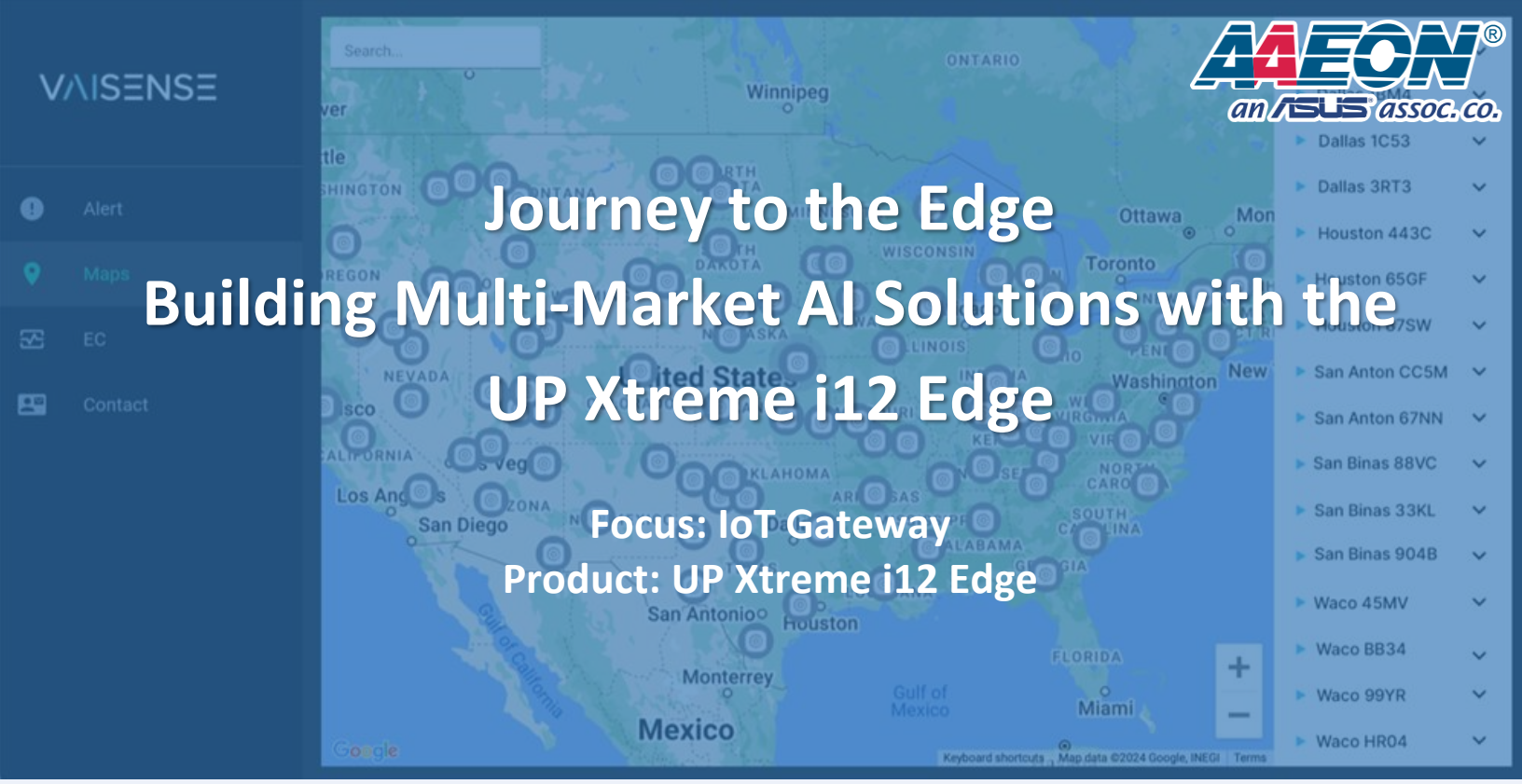

Journey to the Edge
Building Multi-Market AI Solutions with the UP Xtreme i12 Edge

Focus: IoT Gateway
Product: UP Xtreme i12 Edge

Introduction

LatticeWork, a company dedicated to providing comprehensive edge AI systems that combine the software, hardware, and cloud infrastructure required to deploy AI applications at the edge, sought a hardware platform suitable for its VAISense brand of industrial PCs. They selected AAEON's UP Xtreme i12 Edge as the hardware foundation of their IPC range. The purpose of this solution was to deliver edge AI solutions to a wide variety of industries, including healthcare, retail, hospitality, transportation, and public safety.

Challenges

To produce such an ambitious edge computing platform, particularly one that incorporates software, hardware, and edge-to-cloud communication all in one system, LatticeWork identified a number of challenges.

One key pain point was that although the company had developed an impressive AI-optimized operating system that provided its customers with all the tools needed to create and implement sophisticated AI models, the hardware chosen to run their software package needed the necessary computational power, connectivity, and security required for users to fully leverage the capabilities of the VAISense solution.

The Benefits of AAEON's UP Xtreme i12 Edge

Computational Power

LatticeWork's main challenge was finding a hardware platform with computational resources sufficient enough to run complex AI algorithms in a compact and easily deployed system.

The UP Xtreme i12 Edge, at just 152mm x 123.8mm x 71.5mm, met the requirement for a compact system. Meanwhile, its support for both 12th and 13th Generation Intel® Core™ Processors provided exceptional performance capable of handling complex dataflows and algorithms.

Also suited to LatticeWork's needs was the UP Xtreme i12 Edge's power-efficiency. This is due to its CPU's performance hybrid architecture, which allows for more demanding tasks such as data processing on the edge to be handled by its performance cores, while efficient cores manage background operations.

To handle the complex AI algorithms that came with LatticeWork's VAISense software, the UP Xtreme i12 Edge was equipped with AI acceleration modules via its two M.2 2280 M-Key slots, each offering a four-lane PCIe Gen 4 interface. As a result, the VAISense IPC range could process video and sensor data at the edge with the assistance of artificial intelligence.

Latency-Free Edge Communication

For edge computing applications, poor connectivity can negatively impact power consumption, processing efficiency, and real-time decision-making. Compatibility challenges may arise due to differences in hardware, software, and communication protocols.

The UP Xtreme i12 Edge fit the bill when it came to being easily integrated with existing infrastructures, hosting interfaces conducive to robust data transmission. Dual Ethernet ports, including one supporting Intel® Ethernet Controller I226-IT operating at 2.5GbE with Time-Sensitive Networking (TSN) support.

This enabled fast wired networking, essential to for accommodating cameras and sensors for edge computing use.

Additional interfaces such as USB 3.2, USB 4.0, serial ports, and a 40-pin GPIO made the UP Xtreme i12 Edge flexible enough to utilize the VAISense software while also supporting LatticeWork's overall vision of creating a comprehensive system for various vertical market settings.

A Secure Conduit Between Edge and Cloud

The final piece of the puzzle was finding a way to bridge the gap between the edge AI computing completed using VAISense software and LatticeWork's cloud infrastructure. This connection allowed for easy software updates and the deployment of new applications from anywhere, ensuring scalability and flexibility in managing their complete solution.

An inherent level of security was ensured by keeping most of the IPC's functions at the edge; nevertheless, there was still a need for wireless edge-to-cloud communication. Supporting both Wi-Fi 6 and 5G, the UP Xtreme i12 Edge was the ideal system to maintain a stable connection with LatticeWork's cloud infrastructure. While data privacy and security posed significant concerns for LatticeWork, AAEON's Mini PC alleviated these concerns due to the device having onboard TPM 2.0.

By leveraging its onboard TPM 2.0, the final IPC produced benefited from an enhanced security posture. This was achieved by incorporating hardware-based security features that complemented its existing software-based security measures. This measure helped to safeguard against security risks associated with data transmission, such as unauthorized access, data tampering, and man-in-the-middle attacks, ultimately enhancing the protection of data transmitted from the edge to the cloud.

VAISense: A Comprehensive Solution Overview

The success of VAISense's edge AI solutions is the result of a well-rounded business model that encompasses multiple platforms, converging to make the deployment of edge AI solutions possible.

Software

VAISense software is meticulously designed to enhance the development of innovative applications, providing a broad toolset with which its customers can build their own AI applications. Alternatively, its customers have the expertise of VAISense engineers at their disposal, ready to make use of the software to craft and train models that are tailored to customer needs.

Hardware

VAISense offers both off-the-shelf and custom hardware designed to process data at its source. By selecting AAEON's UP Xtreme i12 Edge as a key component of their hardware platform, LatticeWork acquired the necessary computational power, energy efficiency, compact form factor, flexible interface selection, and durability for elite solutions.

Cloud Infrastructure

VAISense has established a robust cloud infrastructure to facilitate deployment and maintenance at scale. This allows for easy software updates and the deployment of new applications from anywhere, ensuring scalability and flexibility.

Support

VAISense provides end-to-end support, from software development to systems integration, to assist organizations succeed in deploying AI solutions at the edge. This comprehensive support ensures that businesses can effectively implement and maintain their Edge AI systems, even with limited in-house expertise.

By addressing LatticeWork's need for a hardware platform with the computational power and expansion to run its edge AI software, the broad selection of interfaces needed to execute latency-free data transmission, and the integrated security to maintain the integrity of this data, AAEON's UP Xtreme i12 Edge became a key component of LatticeWork's VAISense edge AI solution.

About AAEON

Established in 1992, AAEON is one of the leading designers and manufacturers of industrial IoT and AI Edge solutions. With continual innovation as a core value, AAEON provides reliable, high-quality computing platforms including industrial motherboards and systems, rugged tablets, embedded AI Edge systems, uCPE network appliances, and LoRaWAN/WWAN solutions. AAEON also provides industry-leading experience and knowledge to provide OEM/ODM services worldwide. AAEON works closely with premier chip designers to deliver stable, reliable platforms. For an introduction to AAEON's expansive line of products and services, visit www.aaeon.com.

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