inference, and the TANK-XM811 supports the latest Intel® Arc™ Pro series GPU cards. This is important as inference testing on the Intel® Arc™ Pro A50 shows detection of up to 80 objects per frame with just 10% GPU load, providing plenty of headroom for multiple AI applications with a single GPU card.

**Expandability:**
The eChassis provides room for extra GPU cards, while also providing expansion options for motion control cards, frame grabber cards, accelerator cards, or I/O cards. In addition to the selection of native I/O ports on the TANK, these provide every option needed for industrial applications.

**Reliability:**
The TANK-XM811 is also built for industrial environments. It's robust, with a wide temperature range support, making it a good choice for hot factory floors without air conditioning, or at the other extreme in refrigeration in food production.

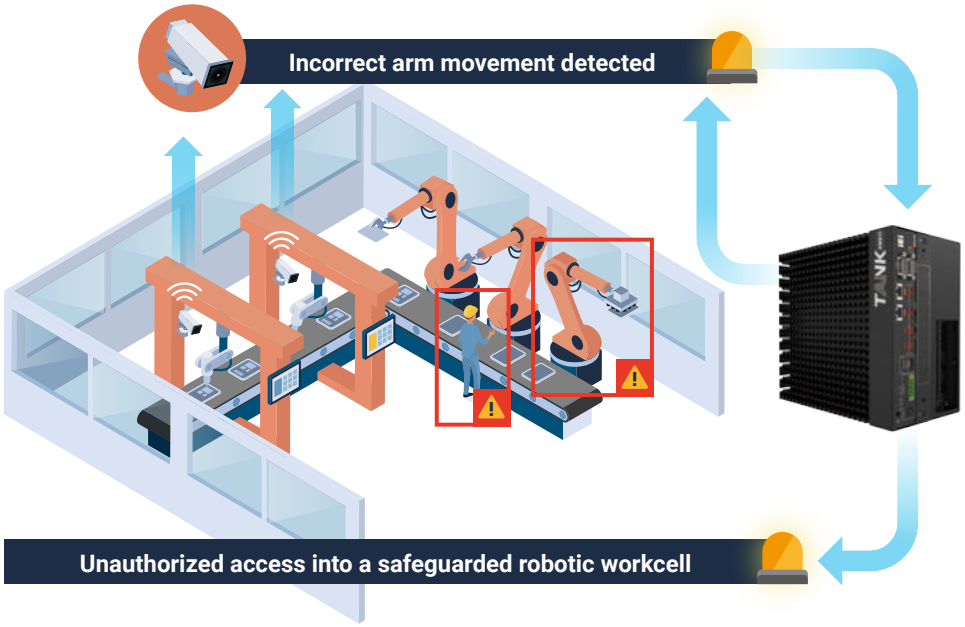
**Connectivity:**
It also offers wireless connectivity thanks to multiple expansion slots with SIM cards for WiFi and Bluetooth. It features multiple native I/O ports suited for factory automation and connects to AWS, Azure, or Google Cloud.

# *IEI Solution*

| TANK-XM811 | |
|---|---|
|  | · Fanless embedded box PC<br>· 12th/13th Gen Intel® Core™ CPU<br>· Modular design for expansion<br>· Wide operating temperature |
| **TXC-XM81-4S** | |
|  | · 4-slot half-size chassis<br>· Compatible with TANK-XM81 series<br>· Maximum 75W for add-on card power |
| **TXCBP-XM81-4B** | |
|  | · 4-slot backplane<br>· Two PCIe x16 (PCIe x8 signal) & two PCIe x4 slot<br>· Compatible with TXC-XM81-4S |
| **Intel® Arc™ Pro A50 Graphics** | |
|  | · Up to four displays at 4K<br>· 6GB GDDR6 high-speed memory |

IEI Integration Corp.

IEI Integration Corp. builds up the business as a leading industrial computer provider, and turns to artificial intelligence and networking edge computing. IEI's products are applied in computer-based applications such as factory automation, computer telephony integration, networking appliances, security, systems, and in fields like AI, IoT (Internet of Things), national defense, police administration, transportation, communication base stations and medical instruments. IEI continues to promote its brand products as well as serving ODM vertical markets to offer complete and professional services.




# Results

With a successful machine vision rollout to monitor robotic arms on the production line, personnel safety and robot efficiency rapidly increased.

### Personnel are safer

Employees will get audio and visual reminders when they step too close to a robot arm, giving them an opportunity to step back and become accustomed to the safe operating area around the robot arm. If they fail to heed the warnings, then the system will take preemptive action to avoid an accident by deactivating the robot arm before it can cause injury to the person.

### Robots are protected

The robot arm is monitored for movements that could potentially damage this costly investment. This additional level of protection is a relatively simple and cost-effective method to protect the robot arm from moving beyond its recommended angles. The collected data also provides the information needed to analyze the robot arm movement so that a more efficient path can be used in the future, providing potential speed increases without any additional expenditure.

For more information or sales inquiries, please click the button below to submit your inquiry.

**Sales Inquiry**