SOLECTRIX USES AMD KRIA[™] SOM FOR VISION SYSTEMS IN MOBILE INDUSTRIAL MACHINES • . • .

CUSTOMER

solectrix)

INDUSTRY

industrial

CHALLENGES

Solectrix was looking to build a vision system for mobile industrial machinery that delivered the AI performance it was looking for at an affordable cost.

SOLUTION

The AMD Kria[™] SOM provides robust processing capabilities while working seamlessly with additional hardware accelerators to handle sophisticated image processing tasks.

RESULTS

Since deploying the Kria SOM in its SXVPU box, Solectrix has been able to deliver high-resolution image processing and AI analysis that directly enhances the safety of autonomous and semiautonomous industrial machines.

AMD TECHNOLOGY AT A GLANCE

AMD Kria system-on-module (SOM)



Today's mobile industrial machinery faces increasing demands for real-time data processing, safety, and automation. In sectors like agriculture, construction, and logistics, vision systems are essential for tasks ranging from hazard detection to precision monitoring and automation. Traditional approaches using fully decentralized smart cameras or centralized electronic control unit (ECU) systems are limited. Smart cameras can be costly and hard to scale, while centralized processing struggles with complex connectivity and overall scalability.

Solectrix GmbH decided to build a system that met in the middle. It's not a smart camera, and not a huge processing ECU. It's a smart subsystem that connects up to four cameras via LVDS links, providing high processing power and flexibility for industrial vehicles. Target applications include forklifts and other construction equipment, along with heavy industrial machinery for mining and agricultural.

CHALLENGE

Stefan Schuetz, managing director at Solectrix, said smart-camera solutions based on the leading competitor's GPUs are typically large and don't have a very broad temperature range, which means they must be actively cooled. He added that the solutions also don't perform as fast, and often come with a significantly shorter period of availability.

"We were looking for a good system architecture that was fast but also flexible," said Schuetz. "In the end, it had to deliver the needed performance, but also be cheaper than four smart cameras and an Ethernet switch."

Solectrix chose the AMD Kria[™] SOM.

SOLUTION

The Solectrix Smart Expandable Vision Processing Unit (SXVPU) is a rugged, industrial vision processing system that connects up to four GMSL2 cameras with Ethernet. The extension to wireless connectivity is possible. The box offers a unique, semi-centralized solution optimized for demanding environments.

The Kria SOM equips the SXVPU with advanced processing and encoding capabilities for four video streams in parallel, enabling real-time responsiveness across a wide range of applications. With wired or wireless connectivity, the SXVPU enables efficient remote control and monitoring, extending safety and operational precision in complex, high-risk environments.

"The Kria device fits perfectly in our solution," Schuetz said. "The device offers latency minimization and the ability to manage four high-resolution camera inputs, giving us complete flexibility."

Schuetz said the AMD Kria SOM allowed Solectrix to focus on differentiating product features, reducing time-to-market by minimizing time spent on base-level setup. This streamlined approach enabled the company to design for industrial-grade ruggedness while maintaining a straightforward path from

concept to production and future design revisions.

"The comprehensive tools and workflows provided by AMD make it easy for our customers to finalize their software and adapt the SXVPU to meet their unique requirements efficiently," Schuetz said. "This is particularly important, allowing us to quickly generate customer-specific variants from this platform with minimal effort. By abstracting foundational software and hardware components, we can fully concentrate on customerfacing features."

The AMD Kria SOM provides robust processing capabilities while working seamlessly with additional hardware accelerators to handle sophisticated image processing tasks. This centralized architecture processes data from up to four cameras in real time, reducing system complexity and cost by enabling the use of conventional machine vision cameras. Ethernet connectivity extends this functionality, enabling seamless integration across multiple zones. The platform is also supported by long-term availability of more than 10 years, which is important for industrial applications relying on long-term planning and reliability.

The SXVPU comes with an architecture for AI acceleration. "Leveraging the AI accelerator in the SXVPU, the system achieves better than 10 TOPS per watt of performance, enabling efficient and responsive analysis for safety-critical applications," Schuetz said. By keeping pre-compression image processing close to the camera, the SXVPU delivers optimal image quality for neural network analysis, avoiding issues like motion blur or color distortion that arise with compressed data. This architecture also reduces latency for safety-critical applications, like remote machine control in extreme environments.

Schuetz added, "Recent benchmarks against competitor systems demonstrate superior latency and adaptability, underscoring the SXVPU's competitive edge. In particular, the latency-optimized streaming path, which processes data in less than 10 milliseconds, is a significant technical benefit for safety-critical applications."

Built to withstand harsh conditions, the SXVPU features IP65/IP67 protection and operates reliably across extreme temperature ranges. Its flexible hardware and software design enables easy integration of sensor fusion technologies like radar, LiDAR, and Time-of-Flight sensors to improve detection accuracy and reliability. While these extensions provide enhanced safety and functionality for industrial applications, they are not initially built-in but can be seamlessly added as needed.

The SXVPU enables a safeguarded 24/7 operation, which can be tailored through customer-specific software extensions to address cybersecurity and functional safety requirements. This flexibility ensures that the SXVPU can meet diverse security demands in industrial applications without predefined standards, allowing for customized solutions as needed.

RESULT

"Since deploying the Kria SOM in its SXVPU box, Solectrix has been able to deliver high-resolution image processing and AI analysis that directly enhances the safety of autonomous and semi-autonomous mobile industrial machines," Schuetz said.

"Also, by leveraging conventional cameras with GMSL2 and a semi-centralized design, the SXVPU reduces system complexity and cost, enhancing overall system transparency and flexibility," he added.

Schuetz said, "With the AMD Kria SOM, the Solectrix SXVPU delivers a groundbreaking embedded vision solution that meets the rigorous demands of the mobile industrial machine sector."

ABOUT SOLECTRIX

Solectrix GmbH, based in Nuremberg, Germany, is well-known for its expertise in the fields of image processing and high-end embedded electronics. With a team of qualified and specialized engineers and technicians, Solectrix is an innovator and independent service provider in the development of high-end electronics solutions. For more information, please visit: <u>www.sxvpu.eu</u>.

ABOUT AMD KRIA SOM ADAPTIVE SoC

Kria SOMs were designed with SW engineers in mind, providing familiar design environments without requiring FPGA programming experience, and enabled by the Kria Starter Kits that are low-cost out-of-the-box ready development platforms. For more information, please visit <u>www.amd.com/kria</u>.

ABOUT AMD

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