Driving Customer Experience with AI Edge Computing

Industry: Car Share, Car Rental

Product: VPC-3350S with AI Core X

Introduction

Car sharing is an increasingly popular service in many cities throughout the world. Companies, such as Zipcar or Car2Go, provide customers with short-term hourly car rentals utilizing an "on-demand" model accessible through smart phone apps. The services are so popular that even traditional rental car agencies are expanding their services to include car sharing.

To maximize profits from their fleet, car sharing services depend on quick turnaround between customers, so enforcing rules such as no smoking is very important to ensure consistent quality for every user. However, in-car smoke detectors aren't always effective at catching violations, such as when the windows are open or if a driver is using smoking alternatives such as vaping. And with car share services beginning to collaborate with ride share services, companies are also keen on enforcing cell phone habits while driving.

ComBox Technology and **LARGA** are two software developers and systems integrators who have partnered together to provide a solution for their car share customers. Their AI inference is capable of accurately determining if a driver is smoking by using visual data to not only look for smoke, but also analyze driver behavior and the position of the driver's hands. The system can also recognize if the driver is holding an object such as a cellphone or cigarette, providing even more accurate and flexible analysis. To provide their customers with an effective package solution, ComBox and LARGA turned to AAEON and the VPC-3350S mobile NVR with AI Core X.

Challenges

To provide their customers with the best solution possible, ComBox and LARGA laid out several key requirements and challenges they needed to meet. AAEON worked closely with the two companies as they tested several systems, selecting the VPC-3350S with AI Core X as the best system to provide both performance and value needed.

Edge Computing

The key to providing an effective system is processing and analyzing images as close to the source as possible, as soon as it happens. Installed in the vehicle itself, the VPC-3350S provides edge computing power to produce results in real time. With edge computing, car sharing companies don't need to invest in expensive databases or cloud services, and can reduce the cost of cellular data usage. Edge computing also helps to avoid issues that occur when cellular communication is unreliable, waiting until the service is available again to upload any incident reports collected.

Scalability

One key requirement ComBox and LARGA laid out was scalability of the hardware solution. The system needs to not only connect to additional inputs and sensors, but also be able to scale up processing power to meet each customer's specific needs. Comparing several platforms, the VPC-3500S proved capable of offering both the power and scalability needed for the application.

| Device model	FPS
Intel Movidius Myriad X VPU (AI Core X)	45
VPC-3350S Intel Atom E3940	20
VPC-3350S Intel Atom E3940 GPU (Intel HD 500)	54
Comparable Intel Celeron Board	13
Comparable Intel Celeron Board GPU (Intel HD 500)	44

As the smoke and phone detection AI inference only needs about 15 frames per second (FPS) to provide reliable results, the VPC-3350S utilizing the integrated Intel HD Graphics 500 processor can provide support for three camera inputs, maximizing accuracy of the model. Combined with the AI Core X featuring the Intel Movidius Myriad X VPU, the VPC-3350S can process up to 99 frames per second, or can offload the processing entirely onto the AI Core X module, freeing up the CPU to perform other vital functions, such as GPS guidance and monitoring the vehicle's systems.

Power Over Ethernet

To reduce the complexity of installation and reduce the load on the vehicle's electrical systems, ComBox and LARGA chose to use cameras which utilize power over ethernet (POE). The VPC-3350S features four POE ports offering up to 60W of power, allowing ComBox and LARGA to deploy the optimal configuration for their application, utilizing three cameras to provide different angles for their AI model.

Mobile Data Transfer

To provide effective enforcement of anti-smoking and cell phone usage policies, ComBox and LARGA designed their AI software to capture and save recorded incidents of policy violations. To ensure quick response and accurate billing of fines or fees associated with policy violations, the software needs to be able to upload the reports to the car share service's billing database when able. The VPC-3350S is designed with mobile operations in mind, and features expansion cards to support the Cat 4 LTE communication the AI software uses.
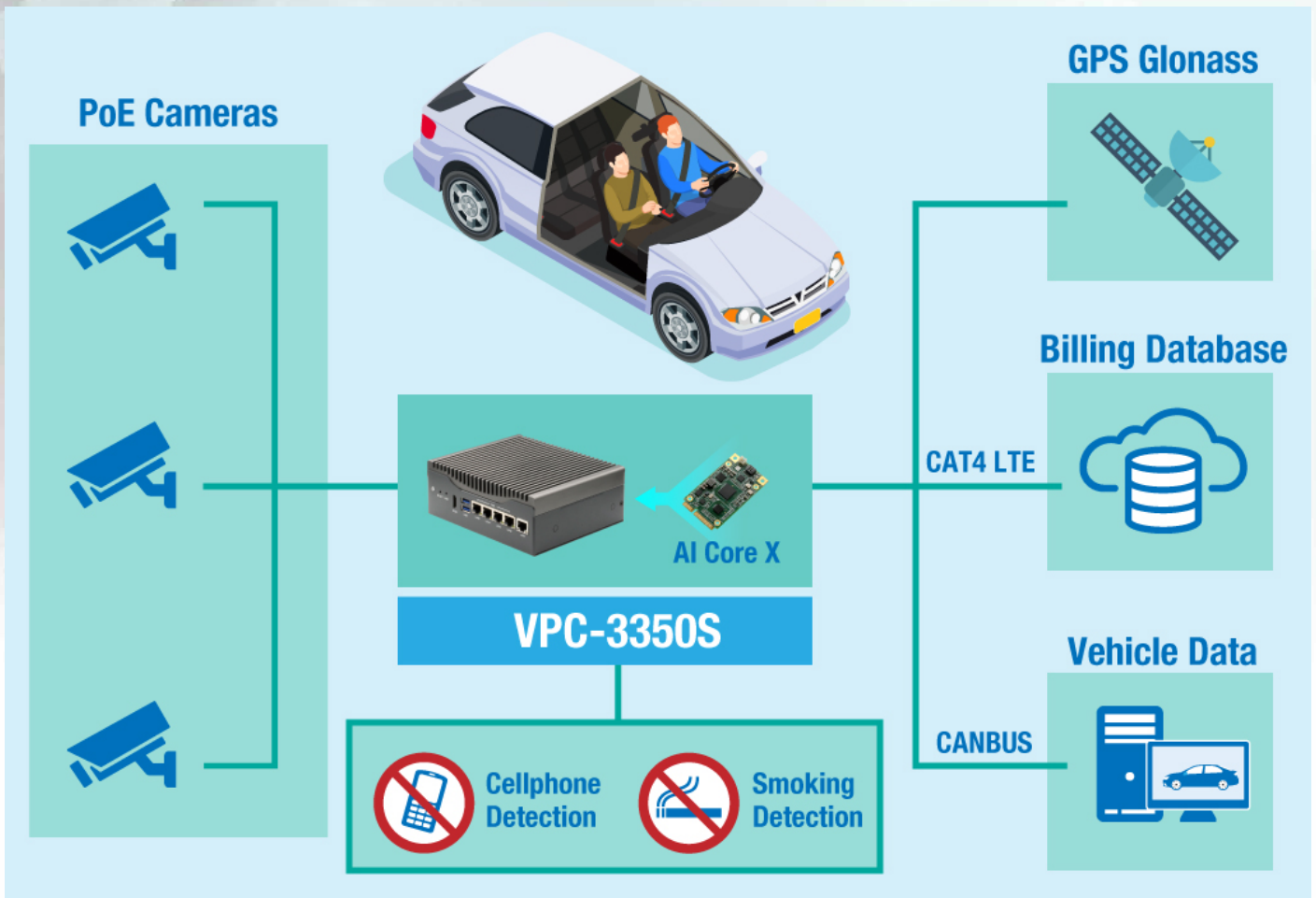
AAEON Advantage

In addition to meeting the core needs of their project, ComBox and LARGA chose the VPC-3350S and AI Core X because of several key advantages offered by the system and AAEON. With great value for performance, rugged design able to operate in a wide range of temperatures, access to Intel OpenVINO toolkit, and AAEON's industry leading support, the VPC-3350S and AI Core X stood above the competition to offer the solution needed.

Value for Performance

The VPC-3350S and AI Core X provide a great value for performance over higher end systems or dedicated GPU AI systems. Less expensive and with lower energy requirements, the system provides exactly the power needed to operate the AI software ComBox and LARGA developed while still offering the room to expand to meet each individual customer's needs.

Rugged Design

AAEON has years of experience designing rugged embedded platforms, and has put that knowledge into the design of the VPC-3350S. The VPC-3350S provides reliable service and low-maintenance operation thanks to fanless construction, and its innovative thermal design allows it to operate without loss in performance across a wide range of temperatures from -20°C up to 70°C. ComBox and LARGA are able to offer their solution to ride share services with large fleets spanning multiple cities and broad geographical regions.

OpenVINO Environment

The VPC-3350S and AI Core X with Intel Movidius Myriad X are compatible with the Intel distribution of OpenVINO Toolkit. This powerful software tool helps developers to optimize AI inferences, and is compatible with frameworks including TensorFlow and Caffe, and can support a developer's own AI inference.

AAEON Service

AAEON offers industry leading support and service to customers, from customizing products to providing end-to-end service for OEM/ODM projects. AAEON worked closely with ComBox and LARGA to ensure they had the right solution for the job, and provide service to help accelerate deployment and shorten time-to-market.

Impact

Thanks to the service and support from AAEON, ComBox and LARGA were able to extensively test and research several platforms to find the best solution, the VPC-3350S and AI Core X. Their extensive research and testing helped prove the capabilities of the VPC-3350S system, and promote adoption of more efficient and effective edge computing solutions by their customers. With a great deal of data and research in hand, ComBox and LARGA are able to demonstrate their expertise and the capabilities of AAEON solutions in applications beyond car share services, such as passenger counting applications on busses, and more.

Car share services can breathe easier knowing they can more effectively enforce their anti-smoking policies, as well as target cell phone usage with ride share partners. Car share services can provide higher and more consistent quality of service for their customers, improving the car share customer experience. Furthermore, improving the service and public opinion helps solidify the

car share industry as city governments are looking to reduce traffic congestion and promote alternatives to vehicle ownership, as well as incorporate car share services into Smart City environs.

Product

VPC-3350S Mobile NVR

The VPC-3350S Mobile NVR from AAEON provides users with choice, flexibility and customization not offered in other Mobile NVRs. The VPC-3350S offers the Intel® Atom® x5 E3940 processor (formerly Apollo Lake) as standard, with options for Pentium® N4200, Celeron® N3350 and Atom® x7 E3950. The core feature of the VPC-3350S is its four PoE Ports, allowing the system to connect to and power a wide range of devices. The VPC-3350S can also be configured with an integrated AI module featuring Intel® Movidius™ Myriad™ X.

The VPC-3350S utilizes an innovative design providing customers with two configurations to choose from; the compact mobile Industrial system, and the flexible In-Vehicle platform. The Industrial configuration offers an I/O compliment perfect for use in machine vision applications, while the In-Vehicle configuration features an innovative modular design allowing ultimate flexibility for less cost, and greater customization.

AI Core X Intel Movidius Myriad X Module

The AI Core X mPCIe module features the Intel Movidius Myriad X, a low-power high-performance VPU designed for AI acceleration with Edge Computing. The Intel Movidius Myriad X offers speeds up to 105 fps (80 typical) and over 1 trillion floating point operations as a dedicated neural network accelerator. The AI Core X is compatible with the Intel distribution of OpenVINO Toolkit, and supports TensorFlow and Caffe frameworks.

About ComBox Technology

ComBox Technology (www.combox.io) is a developer and designer of mobile computing centers based on CPU, GPU, VPU and FPGA for solving high-tech tasks, training and execution of neural networks and artificial intelligence. The company has its own unique stack of technologies, successfully used in the implementation of large-scale projects. The team is made of experienced specialists in the field of design and implementation of electronic computing equipment, who have the necessary technical skills for projects of any scale. Specializing in solving complex technical problems since 2005, ComBox Technology has established itself as a reliable partner in both the Russian and international markets.

During its work, the company has participated in more than 200 projects, such as the development and implementation of an impurity control system in water, a system for monitoring the process of reactive ion etching, coordinate control systems, and others, as well as the design and construction of electronic components for various purposes.

About LARGA

LARGA Group of Companies (www.larga.group) was founded in 1998. For over 20 years, LARGA has been successfully working in the field of high-tech, engineering and video analytic solutions. In the field of video services, the company specializes in providing cloud solutions, and is also a supplier and integrator of leading world developers. The LARGA cloud-based video streaming platform (LVS) is software designed for the simultaneous reception, storage and transmission of audio and video streams, as well as their analysis and control. One LVS server supports up to 10,000 streams (cameras). Their own Larga.Videoserver platform allows users to create clusters of media servers to scale to any number of streams (cameras). Technological superiority allowed LARGA to become the exclusive partner of MTS PJSC in the field of video analytics (MTS is part of BIG 3 operators of the Russian Federation, and one of the largest operators in Europe). According to an independent study (https://www.cnews.ru/reviews/rynok_reshenij_dlya_videonablyudeniya), LARGA ranks 11th place among suppliers of Russian integrators providing video services. In addition to video applications, the company provides solutions in the field of RPA, BI, microsensory solutions, as well as automation of production, including the digital twins engineering.

About AAEON

Established in 1992, AAEON has become one of the leading designers and manufacturers of advanced industrial and embedded computing platforms. Committed to innovative engineering, AAEON provides Industry 4.0 integrated solutions, hardware and intelligent automated services for premier OEM/ODMs and system integrators worldwide, as well as IoT solution platforms that seamlessly consolidate virtual and physical networks. Reliable and high-quality computing platforms include industrial motherboards and systems, industrial displays, rugged tablets, PC/104, PICMG and COM modules, embedded SBCs, embedded controllers, network appliances and related accessories. AAEON also offers customized end-to-end services from initial product conceptualization and product development through to volume manufacturing and after-sales service programs. It is also committed to continuously redefining and harmonizing the management and development processes of the industry.

With its constant pursuit of innovation and excellence, AAEON became a member of the ASUS group in 2011, enabling the company to further strengthen its leadership, access advanced technology from ASUS, and leverage resources from within the group. AAEON is poised to offer more diversified embedded products and solutions at higher quality standards to meet world-class design and manufacturing demands in the years to come.

AAEON is an Associate member of the Intel® Internet of Things Solutions Alliance.

CONTACT US

AAEON Technology Inc.

5F, No. 135, Lane 235, Pao Chiao Rd., Hsin-Tien Dist, New Taipei City, 231, Taiwan, R.O.C.

+886-2-8919-1234

+886-2-8919-1056

FOLLOW US

www.aaeon.com