Solution Brief

Public Safety, Smart City Transportation, Security, and Factory Automation

SINTRONES Uses Intel® Technology for Fleet Camera Applications

ABOX-5211(P) from SINTRONES uses Intel® Core™ Processors to provide image processing for fleet and industrial applications

Better camera technology, high-bandwidth wireless, real-time image processing, and analytics are combining to make in-vehicle video an increasingly useful tool for organizations and government agencies to improve operations and public safety.

The range of vehicles that can benefit from this technology confluence include autonomous mobile robots (AMRs), public safety fleets, delivery vans and other work vehicles.

New camera technology includes high-resolution, wide-angle cameras that provide superior image quality and a broader field of view. This enhances safety by capturing more comprehensive data in different lighting and weather conditions, which is essential for vehicles operating both day and night.

Cloud-based storage and in-vehicle computing capabilities are becoming more powerful with faster response times. On premises edge computers can now process images in real time and send only selected frames to the cloud for analytics or a database query. This computing model reduces latency for real-time decision-making, while securely storing critical footage in the cloud for later review.

Thermal and infrared imaging is gaining traction for nighttime or low-visibility environments. These cameras can detect objects even in complete darkness, boosting safety, particularly for AMRs that are navigating urban areas or delivery vans operating during late hours.

Finally, there's an increasing push towards multi-camera systems with 360-degree coverage. These systems are often paired with artificial intelligence (AI) to allow for full monitoring of the vehicle's surroundings, enhancing both safety and security in diverse applications, from autonomous navigation to vehicle detection in dynamic, high-traffic areas.

These developments require a new breed of hardened computing platform. SINTRONES, an Intel® Partner Alliance Gold Tier partner and Intel® Industry Solution Builders government community member, has set its mission to be the number one supplier of fleet computing. The company is utilizing Intel® architecture technology for its family of connectivity-oriented ABOX-5211(P) computers.

Environmentally Hardened Compute Power

The ABOX-5211(P) Series is designed for fleet applications as well as industrial automation, digital signage, and AGV/AMR. The system is especially suited to applications that need connectivity for video cameras or other network-connected devices.

The ABOX-5211(P) is equipped with I/O options that meet the needs of applications that support a large number of cameras or other peripherals. The front panel includes eight 1GbE ports with optional support for power over Ethernet (POE) ports. The

Figure 1. Front-panel view (see left photo) of the ABOX-5211(P) that shows the connectivity options (LAN, USB, serial) and power connector. M.2 ports for storage are in the back of the system (see right photo).

system also supports eight USB 3.2 ports, four supporting 10Gbps throughput and four supporting 5Gbps throughput. Four RS-232/422/485 ports can provide serial connectivity for legacy devices.

The fanless computer has a wide temperature range of between -40 degrees and 70 degrees Celsius that makes it hardened for installation in a trunk or the floorboards of a vehicle. It also has earned several MIL-STD-810 methods ensuring the system can stand up to advanced levels of vibration and shock. For storage, the system has three M.2 slots for NVMe SSD.

The ABOX-5211(P) product family is based on the following Intel® Core™ Processors, offering a mix of performance and power consumption with a minimum thermal design power (TDP) of 35 watts:

- 10th Generation Intel® Core™ i9-10900TE Processor (20M cache, 2.0GHz up to 4.6 GHz)
- 10th Generation Intel® Core™ i7-10700TE Processor (16M cache, 2.0GHz up to 4.5 GHz)
- 10th Generation Intel® Core™ i5-10500TE Processor (12M cache, 2.3GHz up to 3.7 GHz)
- 10th Generation Intel® Core™ i3-10100TE Processor (6M cache, 2.3GHz up to 3.6 GHz)

AI support is an important component for an in-vehicle computer, enhancing the system's ability to run compute-intensive applications including image detection, video processing and analytics. The Intel Core Processors used in this product family feature Intel® UHD Graphics 630 integrated GPU for both graphics and AI applications. The ABOX-5211(P) also supports third-party discrete GPUs through a PCIe slot.

The ABOX-5211(P) can also be used as a wireless gateway offering LTE cellular access to the cloud for additional processing capacity. Other features of the ABOX-5211(P) system include:

- Built-in battery backup providing 10 minutes of operation without a power source[1].
- E-Mark compliance with automotive standards ensures higher reliability and safety.
- Support for remote diagnostics to simplify troubleshooting resources.
- Smart vehicle power management that adapts to vehicle ignition systems for precise power control based on vehicle setting.
- Isolated power, serial port, I/O design that combine to protect the ABOX-5211(P) from electrical interference and surges to maintain stable connectivity and operation.
- Power efficient design that operates with a TDP of 92W @ 24V under full load, with an additional 120W power budget for PoE.

[1] Intel does not control or audit third-party data. You should consult other sources to evaluate accuracy.

Intel Technologies Augment Processor

In addition to the performance of the Intel Core Processors, the ABOX-5211(P) supports other Intel validated software and hardware technologies, including:

- **Intel vPro® technology**: Provides remote access support for both cloud and edge environments, enabling data retrieval capabilities.
- **Intel® Video Processing Library (Intel® VPL, formerly Intel® oneAPI Video Processing Library, oneVPL)**: Provides advanced access to specialized media hardware, plus encode, decode, and video processing features on Intel GPUs.
- **Processor long life availability**: The ABOX-5211(P) uses the embedded version of the Intel Core Processors that ensures extended hardware availability, aligning with the long-term usage needs of target industry customers.
- **Flexibility of CPU family**: The Intel Core Processor product family has a variety of CPU options with different core counts, power consumption and GPU options that enable SINTRONES products to cater to different customer project requirements.

Ready Made for Public Safety and Security System Use Case

One application that the ABOX-5211(P) is optimized for is public safety and security system. This system is a critical tool for intelligent traffic management, pedestrian safety, and roadway security.

A public safety and security system consists of digital cameras, edge computers, software providing image processing and extraction, and lighting. The object reader cameras are usually high-speed and fitted with infrared (IR) filters. These systems can be mounted in an intersection, on a utility pole, or in a vehicle.

The high-speed camera will capture a digital picture of the object or individual. The computer then processes these images to separate the features of the object or individual from the background image. Subsequently, the software utilizes gesture and behavior detection to convert the pixel image into a defined format.

Figure 2 shows a typical ABOX-5211(P)-based in-vehicle public safety system. On the right, up to eight PoE cameras are collecting data and sending it via Ethernet to the ABOX-5211(P) which is running behavioral or facial analysis software from third-party vendors.

The software queries the command center cloud server using an LTE gateway connected to the ABOX-5211(P) to pass alerts and hits to the central information repository in the cloud for additional data analysis, database queries, reporting and post processing. The information is then presented to the on-scene personnel so that they can take the appropriate action.

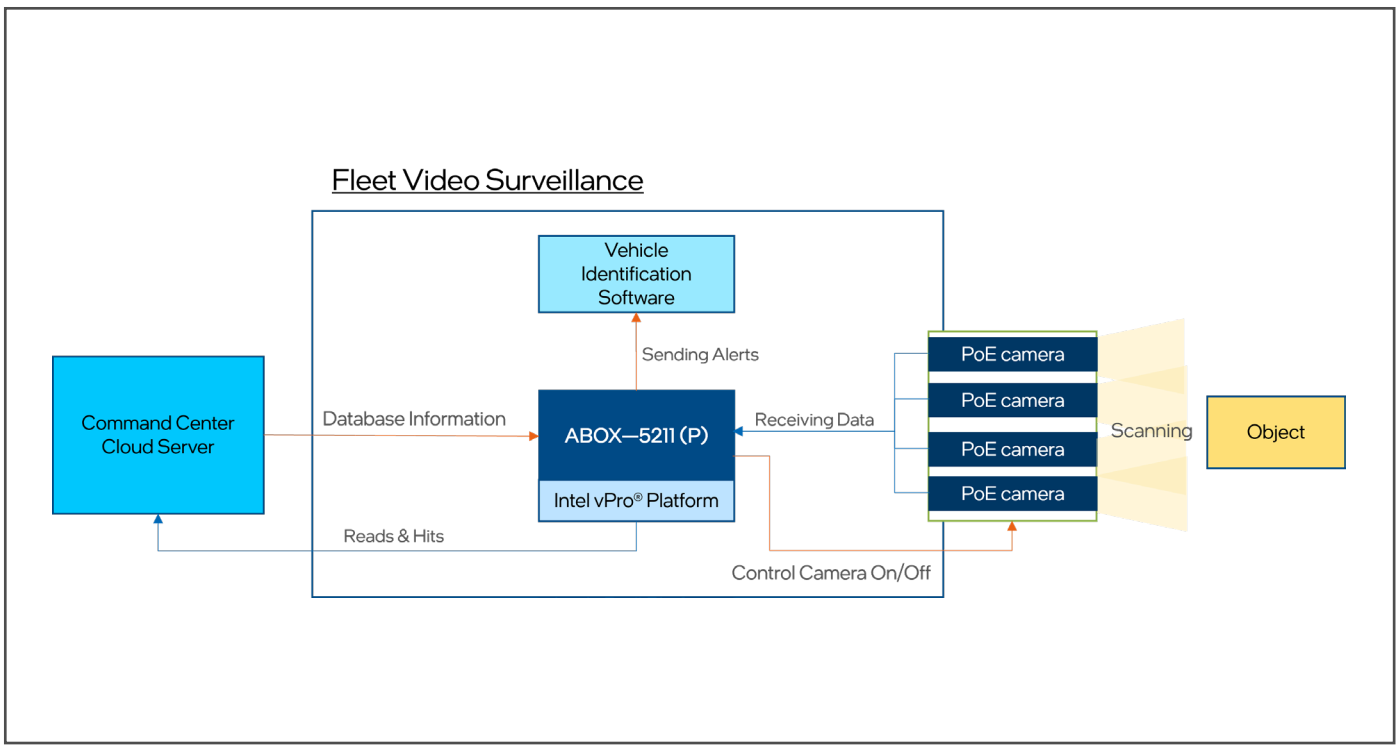

Figure 2. Block diagram of in-vehicle fleet safety application.

Conclusion

Advances in AI, camera and analytics technology are driving deployments of sophisticated new mobile visual data processing applications. For applications like public safety, today's image processing applications add a lot of value to a wide range of use cases. SINTRONES has captured what this market demands in its ABOX-5211(P) which supports Ethernet LAN or USB connectivity with the ability to support an optimal number of connected cameras to provide a 360-degree view of a car, school bus, robot or AGV.

SINTRONES has anticipated the importance of AI in these applications by building in CPU performance to support inference or training processing needs. The 10th Generation Intel® Core™ Processors used in the ABOX-5211(P) have integrated GPUs to boost graphics or AI processing. The integrated GPU delivers this performance without consuming any additional power or taking more board space.

Learn More

SINTRONES ABOX-5211(P) Product Page

SINTRONES Technology Corp.

Intel® Core™ Processors

Intel® vPro®

Intel® VPL

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