

Building an Express Route to Cargo Management with AI

Focus: Logistics
Product: NanoCOM-TGU

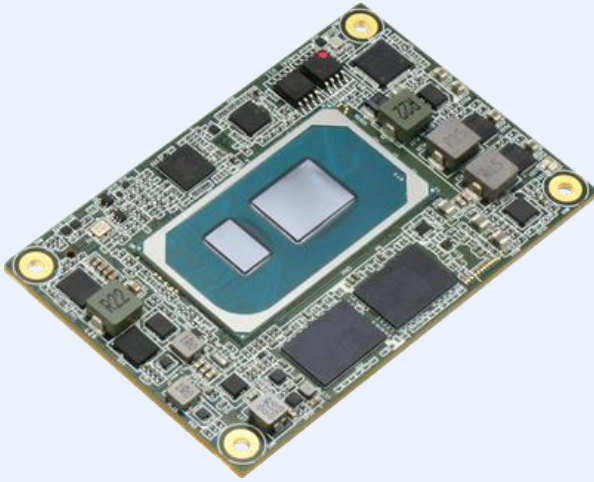
Introduction

Approximately 80% of all cargo is transported by sea, making the shipping industry a vital component of the logistics ecosystem. This sector requires effective checks and balances to ensure the safe delivery of shipping containers to their designated destinations. Traditionally, this was accomplished through the use of paper logs that detailed the cargo ID of each container entering seaports. While this method has been longstanding, it is also time-consuming and labor-intensive, leaving room for human error.

In recent years, the logistics industry has embraced innovation and undergone significant modernization, incorporating electronic tracking and data logging. One company specializing in shipping container logistics solutions decided to invest in an AI-assisted tracking model. They collaborated with AAEON to develop a solution that not only streamlined their cargo management capabilities but also provided durability and seamless upgrade options as technology in the field advanced.

Setting Sail

The client required a product capable of operating in harsh environments, as seaports frequently experience variations in weather and temperature. Given the rapidly evolving demands of the shipping industry, they also needed a solution that would allow for upgrades or reconfigurations as necessary. Therefore, a fully integrated system would not have been suitable, particularly due to the space constraints encountered during deployment. Additionally, a small form factor single-board computer would not have offered the necessary flexibility in interfaces to justify the investment.



Because of this, the client believed that the optimal balance could be found among AAEON's Computer-on-Modules portfolio. This collection offers a wide range of standardized form factors equipped with embedded CPUs, versatile configurable interfaces, and ruggedized components designed to operate in harsh environments. The client was confident that AAEON's COM Express Module lineup contained a model capable of meeting their requirements.

The company chose the [NanoCOM-SKU](#), an innovative COM Express Type 10 module powered by 6th Generation Intel® Core™ processors at time. Coupled with their own AI-enabled carrier board and camera modules, this module effectively met the company's requirements for logging the arrival of shipping cargo at ports. The module's small 84mm x 55mm form factor was particularly attractive to the customer, facilitating installation in confined spaces.

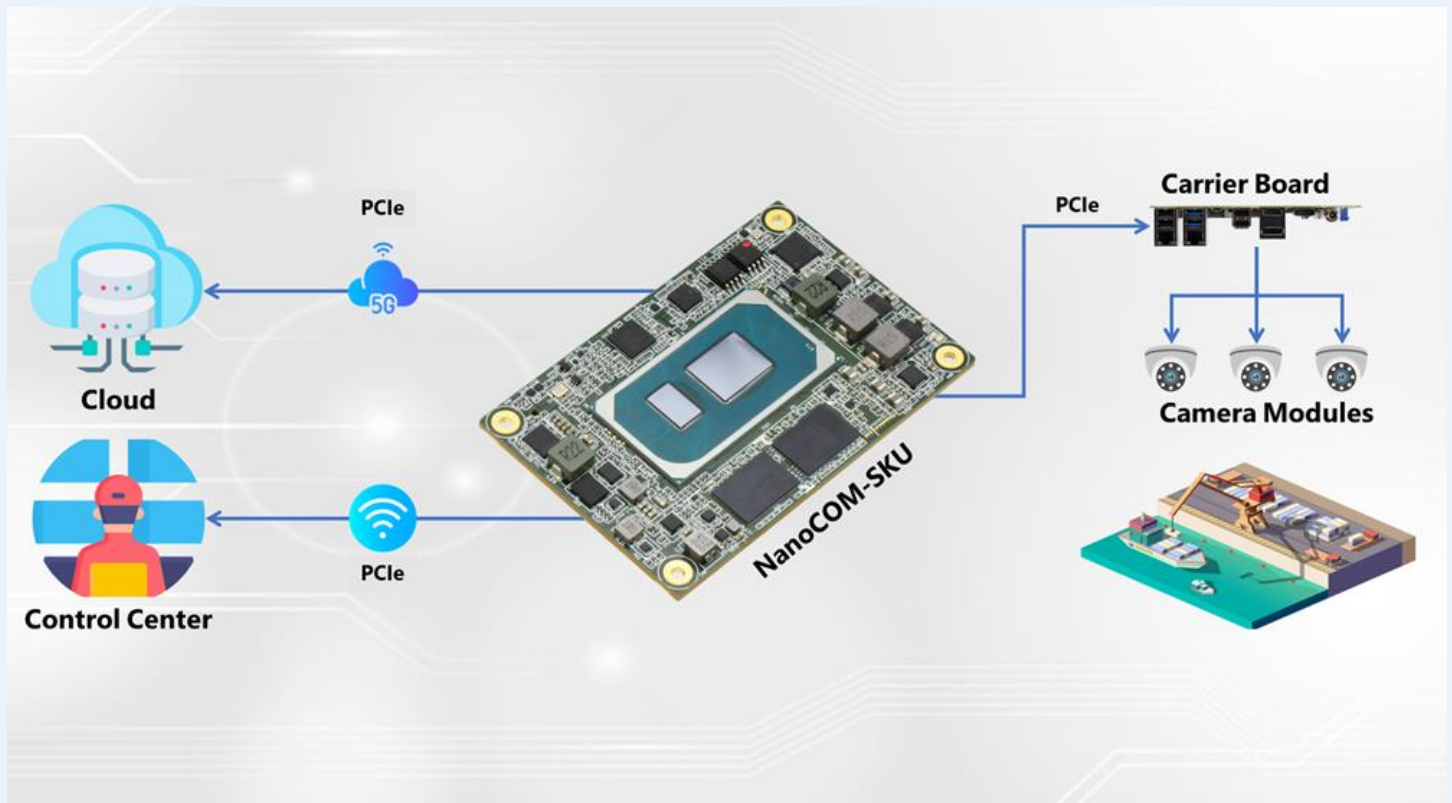
When the customer expanded the scope of their application to include location tracking and damage inspection, in addition to logging cargo, it became apparent that a higher level of processing power was required, and so turned to [AAEON's Q-Service](#), which offered comprehensive support in selecting the appropriate module to upgrade to in order to achieve the desired functionality.

A Modular Approach to Evolving Technology

To streamline the logging of arrival, location, and container condition data for cargo arriving at their ports, the company decided to upgrade to the [NanoCOM-TGU](#). The [NanoCOM-TGU](#) delivered high-speed, efficient processing through its 11th Generation Intel® Core™ processor, which offered up to four cores and eight threads of performance at just 15W.

An additional benefit of the module was its 16GB of LPDDR4 system memory, which granted real-time handling of high-bandwidth data streams for low-latency communication. Consequently, the [NanoCOM-TGU](#) effectively managed the computationally intensive task of data transmission over PCIe between the module and the carrier board, relaying cargo ID, container condition, and location data to the cloud. The application was consequently able to capture images of incoming cargo, analyze the containers using a defect detection algorithm on the carrier board, and process the resulting information swiftly and accurately.

Application Architecture



Connecting the Dots

Once the [NanoCOM-TGU](#) processed the container ID, its location in the yard, and any damage detected, this information was securely transmitted to the cloud. Given the level of detail contained in these records, robust data security was imperative. As such, this data was transferred through a private network enabled by a 5G module connected in one of the NanoCOM-TGU's remaining PCIe slots. Since this network operated on a node-to-node basis, it provided a secure method of information sharing, ensuring data integrity.

To ensure that application maintenance was as frictionless as possible, AAEON once again utilized the PCIe expansion offered by the [NanoCOM-TGU](#). They installed a wireless module with an Access Point mode for data transmission, which facilitated communication between the [NanoCOM-TGU](#) and the main control point of the application. This setup allowed the company's engineers to conduct remote debugging and troubleshooting effectively.

Impact

Throughout the application's lifecycle, AAEON's combination of product quality and dedicated service has reinforced its reputation as a leading provider of Computer-on-Modules. For instance, the application's challenging deployment environment presented a significant obstacle that AAEON helped the customer overcome. The team of experienced Q-Service engineers suggested customized conformal coating for the [NanoCOM-TGU](#), protecting it from environmental elements, in addition to the module's inherent resilience, which offers a wide temperature tolerance ranging from -40°C to 85°C.



This illustrates AAEON's commitment to not only providing high-quality products that can be tailored to fit project specifications but also to emphasizing the importance of having the expertise to provide additional services and troubleshooting. This ensures that a customer's chosen solution aligns with their objectives. Consequently, the project was a resounding success, with the client experiencing a 60% reduction in the time required to read, record, and log incoming cargo, along with the value-added service of damage detection and rapid reporting.

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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