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Second Quarter Summer 2021

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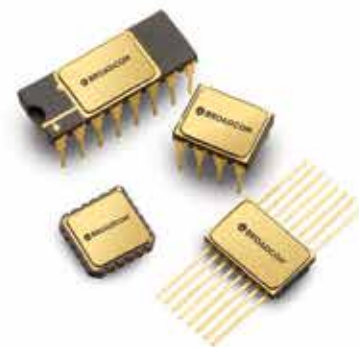


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Industry Watch

Zebra Acquires Fetch Robotics for \$290 Million

The acquisition will allow Zebra to focus on robotics in customer-centric solutions

Zebra Technologies, a provider of various supply chain visibility technologies, has announced it intends to acquire Fetch Robotics, a developer of autonomous mobile robots (AMRs), in a transaction valued at \$290 million. Fetch's AMRs are used for optimized picking in fulfillment centers and distribution centers, just-in-time material delivery in manufacturing facilities, and automating manual material movement in any facility.

Workflow Builder, Fetch's drag and drop workflow development studio, enables out-of-the-box automation so that users can deploy automated material handling workflows more quickly.

"The acquisition of Fetch Robotics will accelerate our Enterprise Asset Intelligence vision and growth in intelligent industrial automation by embracing new modes of empowering workflows and helping our customers operate more efficiently in increasingly automated, data-powered environments," said Anders Gustafsson, CEO of Zebra Technologies, in a statement. "This move will also extend our ongoing commitment to optimizing the supply chain from the point of production to the point of consumption."

According to Ash Sharma, senior research director and warehouse automation lead for market research firm Interact Analysis, "The AMR industry was worth over \$1 billion in 2020 and is forecast to grow to close to \$10 billion in 2024."

Fetch Robotics also offers cloud-based enterprise software, FetchCore, as the foundational platform for deploying and fully integrating a broad range of automated workflows into manufacturing and warehouse operations and providing unique insights into facilities through machine learning on AMR sensor data. The planned acquisition furthers Zebra's vision to bring advanced robotics solutions to users who have labor-intensive operations.

Zebra's focus on robotics automation combines workflow solutions for human workers, including current Zebra offerings such as FulfillmentEdge and SmartSight, with Fetch Robotics' solutions.

Fetch is said to have made "strong progress" as a Zebra Ventures portfolio company, has generated annualized run-rate sales of approximately \$10 million. Zebra expects to fund the \$290 million purchase price—for the 95% of the business it does not already own—with cash on hand. The transaction is subject to customary closing conditions, including regulatory approval, and is expected to close in the third quarter of 2021.



100+ Portable Assets – Including New Communications Vehicles and Micro SatCOLTs – Support First Responders During 2021 Wildfire and Hurricane Seasons

Communications Vehicles (CVs): Filenet stationed 3 CVs across the country to provide an extra-level of communications support beyond the standard deployable asset for first responders when needed. These new assets can be used for emergency deployments or planned events such as training exercises. In addition to providing connectivity via LTE (high-quality Band 14 spectrum) and/or Wi-Fi similar to a Satellite Cell on Light Truck (SatCOLT), CVs provide an air-conditioned command space for 2 first responder communications personnel with multiple monitors, a television, and charging stations, as well as a large exterior screen and speakers for briefings. And since they are equipped with a generator that can run for multiple days before refueling, CVs also include a lavatory, microwave, mini-refrigerator, and sleeping bunk for when deployed during the harshest of conditions.

Micro SatCOLTs: Filenet added 4 of these assets and stationed them out West to support the 2021 wildfire season. Similar to the Compact Rapid Deployables available to agencies to own, Micro SatCOLTs can be easily deployed by a single technician within a matter of minutes once onsite. Their agility makes them ideal for supporting firefighters on the front lines as they adjust to wildfire's unpredictable nature.

U.S. Territory Assets: FirstNet supports America's entire public safety community. That means first responders in all 50 states, 5 territories, and the District of Columbia. By collaborating with local network providers in each region, we have dedicated assets stationed in Puerto Rico and the 3 Pacific territories. And now, Filenet added 2 new portable assets in the U.S. Virgin Islands to provide immediate support.

Land-based Assets: Filenet also added 10 SatCOLTs to provide first responders similar capabilities and connectivity as a cell tower. They're housed across more than 50 locations nationwide to enable a 14-hour delivery window following the initial emergency request.

The FirstNet fleet can also go airborne with 3 FirstNet Flying COWs and the FirstNet One aerostat. FirstNet One is a first-of-its-kind public safety communications solution that can fly up to 1,000 feet and replaces multiple ground-based portable cell sites, making them available to deploy elsewhere. In addition to the FirstNet fleet, public safety can also tap into the 300+ assets, from the AT&T Network Disaster Recovery (NDR) fleet when available. The AT&T NDR program is one of the largest, most advanced of its kind with more than \$650 million invested in the U.S. and another \$15 million invested internationally.



Industry Watch

Seeq & AWS Announce Launch of SaaS Migration Program

Seeq Corporation announces the launch of a new program, the Seeq SaaS Workshop. In collaboration with Amazon Web Services (AWS), the Seeq SaaS Workshop simplifies the migration path to the cloud for Seeq's on-premise customers. Seeq SaaS on AWS benefits for manufacturing organizations include ease of deployment, added support, and faster access to new Seeq capabilities.

Eligible customers participating in the Seeq SaaS Workshop will benefit from a no-cost SaaS migration service, along with additional pricing options for Seeq subscriptions. In addition, Seeq's dedicated support team will assist in efficiently migrating on-premise Seeq implementations, data connections, and workloads to the AWS cloud. Program eligibility includes current Seeq customers with on-premise deployments, who can easily sign up for this limited-time program to accelerate their digitalization initiatives.

Seeq's rapid growth is being fueled in part by its commitment to cloud-based computing. Seeq is available on AWS Marketplace, has AWS Industrial Competency status, and supports many data storage services, including Amazon Redshift, Amazon S3, plus machine learning in Amazon SageMaker, and other services.

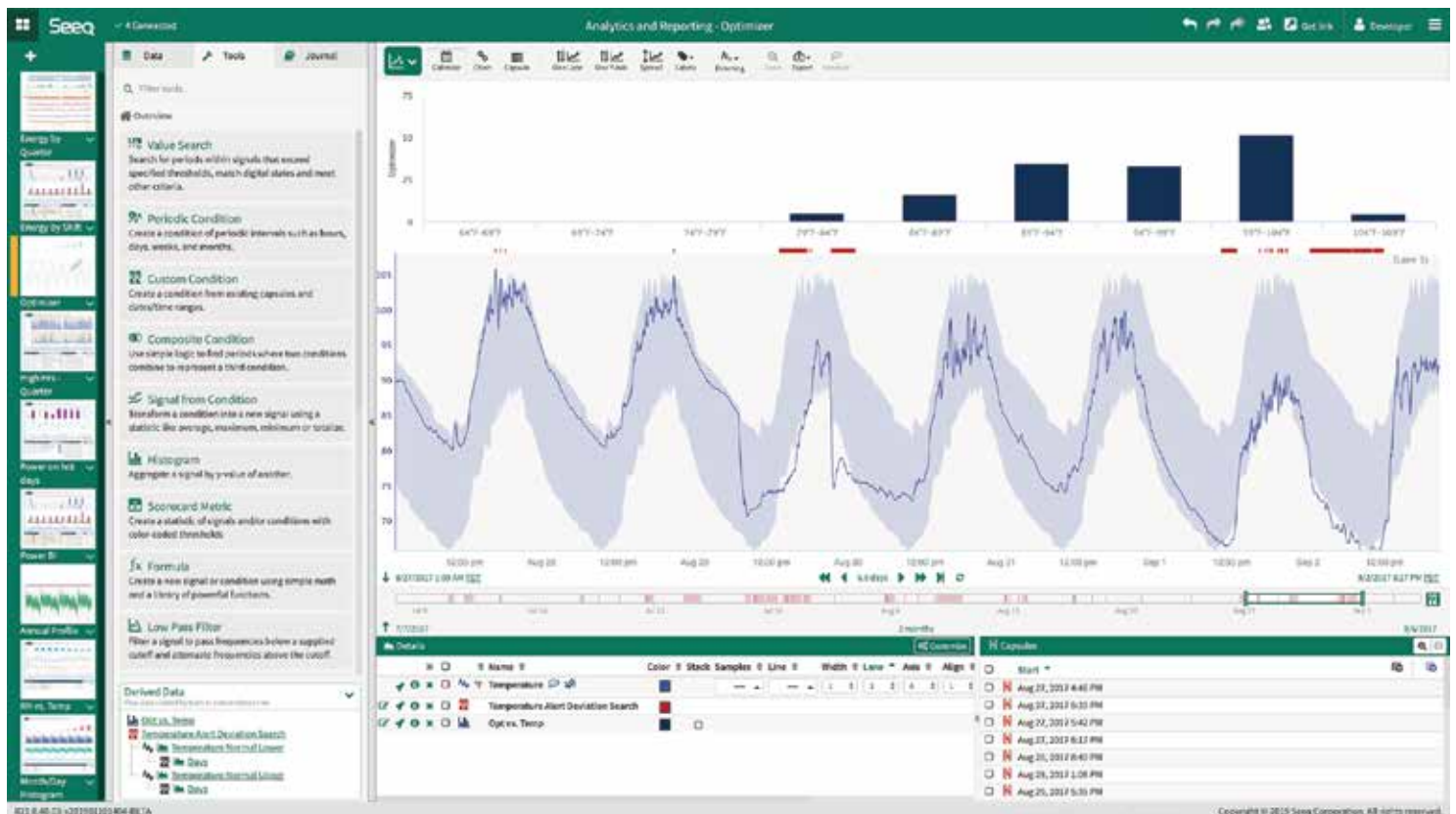
"Customers go to AWS Marketplace to find solutions that provide advanced analytics and real-time collaboration to support their journey to the cloud," says Mona Chadha, Director, AWS Marketplace Category Management. "We are pleased to support Seeq customers' migration to the cloud through the Seeq SaaS Workshop."

Allnex, a global leader in industrial coating resins, is an example of pairing secure cloud services with innovation in advanced analytics with their migration to Seeq SaaS on AWS.

"Allnex utilized Seeq as an on-premise application during the pilot project," relates Diego Gravina, IT Coordinator at Allnex. "But we decided to roll out Seeq as a cloud application due to the advantages this model brings to our business. Our cloud migration was quick, easy, and reliable."

Seeq's comprehensive set of applications for analyzing and sharing insights on process manufacturing data include Workbench for easy-to-use advanced analytics, Organizer for publishing reports and dashboards, and Data Lab for accessing Python libraries. Seeq applications empower engineers and subject matter experts to rapidly investigate, collaborate, and distribute insights to improve operations and business outcomes.

"Seeq's advanced analytics on AWS combines flexibility and scalability," says Dustin Johnson, Seeq's Chief Architect. "And partnering with AWS to streamline our customers' journey to the cloud will quickly empower each of them to unlock the value in their data."



Industry Watch

Smart Warehousing Solutions from SAT Technologies Enable Safer, More Efficient Fulfillment Using OnLogic Computers

With demand for shipping and fulfillment solutions at an all-time high, global industrial computer hardware manufacturer and IoT solution provider, OnLogic (www.onlogic.com), has announced that SAT Technologies (optimizedorderpicking.com) is using OnLogic computers to power their Stack Assist Tool (SAT). The SAT solution combines machine vision, visual display, and laser guidance to enable pallet stacking by instruction, resulting in increased productivity, lower costs, and higher, safer stacking of products.

"The Stack Assist Tool makes stacking by instruction possible. SAT ensures a smooth process whereby order pickers can pick and stack stable pallets in one flow without restacking, without errors, and with minimal training," said Peter Boorsma from SAT Technologies. "Our customers have shared that their investment in the Stack Assist Tool has lowered their overall facility costs by 55%."

SAT Technologies turned to OnLogic for a rugged panel PC solution that could be mounted on an order pick truck in a distribution center, or combined with an Automated Guided Vehicle. The panel displays color-coded stacking instructions to optimize the stack, while an overhead laser array indicates the location for the next item.

"Since the SAT is a mobile unit, the computer needs to be able to withstand shock and vibration. Since some distribution centers can get quite cold, they also needed a solution that could withstand extreme temperatures," said OnLogic Account Manager, Andrea Dekkers. "The large screen and durable design of our rugged panel PCs made them an ideal choice."

The two companies recently shared the story of how SAT Technologies is integrating OnLogic hardware, and how the Stack Assist Tool is being deployed by SAT Technologies' customers to improve warehouse operations.

"OnLogic as a hardware partner offers several key advantages: they are quick with their technical information, the service is complete and when we have technical difficulty OnLogic is a partner who works with us in our search for solutions," said Boorsma. "Their service and communication are top-notch. They are a valued partner to us and would be for any software or hardware business."



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Industry Watch

Enea Joins Telenor in World's Most Diverse Multi-Vendor 5G SA Core Solution

Enea announced that it is part of Telenor's trailblazing initiative to create the world's most diverse multi-vendor 5G standalone (SA) solution, that includes Proof of Concept (PoC) of a fully secure cloud-native 5G Core for network slicing. This is ready for deployment and can support both high-performance telecom and enterprise applications. Having met stringent security requirements, Telenor's solution is already being trialed by the Norwegian Armed Forces and is a pioneering use case of network slicing in action.

Enea provided Telenor with its cloud-native 5G data management solutions including its telco-grade fully secure Unified Data Manager (UDM) that can support up to 10 billion data entries at a rate of 1 to 500,000 transactions per second. Enea's solution also delivers automated end-to-end encrypted communications from the core to the edge. To provide robust data privacy, a critical consideration for the Norwegian Armed Forces, the UDM has built-in Subscription Concealed Identifier (SUCI) capabilities that safeguard user data. It camouflages the permanent identifier that usually accompanies a subscriber's activity on the network.

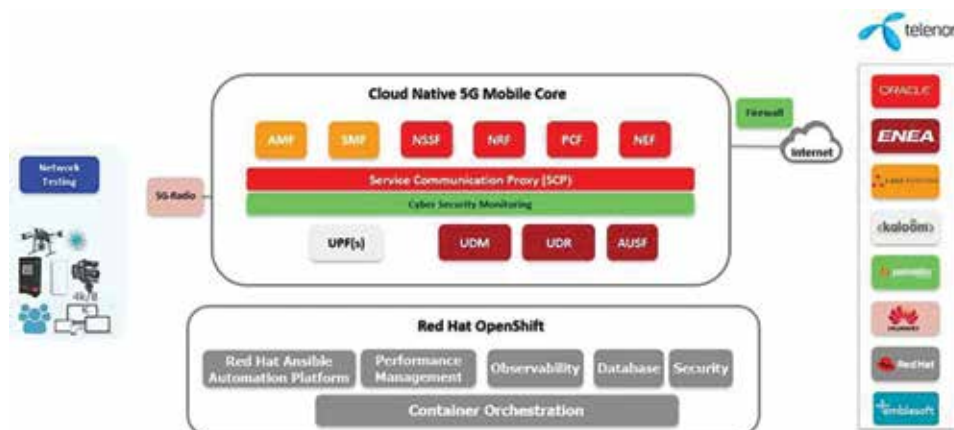
Telenor also utilized Enea's User Data Repository (UDR) and Authentication Server Function (AUSF) to provide best-of-breed 5G data management capabilities. Along with strengthening data security, Enea's solution maximizes uptime by conducting automated end-to-end testing of the 5G Core. This ensures that applications on the network receive data seamlessly and perform efficiently – with five-nine reliability.

"Enea's cloud-native, vendor-neutral data management products are robust and truly innovative. And Enea's collaborative strategy resonates with our own ethos. By creating a multi-vendor environment, operators and enterprises can foster innovation, reduce the total cost of ownership (TCO), and can cut time to market for new services," says Patrick Waldemar, Vice President, Telenor Research.

Indranil Chatterjee, Chief Customer Officer at Enea commented: "It has been a privilege to partner with Telenor and showcase our capabilities in this ground-breaking project. The initiative provides a blueprint for both operators and enterprises to create a cloud-native, best-of-breed 5G environment that, by its multi-vendor nature, eliminates vendor lock-in."

Enea's award-winning solutions are 3GPP compliant and have been deployed by many of the world's largest network operators to efficiently manage data in the 5G Core. 8 out of 10 multi-territory global mobile operator groups have deployed Enea technology.

Sue Rudd Director Networks and Service Platforms at Strategy Analytics added: "Enea and Telenor's innovative collaboration demonstrates the service flexibility 5G SA can offer with end-to-end network slicing and seamless UPF assurance. Enea's rich heritage of developing truly open, interoperable technologies, and vendor-independent 5G data management solutions embody the benefits of virtualization and the security of network slicing to unleash the economic potential of 5G for operators and enterprises."



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Industry Watch

Johnson Controls and Pelion Partner on Artificial Intelligence / Internet of Things (AIoT) For Smart, Healthy, and Sustainable Buildings

Pelion, the connected IoT device service provider, and a subsidiary of Arm, jointly announced a partnership with Johnson Controls, the global leader for smart, healthy, and sustainable buildings. This partnership will accelerate innovation in connectivity, security, and intelligence at the edge for Johnson Controls OpenBlue technology.

"This partnership combines Johnson Controls deep domain expertise in healthy buildings with Pelion's device and edge management capabilities to usher in an era of truly smart, updateable facilities at cloud scale," said Mike Ellis, chief customer, and digital officer for Johnson Controls. "OpenBlue's AI capabilities at the edge will consolidate diverse points of intelligence distributed across various floors, sites or even continents into insights and actions, creating an updateable building that can self-heal and evolve over its lifespan."

This innovation mirrors the automotive sector, where software, multiple sensors, and AI-trained models have transformed the



industry by enabling autonomous driving and software updates that blend data to continually improve vehicle capabilities and experience. Johnson Controls is applying the concept to the built environment. It will leverage Pelion's flexible device management capabilities to unite diverse device types and application layers to feed AI models that respond to dynamic workloads.

"Johnson Controls has the strategic foresight to rely on a partner to streamline the complexity of IoT device management security and secure firmware updates over the air," said Hima Mukkamala, CEO of Pelion. "Pelion's connected device platform will standardize the onboarding process for all systems, including the edge and endpoint devices that run on them, plus offer world-class public key infrastructure for secure and simple integration with third-parties."

This secure, open, and flexible approach to device management will allow OpenBlue to run any device and hardware configuration, from hardware gateways to constrained temperature sensors.

To provide sustainable, low cost, and low power intelligent processing at the edge, the partnership will utilize proven energy-efficient processors from Pelion's parent company, Arm, which are a key part of Johnson Controls' distributed hardware deployment.

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Industry Watch

OSS Wins Autonomous Long-Haul Truck Program with New AI Transportables™ EB4400 Solution



One Stop Systems, Inc. has secured first production orders for a ruggedized-edge, transportable system from a self-driving trucking technology company that utilizes level 4 driving automation.

The win reflects OSS' focus on the rapidly developing segment of the edge computing market that it calls "AI Transportable," with this quickly becoming the fastest growing area of its business. The AI Transportable solution for this customer is based on the company's new ExpressBox 4400 (EB4400), which OSS designed and built to support challenging edge applications like autonomous trucks.

"As our second significant design win for autonomous vehicles, these production orders demonstrate our successful strategy for designing and delivering AI Transportable," stated OSS president and CEO, David Raun. "OSS has developed special expertise in this high growth segment of the edge AI market, which we expect to grow from hundreds of millions in 2021 to multiple billions by 2025. Given this large, high-growth opportunity, we will continue to focus on developing and delivering our leading AI Transportable solutions for transportation and other market verticals."

The EB4400 is ideally suited for such applications since it can expand a host processor system with up to four of the latest PCI Express Gen 4 datacenter-class GPUs for processing sensor data using AI algorithms, and it is packed with upgrades suitable for the edge.

Such upgrades include a rugged frame-in-frame chassis design with a short 19" depth and hard-point flange mounting system. Also includes a redundant 48 Volt-DC power subsystem, grunge filters on the intake fans, and IPMI system management hardware and software, plus up to 512 gigabits of GPU-to-CPU bandwidth. The system is also software compatible with the company's full line of AI framework containers.

"This autonomous truck application using our new EB4400 solution highlights our expertise and focus on the AI Transportable segment of high-performance edge computing," commented Jim Ison, OSS chief sales and marketing officer. "Our solutions cover the entire AI workflow from capturing the data to processing the sensor inputs in real-time, but without compromising performance by using the latest available data center-class hardware in ruggedized edge environments."

"For mission-critical applications like self-driving, rugged AI computing is essential to ensure data is processed live and decisions are made instantly," added Ison. "The system boasts a perfect safety record after rigorous testing on a long-haul trucking route. We look forward to further assisting with the company's deployment of its driving technology, as well as enabling others with AI Transportable solutions."

OSS AI Transportable power leading-edge applications with 'no-compromise,' delivering datacenter-like performance via the latest in high-performance computing. These systems provide large-scale AI inference and AI training of deep neural networks for some of the world's most demanding AI applications. This includes mobile command centers, military surveillance aircraft, large-scale drones, and autonomous vehicles, or any application where responsive action needs to be taken immediately at the very edge.

dSPACE and LeddarTech Join Forces to Drive Development of Lidar Innovations for Self-Driving Cars



dSPACE and LeddarTech are jointly driving forward the development of lidar technologies for advanced driver-assistance systems (ADAS) and autonomous driving (AD).

dSPACE and LeddarTech®, a leader in level 1-5 ADAS and AD sensing technology, have entered into a partnership to jointly drive forward the development of lidar technologies for autonomous driving. The close cooperation will enable dSPACE and LeddarTech to provide high-precision simulation models and interfaces for lidar sensors, enabling OEMs and suppliers to integrate lidar innovations into ready-for-application solutions faster.

The cooperation will support the emulation of new LeddarTech laser sensors in simulation solutions at an early development stage. Moreover, dSPACE will provide simulation models for testing and validation, as well as the sensor simulation environment for validating camera, lidar, and radar sensors throughout the development process – accelerating customers projects.

The dSPACE simulation solution generates point clouds in real-time to simulate objects. The simulation models help determine the most effective positioning of the sensor on the vehicle (sweet spot), as well as the sensor limits (corner cases). LeddarTech will be able to seamlessly incorporate dSPACE's sensor models into its development projects.

"The right testing strategy, the right models, and ready-to-use interfaces for simulation and reprocessing are key building blocks," said Dr. Christopher Wiegand, Product Manager at dSPACE. "This partnership will enable our customers to accurately and quickly perform validation tasks for lidar applications. Without reliable simulations, automated driving systems (SAE Levels 3-5) cannot be achieved."

"OTA simulation is a key innovation for lidar. Integrating LeddarTech's LiDAR products and dSpace's simulation software through a generic sensor interface enables each party to validate products and services to potential customers," stated Michael Poulin, Vice-President, Strategic Partnerships and Corporate Development at LeddarTech. He continued: "Enabling the validation of environmental sensors material properties and weather conditions are crucial in simulations. LeddarTech and dSpace will work together on (further) developing and modeling sensor-specific environmental effects, e.g. rain, fog spray, etc."

Industry Watch

Abaco Systems Announces Design Win with Medical Device Company

Abaco Systems, Inc. announces a design win award of \$3 million, with a long-term value of \$30 million, supporting a medical device that uses low-coherence light to capture micrometer-resolution in two and three-dimensional images. This design win contains the ICS-1650,

Abaco's rugged 2-Channel DC-coupled ADC PCI Express card for software-defined radio (SDR) applications. This module combines the best in ADC and DSP technologies to provide the ultimate advantage in size, performance, and cost. Abaco is proud to deliver this innovative solution to meet the needs of our customer and enables them to provide integrated systems which measure pressure differences across a coronary artery and produces images that can stream easily into a percutaneous coronary intervention (PCI) workflow.

Abaco rose to the challenge to deliver a product originally used in a rugged form factor and transformed it for use in an industrial application by creating a unique form of IP that performs faster than the industry standard. The ICS-1650 provides a powerful base-band signal processing capability by bundling substantial analog to digital converter (ADC), digital down-converter (DDC), & field-programmable gate array (FPGA) resources in one PCI Express card. Applications for this product typically would include communications, signal intelligence, smart antenna, radar beamforming, wireless test and measurement, and satellite ground stations. Innovation such as this is at the core of Abaco's strength, delivering products that exceed customers' expectations and provide the tools required for their success.

The customer chose Abaco because of the long-term support options as well as the overall reduction in risk of product obsolescence, resulting from ten years of code development between the customer's and Abaco's engineers in previous versions of the application. The additional preference for unique intellectual property that met the required schedule and price point demonstrates this design win is truly a testament to the value of the product that Abaco has developed based on the customer's demanding processing requirements and timeline. The initial order is for 1000 units which are currently being delivered, with 4000 units being delivered over ten years.

Pete Thompson, VP of Product Management for Abaco Systems, Inc. said, "This design win shows Abaco's commitment to our customer's successes in industrial environments. This unique application is exactly the type of innovation we strive to deliver. Our ability to provide ongoing long-term support shows our commitment to longevity with our products, and the ICS-1650 is a testament to our reduction in product obsolescence. We are thrilled to support our customers in new and innovative ways."



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AI Must Accelerate for Self-Driving Vehicles to Become Reality

Advances in Edge Computing Must Innovate for Autonomous Vehicles to Realize Their Potential

By Manouchehr Rafie, Ph.D.



Large numbers of sensors, massive amounts of data, ever-increasing computing power, real-time operation and security concerns required for autonomous vehicles are driving the core of computation from the cloud to the edge of the network. Autonomous vehicles are constantly sensing and sending data on road conditions, location and the surrounding vehicles. Self-driving cars generate roughly 1 GB of data per second - it is impractical to send even a fraction of the terabytes of data for analysis to a centralized server because of the processing bandwidth and latency.

Due to the high volume of data transfer, latency issues and security, the current cloud computing service architecture hinders the vision of providing real-time artificial intelligence processing for driverless cars. Thus, deep learning, as the main representative of artificial intelligence, can be integrated into edge computing frameworks. Edge AI computing addresses latency-sensitive monitoring such as object tracking and detection, location-awareness, as well as privacy protection challenges faced in the cloud computing paradigm.

The real value of edge AI computing can only be realized if the collected data can be processed locally and decisions and predictions can be made in real-time with no reliance on remote resources. This can only happen if the edge computing platforms can host pre-trained deep learning models and have the computational resources to perform real-time inferencing locally. Latency and locality are key factors at the edge since data transport latencies and upstream service interruptions are intolerable and raise safety concerns (ISO26262) for driverless cars. As an example, the camera sensors on a vehicle should be able to detect and recognize its surrounding environment without relying on computational resources in the cloud within 3ms and with high reliability (99.9999%). For a vehicle with 120 km/h speed, 1ms round-trip latency corresponds to 3 cm between a vehicle and a static object or 6 cm between two moving vehicles.

Currently, most existing onboard AI computing tasks for autonomous vehicle applications including object detection, segmentation, road surface tracking, sign and signal recognition are mainly relying on general-purpose hardware - CPUs, GPUs, FPGAs or generic processors. However, power consumption, speed, accuracy, memory footprint, die size and BOM cost should all be taken into consideration for autonomous driving and embedded applications. High power consumption of GPUs magnified by the cooling load to meet the thermal constraints, can significantly degrade the driving range and fuel efficiency of the vehicle. Fancy packaging, fan-cooling, and general-purpose implementations have to go. Therefore, there is a need for cheaper, more power-efficient, and optimized AI accelerator chips such as domain-specific AI-based inference ASIC as a practical solution for accelerating deep learning inferences at the edge.

Advantages of Edge computing for AI automotive

Significant efforts have been recently spent on improving vehicle safety and efficiency. Advances in vehicular communication and 5G vehicle to everything (V2X) can now provide reliable communication links between vehicles and infrastructure networks (V2I). Edge computing is most suitable for bandwidth-intensive and latency-sensitive applications such as driverless cars where immediate action and reaction are required for safety reasons.

Autonomous driving systems are extremely complex; they tightly integrate many technologies, including sensing, localization, perception, decision making, as well as the smooth interactions with cloud platforms for high-definition (HD) map generation and data storage. These complexities impose numerous challenges for the design of autonomous driving edge computing systems.

Vehicular edge computing (VEC) systems need to process an enormous amount of data in real time. Since VEC systems are mobile, they often have very strict energy consumption restrictions. Thus, it is imperative to deliver sufficient computing power with reasonable energy consumption, to guarantee the safety of autonomous vehicles, even at high speed.

The overarching challenge of designing an edge computing ecosystem for autonomous vehicles is to deliver real-time processing, enough computing power, reliability, scalability, cost and security to ensure the safety and quality of the user experience of the autonomous vehicles.

Features	Vehicular Edge Computing	Vehicular Cloud
Latency	Low	High
Mobility Support	High	Limited
Location	At User's Proximity	Remote Location
Decision Making	Local	Remote
Communication	Real Time	Constraint in Bandwidth
Security	High	Limited
Reliability	High	High
Architecture Scalability	High Distributed	Limited Centralized
Storage Capacity	Limited	Highly Scalable
Context Awareness	Yes	No
Power Consumption	Limited	High
Computing Capability	Medium	High
Platform	Mostly ASIC	Mostly CPU, GPU, FPGA
Cost	Low	High

Figure 1 - Comparison between Vehicular Edge Computing and Vehicular Cloud Computing

Low Latency

Zero (low) latency for automotive safety is a must. Many of the self-driving car makers are envisioning that sensor data will flow up into the cloud for further data processing, deep learning, training and analysis required for their

self-driving cars. This allows automakers to collect tons of driving data and be able to use machine learning to improve AI self-driving practices and learning. Estimates suggest that sending data back-and-forth across a network would take at least 150-200ms. This is a huge amount of time, given that the car is in motion and that real-time decisions need to be made about the control of the car.

According to Toyota, the amount of data transmitted between cars and the cloud could reach 10 exabytes a month by 2025. That's 10,000 times the current amount. The cloud wasn't designed to process massive amounts of data quickly enough for autonomous cars.

The self-driving car will be doing time-sensitive processing tasks such as lane tracking, traffic monitoring, object detection or semantic segmentation at the local (edge) level in real-time and taking driving actions accordingly. Meanwhile for longer-term tasks, it is sending the sensor data up to the cloud for data processing and eventually sending the analysis result back down to the self-driving car.

Edge computing technology will thus provide an end-to-end system architecture framework used to distribute computation processes to localized networks. A well-designed AI self-driving and connected car will be a collaborative edge-cloud computing system, efficient video/image processing, and multi-layer distributed (5G) network - a mixture of localized and cloud processing. Edge AI computing is meant to complement the cloud, not completely replace it.

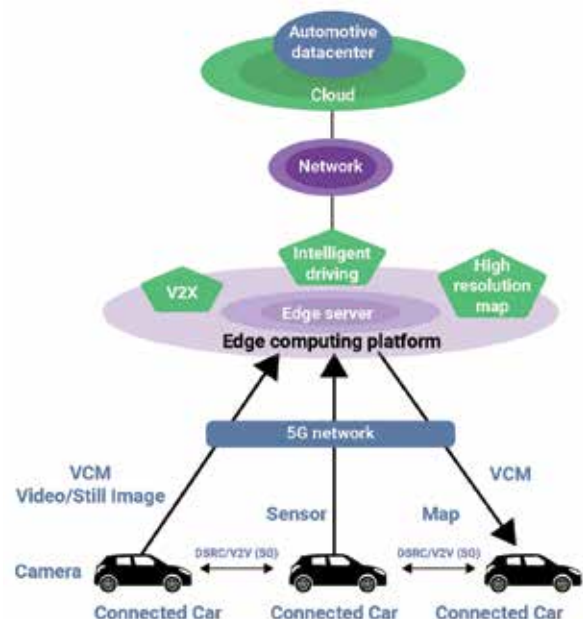


Figure 2 - Collaborative edge-cloud computing

Speed

Given the massive volume of data transmitting back-and-forth over a network, for safety reasons, much of the processing has to occur onboard the vehicle. The speed at

which the vehicle needs to compute continuous data, without the need to transfer data, will help reduce latency and increase accuracy due to a reliance on connectivity and data transfer speeds.

The interdependency between humans and machines means the velocity of information transfer in real-time is essential. Using edge AI computing involves having enough localized computational processing and memory capacities to be able to ensure that the self-driving car and the AI processor can perform their needed tasks.

Reliability

The safety of autonomous cars is critical. Edge computing reduces the strain on clogged cloud networks and provides better reliability by reducing the lag between data processing and the vehicle. It didn't take long for autonomous vehicle manufacturers to realize the limitations of the cloud. While the cloud is a necessity, autonomous cars require a more decentralized approach.

With edge computing and edge data centers positioned closer to vehicles, there is less chance of a network problem in a distant location affecting the local vehicles. Even in the event of a nearby data center outage, onboard intelligent edge inferencing of autonomous vehicles will continue to operate effectively on their own because they handle vital processing functions natively.

Today, automakers provide multiple layers of protection and redundancy for power failure, network failure and even compute failure. Vehicles also have the ability to dynamically re-route and power network traffic and even decision-making to bring an autonomous car to a safe stop. Driverless cars with edge AI computing can support onboard diagnostics with predictive analytics, a system that can grow and evolve in features over its lifecycle.

With so many edge computing vehicles connected to the network, data can be rerouted through multiple pathways to ensure vehicles retain access to the information they need. Effectively incorporating Internet of Vehicles (IoV) and edge computing into a comprehensive distributed edge architecture providing unparalleled reliability and availability.

Security

The ultimate challenge of designing an edge computing ecosystem for autonomous vehicles is to deliver enough computing power, redundancy, and security to guarantee the safety of autonomous vehicles. Thus, protecting autonomous driving edge computing systems against attacks at different layers of the sensing and computing stack is of paramount concern.

Security of autonomous vehicles should cover different layers of the autonomous driving edge computing stack.

These securities include sensor security, operating system security, control system security, and communication security.

In addition, AI at edge gateways reduces communication overhead and less communication results in an increase in data security.

Scalability

Vehicular edge computing inherently has a distributed architecture that can help bring data to the edge of networks, where vehicles can analyze and interact with the data in real time, as if it were local.

While the cloud is a necessity for certain tasks, autonomous cars require a more decentralized approach. For example, intelligent sensors can have the capability to analyze their own video feeds, determine which frames of a video require attention and send only that data to the server. This decentralized architecture reduces network latency during the data transfer process as data no longer has to traverse across the network to the cloud for immediate processing. AI vehicles are being equipped with more onboard computing power than in the past and can perform more tasks on their own, with higher predictability and less latency.

Cost

The increasing number of roadside units (RSUs) equipped with powerful local AI processors can help lower energy consumption, maintenance and operational costs as well as the associated high bandwidth cost of transferring data to the cloud. Meanwhile, one of the key drivers making edge computing a more viable reality today is that the cost of computing and sensors continues to plunge.

AI Automotive Processor Technology

The automotive industry is undergoing key technological transformations, advancing towards higher automation levels. Intelligent driving requires more efficient and powerful AI processors. According to Horizon Robotics' summary of OEM demands, a higher level of automated driving requires more orders of magnitude operations per second (TOPS), namely, 2 TOPS for L2 autonomy, 24 TOPS for L3, 320 TOPS for L4 and 4,000+TOPS for L5.

Automotive processors typically fall into three broad categories:

1. CPU and GPU-based processors: tend to have good flexibility but generally consume more power
2. but more costly and limited programmability compared to GPUs
3. ASICs: usually with a custom design, are more efficient in terms of performance, cost and power consumption

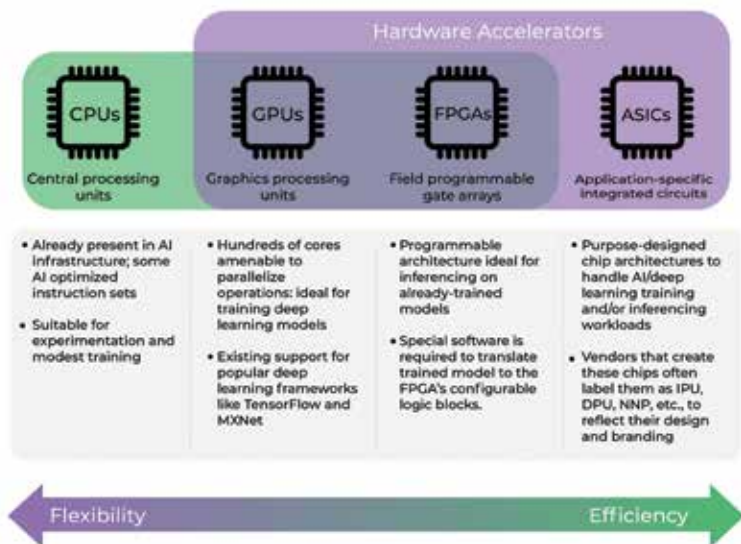


Figure 3

Conventional CPUs and GPUs are struggling to meet the increasing demands of high computing requirements of L4 and L5 autonomous driving levels where FPGAs/ASICs are both outperforming CPUs/GPUs. Autonomous vehicles will need enough computing power to become a “data center on wheels”. Taking the complexity of automotive applications into consideration, computing power alone is not enough. The energy efficiency, performance and cost-effectiveness of AI automotive processors should also be taken into consideration. Full-custom ASICs are by far superior to GPUs/FPGAs in terms of lower power consumption, performance and cost. That is why the integration of AI-specific ASIC accelerators in autonomous driving computing platforms is booming.

High-Performing Accelerator Chips

The inference accelerator chips of Gyr Falcon Technology, Inc (GTI) have a Convolutional Neural Network Domain-Specific Architecture (CNN-DSA) with a dedicated Matrix Processing Engine (MPE) and an efficient AI Processing in Memory (APiM) technology. As an example, GTI's LightSpeur 2803S provides a power efficiency perfor-

mance of 24 TOPS/Watt with all CNN processing done in the internal memory instead of outside DRAM. It can classify 448x448 RGB image inputs at more than 16.8TOPS with a peak power consumption of less than 700mW and with an accuracy comparable to the VGG benchmark. Gyr Falcon's CNN-DSA accelerators are reconfigurable to support CNN model coefficients of various layer sizes and layer types.

For more computationally-intensive edge computing applications such as in driverless-car AI platforms, GTI's PCIe-based AI accelerator cards using 16x 2803S chips delivering 270 TOPS and 9.9 TOPS/W power efficiency can be used for Level 4 AI auto performance demand. Using 4x GTI 2803S PCIe cards (64 chips) can provide the top performance of 1080 TOPS for L5 AI auto performance and beyond.

GTI's AI-based chips have a flexible and scalable architecture and can be easily arranged in either parallel or cascades for any given performance/model size application. Cascading capability provides flexibility and reduces the host workload. Cascading enables support for larger and more complex models (i.e. ResNet-101, ResNet-152, ...). See Figure 4 below.

The underlying function of many autonomous vehicle applications is deep-learning technology, such as convolutional neural networks (CNNs) that are typically used for vehicle and pedestrian detection, road surface tracking, sign and signal recognition, and voice-command interpretation. GTI's AI-based architecture is “silicon-proven” standalone accelerator technology that can be used with any type of sensor output, such as visual, audio and other forms of data. This can include high data rates from machine learning cameras and high-resolution LiDAR as well as low data rates from RADAR and ultrasonic sensors.

About Manouchehr Rafie, Ph.D.

Dr. Rafie is the Vice President of Advanced Technologies at Gyr Falcon Technology Inc. (GTI), where he is driving the company's advanced technologies in the convergence of deep learning, AI Edge computing, and visual data analysis. He is also serving as the co-chair of the emerging Video Coding for Machines (VCM) at MPEG-VCM standards.

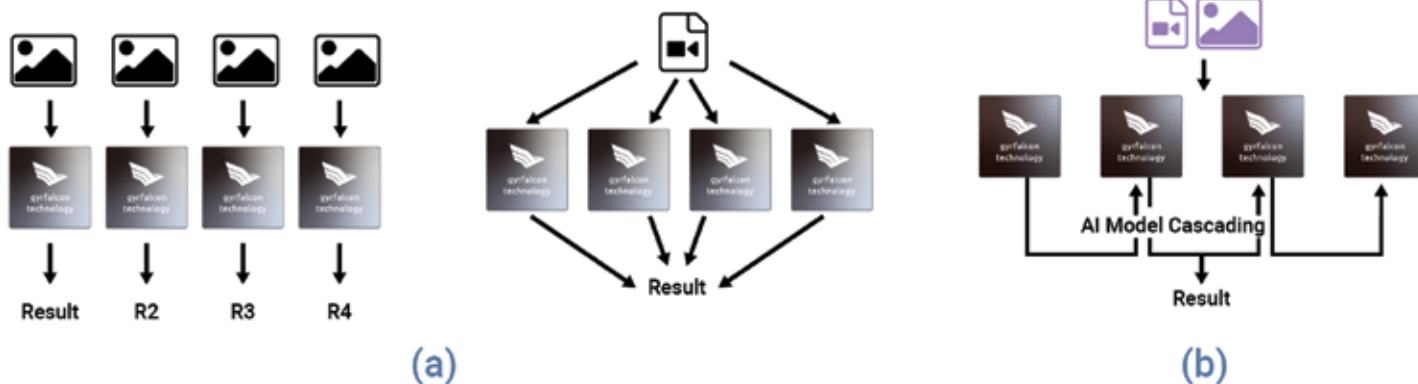


Figure 4 - GTI's AI-based accelerator with a scalable architecture (a) Parallel architecture for higher performance, (b) cascade architecture for larger models



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How Can Cities Build a Network That Gets the Best Out of IIoT?

Formula: The Network Is the Foundation, Solution Providers Deliver the Applications, and Interoperability Is Paramount

By: Todd Thayer, Director of Technical Enablement; Itron

Industrial IoT (IIoT) is growing with seemingly no bounds. According to forecasts by Gartner, 25 billion IIoT endpoints will be in use by 2021. Looking farther out, Million Insights projected that the global IIoT market would reach a value of \$933.62 billion by 2025.

IIoT is the glue that connects endpoints to each other, and much of the data on the IIoT network is generated by intelligent endpoints and applications. Maximizing the value of these systems depends on broad adoption of interoperability standards that enable seamless interoperability across a diverse ecosystem of solutions and providers.

Solution providers that are competing for market share should take a strategic view on how their technologies align with the standards at each layer of the solution, from the back office to the network edge. The field area network (FAN) is arguably one of the most critical layers of the IIoT since it can provide a flexible, multi-purpose connectivity fabric that forms the heart of an IIoT platform.

Network technologies that connect devices and applications will be the key to supporting the myriad applications that comprise the IIoT landscape. However, the network technologies that work for connecting consumer devices are not necessarily appropriate for connecting critical infrastructure across city, industrial and utility service territories. For example, there are a range of options for LPWANs, which provide a network canopy. While many vendors are competing for market share, Wi-SUN-based solutions are among the most widely adopted for IIoT applications. Wi-SUN offers a good combination of performance, reliability, security, and cost. Yet, no single technology can address the diverse use case requirements of IIoT.

In short, IIoT requires a variety of communication technologies to meet all use case requirements, leveraging the strengths of technologies such as 5G, NB-IoT, and radiofrequency mesh (RF-mesh), to deliver a wide range of use cases.

Building the Multipurpose Network

Cities have traditionally run their operations on a patchwork of networks, and those networks stand alone, or are “siloe d.” Today’s smart communities are implementing such a variety of use cases, and the need for a variety of network technologies is very common. Even choosing the proper technology for the use case is overwhelming and complex -- not to mention the difficulty in operating the patchwork of “siloe d” networks. Today, planners need a solution partner that understands the network technology options and can help them choose and design the system with mini-

mum complexity to maximize business outcomes.

Today, planners’ missions and ambitions are much higher: to build a single multi-purpose platform -- rather than separate, siloe d networks -- that provides unified connectivity to support many applications under a single network canopy. Interconnectivity through IIoT and open data governance draws communities together.

Let’s look at the foundation for this desired network. IIoT is multi-layered, encompassing wide area networks, field area networks (FAN), and edge device communications. Think of it as a unified platform consisting of connectivity and apps -- where data from network devices is generated, processed, enriched, and presented.

The foundation of an IIoT network typically comes through the deployment of an “anchor” application, such as advanced metering or intelligent street lighting, because they establish ubiquitous connectivity in large outdoor environments. RF mesh networks are among the most widely adopted technologies for these canopy applications since they offer superior performance, reliability, security, and cost. RF mesh networks are also highly scalable, which will be an essential quality enabling the growth of IIoT-connected communities.

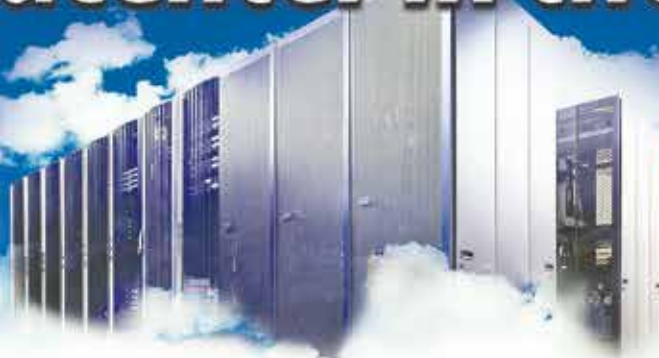
Increasingly, as communities expand and diversify their infrastructure modernization projects, the technical requirements are changing. As new, more sophisticated applications are deployed, they often combine the use of interoperable devices in a unified solution that creates value in new ways. For example, leveraging smart cameras to detect traffic activity and then using that information to dynamically adjust lighting levels to maximize safety and efficiency. Here, interoperability is critical because it provides vendor flexibility while ensuring that all of these systems can work together in a unified system to achieve a common objective.

Protocols Support Application Diversity

While RF-mesh provides a foundation for many IIoT use cases, some other applications and their data are delivered by fit-to-purpose communications protocols. As examples:

- 5G-LTE is expected to be the answer for performance-critical, high-definition, low-latency video applications, such as for eHealth and autonomous vehicles -- where real-time communications are critical.
- NB-IoT or LP-WAN may be the best fit for applications where low power draw, long battery life, very low bandwidth, limited reliability requirements, and low cost are key considerations, such as for agricultural applications and asset monitoring.

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- Wi-Fi remains the technology of choice for a range of consumer applications, including home Internet access, hotspots, and file sharing.

Interoperability Will Become the New Normal

As IIoT matures, the need for interoperability will become more intense. Why? We can expect that the successful deployment of the first set of use cases for the FAN will justify the investment in supporting new use cases. For the FAN, RF-mesh will provide the foundation for the network and the connective tissue, but it may extend into a more intelligent connectivity system that incorporates different network technologies and media. On the software side, what's needed is a common device management framework. That means having a standard approach to managing deployment, commissioning, health checks, and security. Many different vendors and many different communication networks may be used to connect to those devices, and lightweight M2M is emerging as the dominant standard for that function. Technologies such as Lightweight Machine to Machine (LWM2M) will make it possible to manage a broad ecosystem of solutions throughout the entire lifecycle of an IIoT initiative.

Still, even with a good deal of foresight and vision, it's nearly impossible to forecast what types of devices and applications you'll need to deploy and support beyond those that are already on the drawing board.

For communities that have not yet begun their digital transformation, planners, utilities and app developers will have the advantage of learning lessons from the pioneering cities, such as Paris, Singapore and New

York City, that have deployed high-ROI applications, such as smart streetlights and smart meters. They can also work with a trusted partner with knowledge of the communication technologies and applications when designing and deploying solutions to increase the chance of long term success. New applications will emerge, challenging every city to ensure application and device interoperability.

In short, interoperability is essential in order to maintain flexibility throughout the entire IIoT lifecycle – which is best measured in decades, not years.

For solution providers, IIoT brings both new business opportunities and new challenges. Solution providers plugging into the growing smart utility and smart city ecosystem need to recognize that there are many diverse applications of IIoT, and that it's too complex and too costly to deliver proprietary integrated solutions designed to support not just a single use case but a diverse range of use cases.

Solution providers will need to use standards that have been widely adopted so that they are well positioned to “plug into” the other solution providers who will complement their own technology and the solutions that they are delivering. In other words, the best solution is virtually always a cooperative solution.

In short, siloed solutions will give way to discrete solutions that are interoperable – while interoperability will remain the key to digital transformation. If there is a “big picture,” it may be that legacy, siloed municipal networks will be replaced by the IIoT-infused, integrated network that will drive a new future for smart communities.

INDUSTRIAL INTERNET OF THINGS



Innovative Product

IDEC's Safety Commander Merges Industrial-Grade Safety with HMI Tablets

IDEC Safety Commander provides a unique, practical, and patented way for operators to use modern tablet interfaces with industrial machinery and equipment.

IDEC Corporation has developed the HT3P Safety Commander to address a growing need for users who want to incorporate modern tablets into their industrial automation systems, but also need to include a hardwired emergency stop (e-stop) and enabled functionality. The Safety Commander makes it easy to hold a tablet securely in an industrial setting, for applications like machinery, robotics, automatic guided vehicles (AGVs), and production lines.

Tablets Offer More

Traditionally, industrial operations personnel have needed to stand in front of fixed control panels or use dedicated handheld touch panels or teaching pendants. Each of these methods has its place, but for many applications, operators need much more detailed human-machine interface (HMI) capabilities at their fingertips, even as they move about the system. Industrial internet of things (IIoT) initiatives and capable HMI options are now prompting designers to select mobile tablets as visualization and control devices because of their convenience and productivity benefits.

Tablets offer high display resolutions, powerful computational abilities, extensive memory, Wi-Fi networking, and Bluetooth wireless connectivity—all at a low cost. Beyond HMI functionality, they can offer instant viewing of drawings and manuals, videoconferencing, and report creation. But how can consumer- or commercial-grade tablets deliver industrial-grade safety?

Adding Industrial-Grade Safety to Typical Tablets

Recognizing the industry's need, IDEC has developed a unique device for adding industrial-grade safety to typical tablets. The Safety Commander is a hand-held device with a slider and adjustable grippers to accommodate tablets ranging from 8- to 11-inch diagonal size. A tablet mounted into the Safety Commander thus provides:

- Key-locking provisions to keep the tablet secure in the device.
- A sturdy and ergonomic handgrip and strap, for both right- and left-handed users, and an optional neck strap.
- The ability to rotate the tablet to any vertical/portrait or horizontal/landscape orientation using a patented design.
- One hardwired e-stop button with LED indicator.
- One hardwired 3-position enable switch.
- A 5-meter cable.
- USB Type-C port for tablet charging.
- IP54 protection from water splashes and dirt, and drop resistance tested to 1.2 meters.

Unique HMI Capabilities

In many cases, using a modern tablet avoids the need to locate a PC on the plant floor and provides an option to add IIoT functionality to industrial systems. Tablets can offer many more capabilities than dedicated industrial teaching pendants, which are expensive and can be difficult to use. However, users have struggled with custom but awkward designs for incorporating tablets with industrial automation, or they have compromised on safety considerations.

The IDEC HT3P Safety Commander overcomes these physical integration challenges. Using the Safety Commander, AGV and robotics designers can take advantage of the hold-to-run button to integrate tablets into their automation in compliance with ISO/IEC safety standards and requirements. Manufacturing and processing operations can provide the best visibility for their operators while providing them with the flexibility to safely move about the equipment.



Vecow Partners with AI Chipmaker Hailo to Launch Next-generation Edge AI Solution

Vecow ABP-3000 AI Ultra-slim AI Computing System features the Hailo-8™ AI acceleration module, enabling best-in-class AI performance at the edge



Vecow Co., Ltd., a team of global embedded experts, announced its partnership with leading AI (Artificial Intelligence) chipmaker Hailo, to launch their next-generation AI solution, Vecow's ABP-3000 AI computing system. Vecow's ultra-slim AI solution features the compact Hailo-8™ AI accelerator module, enabling breakthrough performance and AI inference capabilities at the edge. The strategic collaboration enables not only a smart AI solution with best-in-class power productivity but ecosystem deployment at the edge.

Powered by the 8th generation Intel® Core i7/i5/i3 processor, the Vecow ABP-3000 AI can integrate multiple advanced Hailo-8™ AI accelerators with best-in-class power efficiency for fanless industrial-grade AI edge devices. The combined solution delivers outstanding AI computing performance across multiple standard NN benchmarks, including over 3000 Frames Per Second (FPS) on Resnet-50, over 2500 FPS on Mobilenet-V1 SSD, over 450 FPS on Yolo-v5m, and up to 230 FPS on Yolo-v3 with a typical power consumption of only 25W for the entire solution.

Hailo's specialized Hailo-8™ AI acceleration module delivers unprecedented performance to edge devices. The module is built with an innovative architecture that enables edge devices to run sophisticated deep learning applications that could previously only run on the cloud. Its advanced structure translates into higher performance, lower power, and minimal latency, enabling enhanced privacy and better reliability for smart devices operating at the edge.

"It's really a win-win solution for Vecow and our customers," said Joseph Huang, Global Sales Director at Vecow. "With the increasing growth of intelligent edge computing, customers are looking for an AI Computing System that combines high-performance, power efficiency, and low latency. We are working with Hailo not only on the ABP-3000 AI, but on more models, and are looking forward to engaging more advanced AI technologies like the Hailo-8 AI accelerator, leading to more benefits for our global partners and customers."

"Enterprises across industries are looking for solutions that ensure their edge devices are more powerful, versatile, responsive, and secure," said Orr Danon, CEO, and Co-Founder of Hailo. "Vecow's vision aligned perfectly with ours, allowing us to develop a joint solution that provides unmatched AI processing, ideal for fields ranging from smart retail to smart cities to Industry 4.0 and beyond. We look forward to continuing working with Vecow to usher in a new wave of AI at the edge."

Antenova's new flexible Fera antenna for miniature devices on 915MHz ISM and LoRaWAN

Antenova Ltd announced a new flexible embedded antenna for the next generation of small monitoring devices on North America's 915MHz ISM and LoRaWAN networks.

This antenna, named Fera, part no SRFI068, is a flexible printed circuit (FPC) antenna measuring 33 x 13 x 0.15mm. FPC antennas do not require a ground plane to function, which is an advantage in small designs where space is tight, as no space is needed around the antenna on the PCB.

This antenna is an FPC that can be bent or curled and inserted precisely into a design and fixed in place by a self-adhesive patch. This makes the integration of the antenna simpler and is practical for low to medium manufacturing volumes.

Fera is available in two shapes – horizontal and vertical orientation, so there are two options for integrating it into a design. It comes with an integral UFL IPEX connector in a choice of two standard cable lengths: 100mm or 150mm, and two cable types – horizontal and vertical - to give designers several options for connecting to the PCB.

The Fera antenna is designed for the smart IoT and monitoring applications now rolling out across North America in the ISM and LoRa bands. It is ideal for small devices with small PCBs, that will be used for remote monitoring, smart meters, medical devices, automotive applications, and other devices using ISM and LoRa gateways.

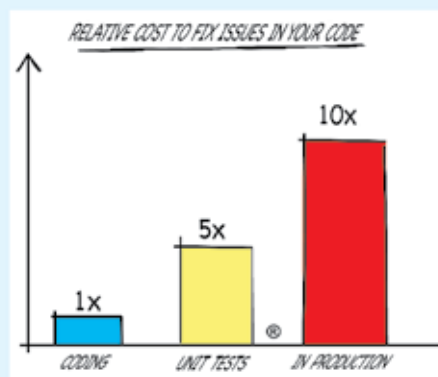




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Innovative Product

Knowles Releases New Development Kit to Bring Voice Control to Smart Home Appliances

The Knowles White Goods Standard Solution, selected by Samsung to enable far-field voice recognition in its FamilyHub™ connected hub for smart appliances.

Knowles Corporation announced the AISonic™ White Goods Standard Solution, a new, complete development solution that enables fast and easy voice integration for smart appliances. The development kit enables OEM and ODMs to build voice-activated control and far-field speech recognition capabilities into smart appliances, including refrigerators, ovens, and microwaves, clothes washing and drying machines, vacuums, dishwashers, and more. The Knowles White Goods Standard Solution was used by Samsung in its FamilyHub™ connected hub for smart appliances.

The AISonic White Goods Standard Solution is a development package built upon Knowles' industry-leading AISonic Audio Edge Processor IA8201 for the most accurate contextual audio and sensing and includes an IA8201 reference board accompanied by an API supporting integration with Application Processors, or MCUs or RF chipsets, a system firmware release configured to support sensors, and pre-integrated microphones from Knowles to enable high-quality audio capture and high signal-to-noise ratio.

The Knowles White Goods Standard Solution supports voice service interoperability, allowing multiple voice assistants to be integrated into a single device and enabling customers to talk to the service of their choice securely by simply saying its name. This enables the Knowles White Goods Standard Solution to be integrated into a broader ecosystem of smart appliance devices, allowing for greater product development freedom and innovation.

The smart appliance market is one of the fastest-growing verticals in the smart home, with voice control representing a critical technology feature supporting it. According to research from SAR Insight, over 66M voice processors for smart appliances are expected to ship by 2024, representing a CAGR of 55% between 2019 and 2024.

"As the smart home appliance market matures and continues to expand, support for voice interfaces is expected to become a highly requested feature that consumers look for in new appliances," said Vikram Shrivastava, senior director, IoT Marketing at Knowles. "The ability to ask your refrigerator to read aloud your grocery inventory, play a recipe video while cooking, or ask your oven to pre-heat while you prepare dinner, all contribute to the user experience but often, OEMs and ODMs face reduced power and memory constraints when adding voice capabilities. These constraints can have an impact on usability – the AISonic Audio Edge Processor removes this friction by providing high performance in a small size, with high efficiency, privacy, and compute power enabling customers to design modern products with far-field voice processing functionality for accurate listening. We also have an ecosystem of hardware system integrators that have developed modules to integrate with legacy appliance control boards."

The AISonic White Goods Standard Solution also includes algorithms for an Audio Front End suitable for use with Amazon Alexa assistants and other cloud-based ASR APIs through the Knowles OpenDSP partner program. Knowles integration partner Sensory Inc. provided the wake word engine for the White Goods Solution, enabling Amazon-certified voice wake and far-field voice recognition for memory-constrained smart appliances.

"The smart home and appliance market continues to be a major opportunity, but it has also become highly-competitive – voice support can be a major product differentiator," said Joe Murphy, VP of Marketing, Sensory Inc. "Working with Knowles, we are excited to provide Sensory's VoiceHub and TrulyHandsfree™ wake word engine for OEMs and ODMs to develop and deploy voice support for new smart appliance applications that perform efficiently and provide the best user experience."



IAR Systems enables Advantech to innovate smart industrial IoT edge devices

Using IAR Embedded Workbench has helped Advantech to deliver smart solutions that strengthen production management efficiency and enable digital transformation

IAR Systems®, the future-proof supplier of software tools and services for embedded development, announced that its development tools have enabled Advantech, a global leader in Industrial Internet of Things (IIoT) technology, to successfully develop their latest remote I/O data acquisition module, ADAM-6300. ADAM-6300 can serve as an intelligent network node in an IoT application, to meet the needs of environmental monitoring, make application configurations easier and faster and assist companies in their digital transformation.

The rapid development of IIoT has led to substantial growth in the demand for smart edge devices. Advantech's ADAM-6300 is an OPC UA remote I/O data acquisition module that does not require an external gateway and can be directly connected to SCADA, database, or public cloud services. It supports OPC UA (Open Platform Communications Unified Architecture) function and includes built-in hardware security protection. ADAM-6300 is highly recommended for applications such as water treatment, machine management, and production process monitoring.

"Advantech has been working with IAR Systems tools for more than 16 years, because of its extensive support for MCUs, stable products and the fact that it meets Advantech's requirements for the development of industrial products," said Adam Lin, Senior R&D Manager Industrial Internet of Things Business Group, Advantech. "ADAM-6300 can be seen as a representative work of Advantech brand and as an industry pioneering work since it was implemented the way that it originally would need to run on a PC rather than on an embedded platform. And this could only have been developed and realized through the use of IAR Embedded Workbench."

"The industrial-grade products developed by Advantech have very high requirements for stability, and it is a great match with IAR Embedded Workbench to provide stable product quality and service," said Chris Lin, Sales Manager Taiwan, IAR Systems. "We are honored to have Advantech using our tools to realize the integration of IoT edge devices. With new smart monitoring function, we look forward to continuing assisting Advantech in their innovations for industrial IoT applications."

Microchip licenses SEGGER's emFloat floating-point library for the XC32 V4.0 compiler toolchain

SEGGER Microcontroller announces that Microchip Technology Inc., a leading provider of smart, connected and secure embedded control solutions, has licensed SEGGER's optimized floating-point library, emFloat, for Microchip's XC32 V4.0 compiler toolchain and Arm® Cortex-M® devices.

emFloat is a complete, fully optimized, and verified floating-point library for embedded systems. The arithmetic routines are hand-coded in assembly language and optimized for small code size and increased execution speed.

"We found that emFloat provides our clients with the best floating point package available in terms of code speed and size. We are pleased to announce that it will be included with the next release of our MPLAB® XC32++ compilers," says Rodger Richey, Senior Director of Global Development Systems for Microchip.

"We put a lot of time and energy into optimizing emFloat for SEGGER's Runtime Library, emRun, as well as for use in other toolchains," says Rolf Segger, founder of SEGGER. "It is good to see emFloat recognized for the great product it is and to see our software engineers get the credit they deserve for this quality work."

About emFloat

Developed over a period of more than two decades, emFloat is a highly-optimized, IEEE 754 compliant, floating-point library designed from the ground up for embedded systems.

A part of the SEGGER Runtime Library, emRun, and included in object code form in SEGGER Embedded Studio, it is available stand-alone for developers who wish to increase performance or reduce the code size of their application.

Very fast and very small, it delivers FPU-like performance in pure software. Where available, it even boosts the performance of an FPU for complex mathematical functions.



Innovative Product

SSV now also offers task-specific industrial sensors for machine learning applications in the Smart Factory in the quantity of 1 with the help of a modular system

Sensor data for Smart Factory digitalization tasks require significantly higher-quality informational content than, for example, in classic flow control applications. Through a selection of sensor elements suitable for the task, sensor fusions for linking different measured values, and AI algorithms, the raw sensor data in the SSV sensor solutions become valuable information that can be used for various tasks in process optimization, machine, and plant maintenance as well as intralogistics.

With the Smart Factory sensor product family based on a modular system, SSV now offers retrofit sensors with an application-specific data output. For this purpose, the housing, sensor elements, signal processing, power supply as well as data and configuration interface are adapted to the task.

A support docker with various functions adapted to the respective sensor is supplied as an accessory for each sensor. In addition to Node-RED functions, these include a TensorFlow Lite interference interpreter for real-time analysis of the sensor data using previously trained neural networks to create the desired information for transfer to higher-level systems, such as an MES.



Ambiq Brings Intelligent Voice-Command to Battery-Powered Endpoint Devices

Complete Industry-Leading Ultra-Low Powered Solution to Enable Billions of Future IoT Devices with Voice Functionality

Ambiq the new Ambiq Voice-on-SPOT™ (VoS) Kit, designed for manufacturers to introduce voice-command into their IoT devices with faster time-to-market. Aimed to deliver the complete ultra-low-power solution at both the MCU and the system levels, the VoS Kit integrates Ambiq's hardware and software with peripherals and third-party IP, including signal processing using DSP Concepts' Audio Weaver, Sensory™ VoiceHub, and Retune DSP® VoiceSpot.

The speech and voice recognition market is projected to be worth \$27.16 billion by 2025. Spurred by the pandemic, the adoption of voice assistants will continue to rise as both businesses and consumers look for easier, more convenient, and safer ways to interact. The VoS Kit is Ambiq's solution to bring voice and audio capability to battery-powered devices with Always-on-Voice (AoV) functionality. Targeted applications include remote controls, gaming controllers, smart sensors, smartwatches, remote mics, and health trackers.

"Voice is the most convenient but least utilized input modality to interact with a product. The mass adoption of artificial intelligence (AI) in our everyday lives has accelerated the shift toward voice applications," said Marc Miller, the Director of Solutions Marketing at Ambiq. "With the Ambiq VoS Kit, manufacturers finally have a complete solution to implement always-on voice command in their IoT devices while achieving up to one-year battery life."

ULTRA-LOW POWER SYSTEM

for IoT endpoints and wearables



winbond

Available now, the first VoS Kit, built on the Apollo3 Blue Plus MCU, will support Always-on-Voice with application and cloud service driven options for one or two mics, signal processing, wake word/command detection, codec, and Bluetooth® LE (BLE) communication. The next generation, the Apollo4 Blue VoS Kit, targeted for the third quarter of 2021, will further lower always-on power with 2 analog mic inputs while increasing capabilities with up to 8 digital mic inputs, 120dB SNR (Signal to Noise Ratio) PDM (Pulse Density Modulation) to PCM (Pulse Code Modulation) converter, 192MHz Arm® M4F MCU, highly precise clocking and advanced interconnectivity with hardware rate matching. The Apollo4 Blue VoS Kit will expand Ambiq's repertoire with excellent voice input for phone calls, translation, and audio conferencing.

NVIDIA Isaac Sim on Omniverse Now Available in Open Beta

The new Isaac simulation engine not only creates better photorealistic environments but also streamlines synthetic data generation and domain randomization to build ground-truth datasets to train robots in applications from logistics and warehouses to factories of the future.



Omniverse is the underlying foundation for NVIDIA's simulators, including the Isaac platform -- which now includes several new features. Discover the next level in simulation capabilities for robots with NVIDIA Isaac Sim open beta, available now.

Built on the NVIDIA Omniverse platform, Isaac Sim is a robotics simulation application and synthetic data generation tool. It allows roboticists to train and test their robots more efficiently by providing a realistic simulation of the robot interacting with compelling environments that can expand coverage beyond what is possible in the real world.

This release of Isaac Sim also adds improved multi-camera support and sensor capabilities, and a PTC OnShape CAD importer to make it easier to bring in 3D assets. These new features will expand the breadth of robots and environments that can be successfully modeled and deployed in every aspect: from design and development of the physical robot, then training the robot, to deploying in a "digital twin" in which the robot is simulated and tested in an accurate and photorealistic virtual environment.

Summary of Key New Features

- Multi-Camera Support
- Fisheye Camera with Synthetic Data
- ROS2 Support
- PTC OnShape Importer
- Improved Sensor Support
- Ultrasonic Sensor
- Force Sensor
- Custom Lidar Patterns
- Downloadable from NVIDIA Omniverse Launcher

Developers have long seen the benefits of having a powerful simulation environment for testing and training robots. But all too often, the simulators have had shortcomings that limited their adoption. Isaac Sim addresses these drawbacks with the benefits described below.

Realistic Simulation

To deliver realistic robotics simulations, Isaac Sim leverages the Omniverse platform's powerful technologies including advanced GPU-enabled physics simulation with PhysX 5, photorealism with real-time ray and path tracing, and Material Definition Language (MDL) support for physically based rendering.

Modular, Breadth of Applications

Isaac Sim is built to address many of the most common robotics use cases including manipulation, autonomous navigation, and synthetic data generation for training data. Its modular design allows users to easily customize and extend the toolset to accommodate many applications and environments.

Seamless Connectivity and Interoperability

With NVIDIA Omniverse, Isaac Sim benefits from Omniverse Nucleus and Omniverse Connectors, enabling the collaborative building, sharing, and importing of environments and robot models in Universal Scene Description (USD). Easily connect the robot's brain to a virtual world through Isaac SDK and ROS/ROS2 interface, fully-featured Python scripting, plugins for importing robot and environment models.

Synthetic Data Generation in Isaac Sim Bootstraps Machine Learning

Synthetic Data Generation is an important tool that is increasingly used to train the perception models found in today's robots. Getting real-world, properly labeled data is a time-consuming and costly endeavor. But in the case of robotics, some of the required training data could be too difficult or dangerous to collect in the real world. This is especially true of robots that must operate close to humans.

Isaac Sim has built-in support for a variety of sensor types that are important in training perception models. These sensors include RGB, depth, bounding boxes, and segmentation.

- The graphical user interface, application, PowerPoint
- Description automatically generated
- Ground Truth Synthetic Data with Glass Objects

Domain Randomization

Domain Randomization varies the parameters that define a simulated scene, such as the lighting, color, and texture of materials in the scene. One of the main objectives of domain randomization is to enhance the training of machine learning (ML) models by exposing the neural network to a wide variety of domain parameters in simulation. This will help the model to generalize well when it encounters real-world scenarios. In effect, this technique helps teach models what to ignore.

Innovative Product

X-FAB Enhances Automotive Embedded Flash Offering for its 180 nm High-Voltage CMOS Technology Portfolio

X-FAB Silicon Foundries, the leading foundry for analog/mixed-signal and specialty semiconductor solutions, has introduced a new Flash memory capability for its XP018 high-voltage automotive process. This new Flash IP leverages X-FAB's already widely proven Silicon Oxide Nitride Oxide Silicon (SONOS) technology, which offers a combination of elevated levels of performance and best-in-class reliability. Fully compliant with stringent AEC100-grade 0 automotive specification, it can withstand operation across a -40°C to 175°C temperature range and fully supports the functional safety levels specified by ISO 26262.

It is supplied in a 32 KByte array size, following an 8K x 39-bit configuration, with a 32-bit data bus. A further seven bits are dedicated to Error Code Correction (ECC) so that zero-defect reliability in the field is assured. X-FAB's proprietary XSTI embedded Non-Volatile Memory (NVM) IP test interface has also been included to enable full serial access to the memory.

As this automotive-grade Flash IP is capable of running on a single 1.8 V power supply, it is well-suited for low-power designs. The addition of a built-in self-test (BIST) module is pivotal in enabling effective memory testing, as well as enabling comprehensive product debugging. X-FAB is also able to provide a full NVM test service to customers if required.

"This new IP solution further enriches X-FAB's embedded Flash portfolio for 180 nm open technology platforms, which come with a large selection of voltages and wafer materials. This strengthens our offering to the market, allowing us to meet customer demands across a wider variety of applications," states Thomas Ramsch, Director NVM Development at X-FAB. "It will be of particular value in situations where both low-power and resilience to challenging conditions are expected."

"By being able to complement existing X-FAB platforms with new embedded Flash capabilities, our customers will benefit from significant reductions in footprint. Also, the modular approach of XP018 means that fewer mask layers are going to be needed. Both these factors will help with realizing major die cost optimization," adds Nando Basile, Technology Marketing Manager for NVM solutions at X-FAB. "The new Flash IP means that XP018 is now able to address mixed-signal, high-voltage applications where additional logic content and computational resources are required in a highly cost-effective way. This will specifically benefit battery-operated devices, such as portable or autonomous smart sensors, with a great deal of potential in healthcare, industrial, consumer and IoT sectors."



ADLINK Releases CompactPCI® Serial Processor Blade Powered by 9th Gen Intel® Xeon®/Core™ i7 Processors

ADLINK Technology Inc. launched the cPCI-A3525 series CompactPCI® Serial processor blade in a single-slot (4HP) form factor. The 3U module features the latest 9th generation Intel® Xeon®/Core™ i7 processor, formerly known as Coffee Lake Refresh. It supports the newer CompactPCI® Serial standard, PICMG® CPCI-S.0, for next-generation, mission-critical applications requiring higher performance, such as railway transportation, aerospace and defense, and industrial automation.

"Systems integrators and solution providers serving the railway, aerospace & defense and industrial sectors need access to next-generation technology for easy insertion and upgrades that offer a combination of high performance and ongoing reliability," said Eric Kao, General Manager of ADLINK's Networking, Communication & Public Sector business unit. "The new PICMG® CPCI-S.0 CompactPCI® Serial Rev 2.0 standard is the fastest, most versatile, and cost-effective open standard using PCI Express (PCIe). Additional high-speed interfaces, including SATA, USB, and Ethernet, are also supported."

The second revision of the Serial standard increases its capability by providing direct rear I/O over the P6 connector to support an optional SSD daughterboard. The cPCI-A3525 offers data throughput options with PCIe interfaces that include two PCIe x8 Gen 3, two PCIe x4 Gen 3, and one PCIe x2 Gen 3. Seven 6 Gb/s SATA interfaces and up to ten USB 2.0/3.0 ports are also available at the rear. Front I/O includes two dual-mode DisplayPorts, two USB 3.0 connectors, two Gigabit Ethernet ports.

The blade hosts a multi-core 9th generation Intel® Xeon®/Core™ i7 processor with up to 32 GB DDR4 2666MHz dual-channel SODIMM, and, depending on the specified processor, it supports ECC-type memory. The CM246 chipset with AMI UEFI BIOS and dual 128 Mbit SPI flash memory supports Microsoft Windows 10 and Linux as standard, with other operating systems upon request. In addition, the cPCI-A3525 offers increased robustness with an operating temperature range of 0 to +60°C, maintained support for hot-swapping, and ADLINK's Smart Embedded Management Agent (SEMA) 4.0 for online system health monitoring.

Innovative Product



OmniVision Announces World's First Dedicated Driver Monitoring System ASIC With Integrated AI Neural Processing Unit, Image Signal Processor, and DDR3 Memory

Optimized for Entry-Level DMS With Industry's Lowest Power Consumption and Board Space for Processing Eye Gaze and Eye Tracking Algorithms; ASIC and Image Sensor, Combined, Consume Less Than 1 Watt

OmniVision Technologies, Inc. announced the OAX8000 AI-enabled, automotive application-specific integrated circuit (ASIC), which is optimized for entry-level, stand-alone driver monitoring systems (DMS). The OAX8000 uses a stacked-die architecture to provide the industry's only DMS processor with on-chip DDR3 SDRAM memory (1GB). This is also the only dedicated DMS processor to integrate a neural processing unit (NPU) and image signal processor (ISP), which provides dedicated processing speeds up to 1.1 trillion operations per second for eye gaze and eye tracking algorithms. These fast-processing speeds with 1K MAC of convolutional neural network (CNN) acceleration, along with integrated SDRAM, enable the lowest power consumption available for DMS systems—the OAX8000 and OmniVision automotive image sensor consumes just 1 watt in typical conditions, combined. Further optimizing DMS systems, this integration also reduces the board area for the engine control unit (ECU).

According to Yole Développement, the accelerated market drive for DMS is expected to generate a 56% CAGR between 2020 and 2025. (1) This is being driven by the European Union's Euro NCAP requirement that all new cars sold in the region have a DMS camera by 2022. "Most DMS processors on the market today are not dedicated to this application, requiring added circuitry to perform other system functions that consume more power, occupy more board space, and does not allow room for on-chip SDRAM," said Brian Pluckebaum, automotive product marketing manager at OmniVision. "By focusing the design of our OAX8000 ASIC on entry-level DMS, we were able to create the automotive industry's most optimized solution."

The OAX8000's on-chip NPU is supported by the popular TensorFlow, Caffe, MXNet, and ONNX toolchains. Additionally, this ASIC embeds quad Arm® Cortex® A5 CPU cores with Neon™ technology for accelerated video encoding/decoding and on-chip video analytics algorithms, along with hardware for image processing, video encoding, and RGB/IR processing. Its high dynamic range (HDR) processing capability allows the ASIC to accept input from RGB/IR image sensors and support high-quality output, for videos taken during the day or at night, in conditions with widely contrasting bright and dark images. The integrated video encoder accepts up to 5 megapixel captures from OmniVision's automotive image sensors, and outputs up to 2K resolution video at 30 frames per second (fps).

The boot-up time for the OAX8000 is significantly faster than its nearest competitor. This rapid startup eliminates any delay between ignition and activation of the DMS camera. Additionally, it supports secure boot features to provide cybersecurity.

Other applications include processing occupant detection algorithms, such as distinguishing a baby from a grocery bag, and providing alerts when objects are left behind in the vehicle. Additionally, this ASIC can be used in automotive video security systems to perform functions such as FaceID, as well as preset driver-comfort settings (e.g., seat position) that are activated when the DMS first scans the driver's face.

A support docker with various functions adapted to the respective sensor is supplied as an accessory for each sensor. In addition to Node-RED functions, these include a TensorFlow Lite inference interpreter for real-time analysis of the sensor data using previously trained neural networks to create the desired information for transfer to higher-level systems, such as an MES.

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