SYSGO

EMBEDDING INNOVATIONS

Manage Automotive Complexity
with Safe & Secure Virtualization

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#1 Europe's No 1
in Real-Time Operating Systems

SYSGO at a Glance

SYSGO is an independent entity from the THALES group and Europe's No 1 in safe & secure operating systems. Since 1991, SYSGO has expertise in embedded devices and is one of the pioneers in embedded Linux. The main markets are Aerospace & Defense, Railway, Automotive, and Industrial Automation, where we are active with professional services mainly in customer systems that are following various certification standards.

Our RTOS & Hypervisor PikeOS is well-known in the market as a reliable and certifiable operating system including virtualization and multi-core support.

Our solutions significantly reduce cost, space, weight, time-to-market for our customers. We guarantee a reliable, long-term supported operating system as basis for their innovative products.

SYSGO offers long-term support for devices that need to run more than 20 years. As an European company, our products have no export restrictions and are ITAR free.

→ **www.sysgo.com/about-us**

Automated Driving starts with Safety

Car manufacturers face the challenges of integrating a real flood of electronic components, reducing development and production costs, and reacting quickly to environmental and public requirements, while still ensuring the Safety and Security of the entire vehicle system. A certification for ISO 26262 raises demands for intelligent and extensible system architectures.

The increasing number of software applications and assistance systems means that Automotive electronics require similar Safety architectures to those used in the Avionics industry. This were we come into play. Our PikeOS is a hypervisor that can host various software packages in individual partitions and control communication and data flow between the applications and hardware.

Automotive Complexity – Managed with Safe and Secure Virtualization

PikeOS provides a modular software architecture which can integrate multiple applications on a single hardware platform. Furthermore, PikeOS offers both, a full hard Real-time Operating System (RTOS) and a virtualization and partitioning system that are designed to support the special requirements of Automotive applications. The core of our PikeOS platform is a small, certifiable separation kernel, providing a virtualization infrastructure with the ability to house diverse resource and function needs into safely divided individual partitions.

Because Automotive applications can range from non-critical infotainment systems to highly critical control functions in the car (like ADAS), PikeOS accordingly provides a broad variety of guest operating systems: From POSIX to Linux and Android to AUTOSAR or COVESA.

Thanks to strict separation technology, applications of different criticality levels, different security levels, real-time or non real-time (using time partitioning) can run concurrently in a mixed-critical environment on a single standard hardware platform.

PikeOS: RTOS & Hypervisor

PikeOS is based on a microkernel with the performance of a traditional real-time operating system. This includes a hypervisor that provides partitions which can host different applications – from a simple yet highly critical control task to a fully-fledged operating system like Linux. Customers can start with a platform development using RTOS and later add hypervisor functionality.

As a consequence, safe and unsafe applications can coexist on the same platform. Complex systems consisting of multiple devices in the past can now be consolidated on a single hardware platform. This saves weight, energy consumption and cabling, and reduces the bill of material. The PikeOS Hypervisor runs on x86 as well as ARM or PowerPC and can easily be adapted to other CPU architectures.

Safety & Security including Certification

The PikeOS Hypervisor itself is certified to ASIL B according to the ISO 26262 standard, thus providing the foundation for mission-critical systems with both, functional Safety and IT Security requirements.

Since 2017, SYSGO has a joint venture with Vector Informatik and jointly develops an adaptive AUTOSAR solution certifiable to ASIL D.

→ **www.sysgo.com/vector**

Strong Separation & Protection

The safeguard mechanisms are essentially based on two principles: Strict separation of applications by time and resource partitioning and control of communication channels. The individual applications that comprise the overall system can represent different levels of criticality. For secure systems, PikeOS can provide secure boot mechanisms and build a root of trust for the applications. Due to the protection mechanisms provided by PikeOS, the certification according to industry specific Safety and/or Security standards can be made separate for each application – a key feature to keep cost under control.

The PikeOS Separation Kernel Version 5.1.3 is currently the only Separation Kernel worldwide that holds a Common Criteria EAL5+ certification for its separation performance.

→ www.sysgo.com/cc

PikeOS in Automotive Electronics

The PikeOS hypervisor was specifically designed for the development of software in embedded systems with certification requirements. The architecture forms the basis for certification and official approval of critical systems according to standards for functional Safety and IT Security.

PikeOS has been used for many years as a basic software in aircraft electronics to reduce the number of ECUs (electronic control units) and thus the complexity of the overall system. The increasing number of software applications and assistance systems in cars also require analogical system architectures, similar to an airplane.

ISO 26262 Certification

The ISO 26262 is an international standard that defines the Safety life cycle of electrical, electronic and software-based components in passenger vehicles. Based on the IEC 61508, the ISO 26262 reduces the risk of dangerous operational situations and defines Security measures that reduce the risk of downtime. To meet the requirements of ISO 26262, PikeOS is optionally offered with an Automotive Certification Kit. This CertKit includes an "ISO 26262 Part 6 compliant PikeOS Hypervisor" and a set of development and testing documentation.

Furthermore, additional Safety information can be provided, to achieve ISO 26262-compliant systems. Important components of this Certification Kits are a Safety manual with guidelines for the use of PikeOS in Safety-critical system designs, as well as a Safety case with characteristic functional Safety requirements in accordance with the necessary Automotive Safety Integrity Levels (ASIL).

→ www.sysgo.com/certkits

Use Cases

Human Machine Interface (HMI), Advanced Driver Assistance Systems (ADAS), Driver Monitoring System (DMS), AUTOSAR Adaptive, Connectivity Gateway, ECU Virtualization / Consolidation

→ www.sysgo.com/automotive

PikeOS for Automotive

Today's modern Automotive applications go beyond the actual vehicle. In particular, secured communications are needed to ensure smooth mobility. The use of PikeOS resolves a wide array of challenges at the same time.

PikeOS enables the integration of a large number of functions and applications onto a single hardware platform. The strict separation of applications into secure partitions allows authorized access only and avoids mutual interference.

Applications of various levels of criticality and Security are safely separated from each other and can be certified separately. Our technology supports Android, AUTOSAR classic & adaptive, COVESA or AGL (via Linux), Linux, ELinOS, PikeOS Native and POSIX.

High scalability and hardware independence secures return on investment. And PikeOS allows legacy code re-use and reduces system boot-up time.

Customer Voice

"We have developed a virtualization technology for our V850 architecture, allowing high speed and composite control for industrial machinery and automotive. SYSGO enables us to achieve a scalable CPU architecture with virtualization technology that supports our customers in building flexible development systems."

Michiya Nakamura
General Manager
1st MCU Business Division
at Renesas
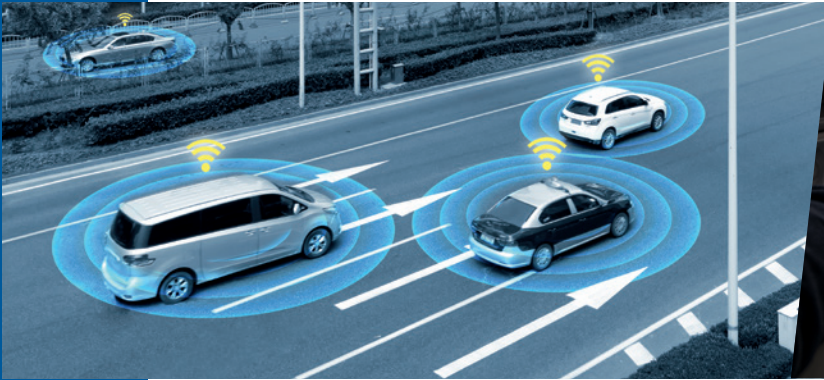
Automotive Customers

- Continental
- Ford
- Hella
- Knorr-Bremse
- LEAR
- MAN
- MAGNA

- Renault
- Stoneridge
- Valeo
- VW
- ZF

SACoP
Secure Automotive Connectivity Platform

SYSGO's turnkey-ready development platform and secure gateway for Automotive connectivity. Our solution is a fully-integrated software framework to administrate and exchange data securely thus encompassing the increasing challenge of connected cars. This platform can be used as foundation for a gateway development.

→ www.sysgo.com/sacop

Automotive Grade Linux Project – SYSGO is participating

SYSGO has joined forces with the Linux Foundation to actively participate in their Automotive Grade Linux (AGL) project. In this open-source project, well-known Automotive manufacturers and suppliers will work alongside hardware and software manufacturers to develop and implement a completely open software stack for the connected car.

→ www.sysgo.com/agl-project

Magna & PikeOS: Assisted Parking

Several OEMs are using 360-degree view systems (for assisted parking) of the latest generation on the road, based on SYSGO's PikeOS Hypervisor.

The safe and secure hypervisor technology is used to combine the integrated camera and vehicle information system on the same hardware. The platform is the basis for further joint customer projects and can be used for next generation autonomous vehicles.

→ www.sysgo.com/magna

Whitepaper Download

We offer a wide range of whitepapers covering Safety & Security, secure updates for high assurance mixed-critiality systems, successful multi-core certification, host intrusion detection, transparent control-flow or C++ in Safety-critical environments.

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