On the Right Track

AAEON Accelerates Routes to Passenger Information System Deployment

Focus: Transport
Product: PICO-APL3

Introduction

A leading company in the transportation field deployed AAEON's PICO-APL3 as part of a new passenger information system (PIS) for their fleet of trains, which serve to display key information such as the train's location, issue audio updates, and create revenue through advertisements.

The use of embedded technology in PIS' has steadily increased in recent years, with a move away from traditional single-purpose signage or loudspeaker announcements and a shift towards systems designed to provide more interactive, real-time information to passengers using public transportation services such as buses, trains, and metros. The objectives of this shift have been to enhance customer satisfaction by keeping them informed about relevant travel information, schedules, delays, route changes, and other pertinent details related to their journey.

An additional benefit for systems integrators and transport providers themselves has arisen in the form of advertisements being shown on more sophisticated displays, which is an excellent way for them to generate revenue and build greater business relationships.

Outlining Client Needs

There are a number of challenges to deploying an operational PIS, both practically and with respect to regional regulatory requirements. By far the largest practical concern for clients is the question of whether the embedded technology they choose can withstand the demands of in-vehicle deployment.

When deployed onboard trains, embedded single-board computers can face extreme changes in temperature, damage from fluctuating power sources, and are often required to fit into confined spaces. With these challenges, it is clear that any environmental factor leading to the failure of an embedded board would have a consequential impact on the PIS as a whole, requiring frequent maintenance or in the case of failure, customer dissatisfaction.

The client in this instance had an existing relationship with AAEON, and took great reassurance not only in the ability of AAEON to meet its project requirements, but also in AAEON's reputation for high standards when it came to testing the environmental resilience of its embedded boards.

Curating a Customer-Focused Solution

As a result of their initial consultation with AAEON, it was obvious that the efficiency of any potential solution was more important to the client than the prestige of having the newest or most powerful CPU for their system. As AAEON prioritizes the practicality of its products for any given application, and excels at customizing its standard solutions to fit the customer's requirements, the obvious choice was to propose a board with low power consumption, yet performance substantial enough to power their application.

Often, this involves AAEON illustrating its customization capabilities through services such as providing preloaded operating systems, custom thermal solutions, and flexible design considerations to ensure compatibility with other components of the customer's solution.

A second factor in their decision was the environmental resilience that the chosen solution could offer. The customer required the board to be able to operate in extended temperature ranges, as its location and interaction with other system components within train carriages could see temperatures range from below freezing when at station depots to well above the standard operating temperature of most commercial components while in operation.

The customer also expressed concern that the vibration and shock levels caused by the trains in which it would be deployed could cause modular solutions, such as those with socket-type CPUs, DIMM-based memory, or SSD-based storage to come apart in transit.

Despite prioritizing efficiency over raw processing power, the client still required the board to possess advanced computing capabilities, particularly with regard to ensuring time synchronization when communicating with other onboard systems. Another preference related to this facet was that the customer wanted the additional guarantee that comes with Ubuntu certification, as this would ensure long-term support for their solution on a software-level.

The PICO-APL3: A Fully Integrated, Configurable Solution

When seeking a board to fit all of the client's needs, AAEON explored a number of options. Due to the very specific set of non-negotiable features outlined by the client and with a wealth of experience in providing embedded solutions for transport purposes, AAEON's team was able to determine potential pitfalls that could affect the longevity of the application in advance.

As a result, AAEON proposed a board that suited all of the technical requirements of the project, but offered some small customizations to guarantee the customer would get long-term, high-quality operation out of it.

The answer was the PICO-APL3, a Pico-ITX single-board equipped with the low power, cost-efficient Intel® Celeron® Processor N3350. With DDR3L system memory, 32GB of eMMC storage, and TPM 2.0 integrated on the diminutive 100mm x 72mm board, the PICO-APL3 addressed the clients concerns about the integrity of the components remaining intact as well as their need for a small form factor solution. The choice of the Intel® Celeron® Processor N3350 was also aligned to the client's needs, with a very conservative 6W TDP and adequate dual-core processing capacity.

These practical features underpin the PICO-APL3's overall suitability for applications related to PIS and digital signage in general, with its combination of eDP, HDMI, and daughter board-facilitated DDI offering three simultaneous display outputs. AAEON was able to fulfill the client's request for wide-temperature operation using a custom service on a project basis. AAEON determined the board would be able to tolerate the temperature ranges of -20˚C ~ 70˚C (-4˚F ~ 158˚F) required by the deployment, alleviating the client's concern regarding this aspect of the selection.

This also provided a cost-efficient alternative to Wide Temperature Assurance Service (WiTAS) testing through project-based customization. Similarly, while AAEON's standard PICO-APL3 models are equipped with a 12V power input via either a 2-pin phoenix connector or DC jack, optional accessories for the board include a 120W DC-DC converter, allowing for a 9V ~ 36V power input, protecting the board components from power surges or fluctuations while in operation.

Bringing Value Aboard

Once the client's specifications had been met, the next step was to demonstrate the benefits that the application would receive by choosing the PICO-APL3 over boards from other embedded systems providers.

This began with a simple feature that is harder to find in more recent boards on the market: an amplifier header. The PICO-APL3 had the rare distinction of onboard HD audio via a 2W amp, with which the customer could add an additional degree of interactivity to their application, increasing customer satisfaction and generating advertising revenue.

Most importantly, the client required real-time, synchronized operation, meaning the application needed an IRQ source configured at various frequencies up to 4kHz for a maximum latency of 1 millisecond. To achieve this, AAEON managed to optimize its BIOS compatibility to support an external EtherCAT slave device at the desired low-latency, including a 100MHz clock with at least 300ppm frequency stability, meaning information could be relayed and displayed to passengers immediately.

Being Ubuntu Classic-certified hardware, the PICO-APL3 also gave the client peace of mind that the board was compatible with the open-source software they intended to use for the application. Further, this certification meant that the client could rely on long-term software support on the Ubuntu platform, such as kernel updates for added security, along with level 1 and level 2 technical support from AAEON.

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The Outcome? A Solution Built to Last

By working with AAEON, the client not only received step-by-step support in selecting the appropriate embedded board for their application but also benefited from AAEON's many years of experience and knowledge of what such applications require, along with the technical expertise to customize the PICO-APL3 to fit these conditions.

Consequently, the company was able to deploy an efficient, technically sophisticated, and environmentally resilient solution that was built to last.

The project was undertaken and successfully deployed to the customer's satisfaction, with the company providing a glowing endorsement of how substantial an impact AAEON's PICO-APL3 had on the operation of their PIS application, once again demonstrating AAEON's commitment to producing both world-class products and providing curated service to help bring solutions to market successfully.

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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