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White Paper

Powering IIoT Edge-Computing for Vertical Market AI, Energy, and Transportation

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Titanium

TABLE OF CONTENTS

1 ..... Challenge

2 ..... Solution Overview

3 ..... Solution Description

4 ..... Vertical Markets

5 ..... Conclusion

1

Challenge

Are your IIoT applications failing to keep pace with expanding workloads at the edge? Can they handle the predicted data speed, quantity, and loading increases? Do they have the fit for purpose processing power and network bandwidth required to properly execute the acquisition, processing, and display of incoming data in near real-time?
Meeting and exceeding these new demands at the IIoT edge is important because these changes impact mission-critical artificial intelligence (AI), energy, and transportation applications. AI is one of the fastest-growing markets and applications for this new technology are quickly emerging that can enhance the quality of people's lives and make industrial operations more reliable and efficient.

AI systems help ensure the uninterrupted functioning of key systems critical for keeping the economy running smoothly, such as energy infrastructure where losing electrical power can lead to blackouts that cause inconvenience to people's lives and catastrophic losses for industry, or transportation that gets millions of commuters to work everyday and keeps the goods and services that we all rely on from one place to the next.

IEI Integration Corporation, with over 25 years of experience in industrial automation, has its finger on the pulse of IIoT. As a leading edge-computing solution provider of integrated industrial computing, networking and storage technologies, IEI has formed strategic partnerships with reliable leading performance chip suppliers like Intel to manage data acquisition, transmission, inference, and storage tasks. IEI's IIoT edge-computing solutions provide the platform to serve mission-critical markets like AI, energy, and transportation to enhance capabilities, capacity, and reliability.

2

Solutions Overview

The new IEI TANK-XM811 provides a powerful, expandable, and reliable solution for IIoT edge computing.

Powerful processing for the TANK-XM811 is provided via a 13th generation Intel® Core™ Raptor-Lake processor and Intel® R680E chipset. This new processor uses the Intel® 7 nanometer lithography process and offers up to 16 cores and 24 threads with Intel® Hybrid Technology for outstanding multi-threaded performance. The kit delivers low latency, high network, and data transmission speed with PCI Express 4.0 for double throughput and provides optional Intel® Wi-Fi 6E.

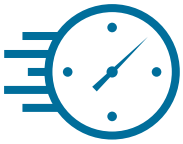
Expansion options include a rich selection of I/O ports for AIoT applications. External I/O connections include dual independent 4K display ports (HDMI and DP++), six COM ports, eight USB 3.2 Gen 2 ports, two 2.5GbE LAN ports, and two PCIe x8 slots. Add additional I/O by installing I/O expansion cards that provide PoE LAN, M.2 A-Key, or B-key support.

Reliable operation with the integrated Intel® Iris® Xe graphics offers greater GPU computing performance and speed for AI inference operations. Powered by the Intel® Distribution of OpenVINO™ Toolkit and Intel® Movidius™ Vision Processing Unit (VPU) accelerator cards to improve AI performance, you can enjoy next-gen AI, energy, and transportation applications in automating business, inference computing, and data analysis.

3

Solutions Description

The TANK-XM811 with 13th generation Intel® Core™ processor offers powerful features for processing and developing AI models and workloads, includes essential industrial-focused I/O and many expansion options, and provides reliable operation in harsh environments under heavy workloads.



Powerful

Intel® Hybrid Technology provides intelligent workload optimization by combining performance cores (P-cores) that improve IoT workloads and efficient cores (E-cores) designed for background task management and multitasking. The two core types have different power and performance characteristics to respond to different tasks, ensuring higher workflow efficiency, better power consumption, and lower operating temperature.

Intel® Distribution of OpenVINO™ Toolkit is based on convolutional neural networks (CNN); the toolkit extends workloads across multiple types of Intel® platforms and maximizes performance. It can optimize pre-trained deep learning models such as Caffe, MXNET, and Tensorflow. The tool suite includes more than 20 pre-trained models, and supports 100+ public and custom models (including Caffe, MXNet, TensorFlow, ON NX, Kaldi) for easier deployments across Intel® silicon products (CPU, GPU, FPGA, VPU).

3

Expandable

Rich built-in I/O on the IEI TANK-XM811 supports various AI, energy and transportation solutions, brings eight USB 3.2 Gen 2 ports, six COM ports (RS-232/42 2/485), and two 2.5GbE LAN ports to integrate various sensors, IP cameras, and other devices. Its expansion capability is supported by two PCIe x8 slots for AI accelerator cards, PoE cards, or a variety of add-on cards.

eChassis	TXC-XM81-3S	TXC-XM81-3S	TXC-XM81-4S	TXC-XM81-4S	TXC-XM81-4S	TXC-XM81-G1	TXC-XM81-G2
eBP	TXCBP-XM81-2A	TXCBP-XM81-2B	TXCBP-XM81-4A	TXCBP-XM81-4B	TXCBP-XM81-4C	TXCBP-XM81-4A	TXCBP-XM81-G2
							
Slot 1	PCIe x16	PCIe x16 (x8 signal)	PCIe x16	PCIe x16 (x8 signal)	PCIe x16	PCIe x16	PCIe x16 (x8 signal)
Slot 2	-	-	PCIe x1	PCIe x4	PCIe x4	PCIe x1	-
Slot 3	PCIe x4	PCIe x16 (x8 signal)	PCIe x4	PCIe x16 (x8 signal)	PCI	PCIe x4	PCIe x16 (x8 signal)
Slot 4	-	-	PCIe x4	PCIe x4	PCI	PCIe x4	-
Slot 5	-	-	-	-	-	-	PCIe x4
Slot 6	-	-	-	-	-	-	PCIe x4

3

Reliable

Wide temperature operation from 20°C to 60°C because the TANK-XM811 uses a pin-fin heatsink design that allows airflow in two directions, providing better cooling than traditional parallel fins and keeping the system cool, even without fans. An optional external fan kit can assist with air flow when temperatures get too high, such as under high processing loads or in extreme environments.

Rugged design of the TANK-XM811 allows it to withstand 50 G shock and 3 Grms vibration, particularly important for use in AGVs and moving vehicles. High-performance applications require greater power input to support powerful accelerator cards, so the TANK-XM811 supports standard power input of 12–28V DC and an optional secondary power input that can accept the extra power needed for more intense computational tasks.

4

Vertical markets

The TANK AIoT development kit is a versatile all-in-one solution suitable for many vertical markets, and in particular smart factories, energy, and transportation.

AI

AI technologies are permeating every aspect of our personal lives, including applications such as facial recognition, personalized shopping, and healthcare. The same is happening in industry, for example AOI defect classification with vision AI that brings precision and automation to flow processes with collaborative robots, IP cameras, or AGVs to enhance production efficiency, quality, and safety. The TANK AIoT Dev. Kit has rich I/O ports for connecting edge devices, and a PCIe 4.0 x8 slot for high-speed expansion cards like AI accelerator cards, graphic cards, or PoE cards, increasing the accuracy of defect classification, lowering costs, and reducing the time spent on review and repair stations.

4

Energy

Energy powers the modern world as we know it. Monitoring, maintaining, and repairing the systems that provide power, such as the natural gas pipelines that deliver natural gas from Russia to Germany, helps ensure the uninterrupted delivery of critical resources. Oil & gas and substations need high-speed processing, wide-bandwidth data connections, and multiple sensor connections to provide real-time monitoring, centralized data aggregation, and uninterrupted operation for oil and gas operations and substations. The TANK AIoT Dev. Kit can withstand high temperatures and run 24/7, while simultaneously processing vast amounts of incoming data from external sensors and reacting to that data in near-real-time, and transmitting that information back to the control center to inform decision-making and assist preventative maintenance.

Transportation

Transportation systems shuttle goods through the supply chain and get millions of workers to their jobs every day. During the COVID-19 pandemic the logistics industry saw major increases in shipped goods, straining their existing capacity and making the reliable and efficient use of available resources more critical than ever. Marine and rail transportation is complex, with multiple onboard systems to handle different applications. Trains have condition monitoring systems, CCTV, passenger information systems, and passenger Wi-Fi. Marine vessels have systems on the bridge for displaying navigational information, in the control room for consolidated control of all of the vessel's facilities, and in the engine room for monitoring engine performance. The TANK AIoT Dev. Kit is a high-performance system that provides the network capabilities for high-speed wide-bandwidth data transfer and the processing power and expansion for AI loads.

5

Conclusion

The TANK-XM811, with a 13th generation Intel® Core™ processor, has the processing power and network bandwidth to support advanced IIoT applications at the rugged edge. Even with higher data speeds, increased data quantity, and heavy loading, the TANK enables the acquisition, processing, and display of incoming data in near real-time.

The TANK-XM811 enables stable energy so that people's daily lives and industrial operations continue uninterrupted, and enables transportation to get people where they need to go more reliably and get goods and services to their destination on time.

The TANK-XM811 features a fanless design, industrial-grade wide temperature support, dual 4K display outputs, expandable GPU power, rapid NVMe storage, and scalability through IEI's eChassis modules.

All-in-all the TANK-XM811 is the ideal choice for most AIoT applications.

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

Sales Inquiry