Tightening Security on the Edge with the PICO-TGU4

Introduction

A renowned industry-leading manufacturer of versatile camera platforms was seeking a solution to power their high-specification, medium-to-long-range rugged surveillance system. The end product was primarily targeted towards the security sector, where it would find application in various settings, such as highway traffic monitoring, border surveillance, and perimeter security.

Challenges and Customer Needs

Due to the challenging outdoor deployment environments in which the end product would operate, the company aimed to incorporate a board-level system into their proprietary IP67-rated chassis.

This choice was driven by several factors, including the integration of diverse components to offer specific features tailored to various client requirements, such as modular cooling mechanisms and versatile mounting options.

Given these considerations, there were several crucial features that the company deemed necessary for the board to possess.

Component Integration

In order to circumvent the need for installation steps and potential maintenance stemming from the installation of individual components on the SBC, such as memory modules or socket-type CPUs, the company specifically requested a board that featured fully embedded hardware.
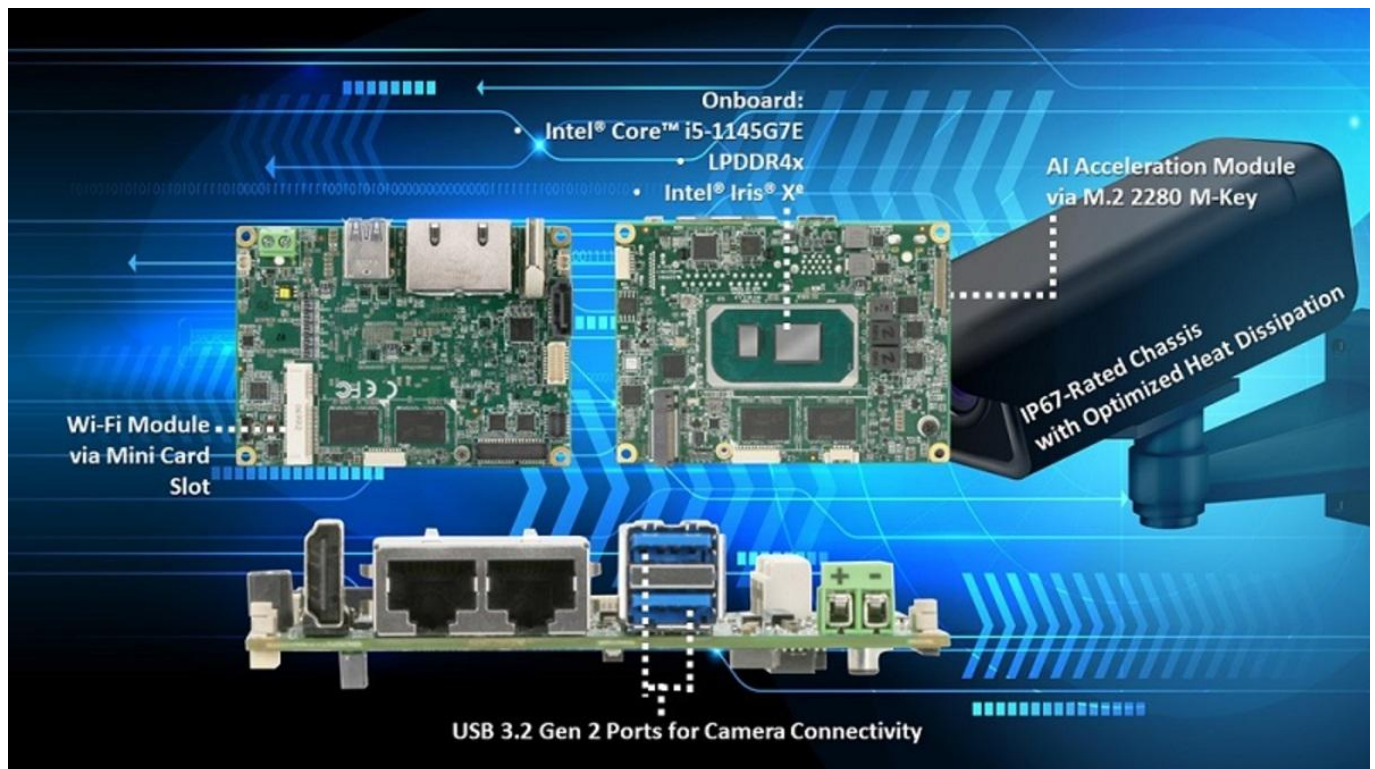
Edge Capability

Given the system's requirement for precise data analysis within challenging and somewhat remote environments, the powering board needed to possess the capability to execute intricate computations on the edge.

Connectivity

Though the primary functionality of the system would be localized at the edge, it was still essential for it to have the capacity to gather data from peripheral hardware and relay this information to a central server.

This transmission would facilitate the reporting of occurrences like perimeter breaches or highway incidents for review by personnel.
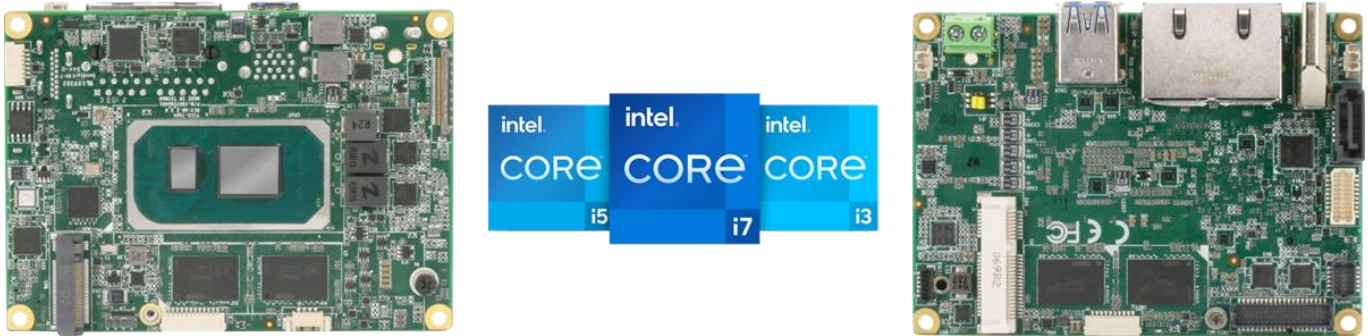
Solution Architecture

Enclosed within the company's hermetically sealed, IP67-rated chassis, the PICO-TGU4 was equipped with the necessary functions to ensure the unit could be deployed across a wide spectrum of security applications. These applications included perimeter monitoring, maritime surveying, highway traffic control, and border surveillance.

The unit collected data via USB cameras connected through the PICO-TGU4's dual USB 3.2 Gen 2 ports. These cameras were safeguarded from environmental wear due to the integration of the board into the system chassis. The USB cameras' video feed would then be subjected to analysis, employing the inferencing capabilities of both the Intel® Core™ i5-1145G7E processor on the board and an additional AI acceleration module. This combination ensured swift and accurate presentation of results, facilitated by the board's high-bandwidth onboard LPDDR4x system memory.

In cases where the system detected a noteworthy incident or event, such as a breach of perimeter, a traffic accident, or a security concern, it possessed the capability to transmit its findings wirelessly to a central server. This transmission was facilitated by the Wi-Fi module located in the Mini Card slot of the PICO-TGU4.

Why the PICO-TGU4?

Having determined that it fulfilled all the requisite suitability criteria, the company made the decision to incorporate AAEON's PICO-TGU4 embedded Pico-ITX Board.

This choice was driven by the major advantages presented by this model, including its robust embedded 11th Generation Intel® Core™ i5 processor and soldered LPDDR4x system memory.

Additionally, the board offered a degree of versatility for supplementary wired connectivity through its I/O and wireless communication protocols via its expansion slots.

Onboard Processing, Soldered LPDDR4x

The PICO-TGU4 effectively fulfilled the company's primary demand by incorporating both its 11th Generation Intel® Core™ i5 CPU and LPDDR4x system memory onboard. This was especially advantageous given the board's remarkably compact form factor of 3.94" x 2.84" (100mm x 72mm).

This compact size allowed for inconspicuous integration within the company's system, and did not impose spatial constraints on the system's other components.

11th Generation Intel® Core™ Performance

By selecting the SKU equipped with the Intel® Core™ i5-1145G7E processor, the company leveraged significant processing capabilities, coupled with various complementary technologies suited for edge computing, including Intel® Deep Learning Boost.

Utilizing the strong graphic power of Intel® Iris® X^e, the customer was able to design and build complex, intricate files, while processing image data with speed and efficiency.

Moreover, the board's M.2 2280 M-Key slot offered an opportunity for enhanced inferencing performance by accommodating an AI acceleration module. This extension led to heightened inferencing accuracy within the application.

Conducive I/O & Wireless Expansion

The PICO-TGU4 embodied the ideal fusion of onboard interfaces and wireless module support for the system. Utilizing the board's dual USB 3.2 Gen 2 ports for peripheral cameras facilitated the direct acquisition of visual data for analysis.

Furthermore, the board's integration within a sealed, IP67-rated chassis guaranteed the safeguarding of connectors from potential damage. In a parallel manner, the board's Mini Card slot was occupied by a Wi-Fi module, allowing the system to wirelessly transmit data to a central server when required.

Outcome

Due to the seamless integration of the PICO-TGU4 into the customer's solution, a multiyear agreement was successfully finalized, AAEON also provided technical support to help the customer optimize the heat dissipation of the final product, expediting the product development process and bringing it to mass production on schedule in a cost-efficient way.

The launch of the novel surveillance system was met with a positive reception, owing to its adaptability and wide range of potential applications within the security sector. The array of application-specific features inherent in the PICO-TGU4 underscores AAEON's design proficiency and its capability to introduce top-tier embedded solutions to the market, as validated by the success of this project.

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.