# Industrial Robot Safety

PikeOS and NexCOBOT

Jointly we can address new or critical embedded certification use cases with multi-level criticality by joining **SYSGO's PikeOS** mixed criticality RTOS and **NexCobot SCB100** Safety hardware based on Intel Intel x6000FE series Atom processors functional Safety (FuSa) offering for the industrial market.

Monitored Stop	Hand Guide Control
Speed & Separation Monitoring	Power & Force Limiting
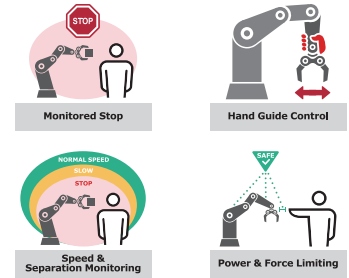
INDUSTRY MARKET CHALLENGES

- Embedded equipment and systems are proprietary
- Need for hardware consolidation to reduce weight and power
- Real-time handling is necessary
- New technologies such as 5G, vision and AI/ML need more processing power and data management with a higher need for Cyber Security, especially for robotic solutions

- Changes to the industrial robot Safety standard (ISO 10218)
- More and more reducing component signals and increasing management of data and reducing cost
- For cobots designed to work in a close proximity to human counterparts, more regulations and standards are underway to build up safe robotic environments

---

SCB100 - THE FIRST X86 FUNCTIONAL SAFETY CONTOLL PLATFORM

NexCobot SCB100 offers:

- Industry's leading cobot controller board ready with full functional Safety
- SIL 2-compliant, SCB 100 brings a shortcut to collaborative solution development, facilitating the entire process by offering a worry-free developer platform to build Safety solutions on Intel Atom® x6427FE processor, a brand new core optimized for IoT applications, empowers SCB 100 with an all-around functional Safety package, covering hardware, software as well as Safety documentation, for all collaboration workplaces
- FSoE (FailSafe over EtherCAT) enables the transfer of Safety-critical control data through EtherCAT, incorporating control and Safety data into a single communication system
- Extending protections from motion control to auxiliaries, covering Safety devices, I/O devices, Safety sensors as well as Safety teach pendants, NexCOBOT aims to build a comprehensive Safety network

Main features:

- Compliant to IEC 61508, SIL 2, and ISO 13849, Cat 3 PLd
- Intel Atom® x6427FE processor
- EtherCAT slave support
- 12-channel input/4-channel output Safety I/O
- HDMI support
- Supports 2 x DDR4 SO-DIMM, up to 32 GB
- Supports 4 x Intel® GbE ports, 6x USB 2.0/3.0, 2x COM, 1 x mini-PCIe

SYSGO PikeOS offers:

- PikeOS is a hard real-time OS and Hypervisor in one product with a wide range of guest operating systems (POSIX, Linux, Android, Windows, ARINC, Autosar, ...) including ELinOS, SYSGO's own embedded Linux distribution product
- Software is executed independently from each other via software time and space partitioning used in mixed critical applications
- PikeOS has a fast and efficient separation kernel architecture
- Combined Safety and Security in a single product
- PikeOS is based on a certification approach which is modular and hw-independent to the upmost extend
- Hardware virtualization support on x86 architectures
- High performance in multi-core software applications
- Long-term support

- **Security**
  - The PikeOS 5.1.3 separation kernel is certified against Common Criteria EAL 5+
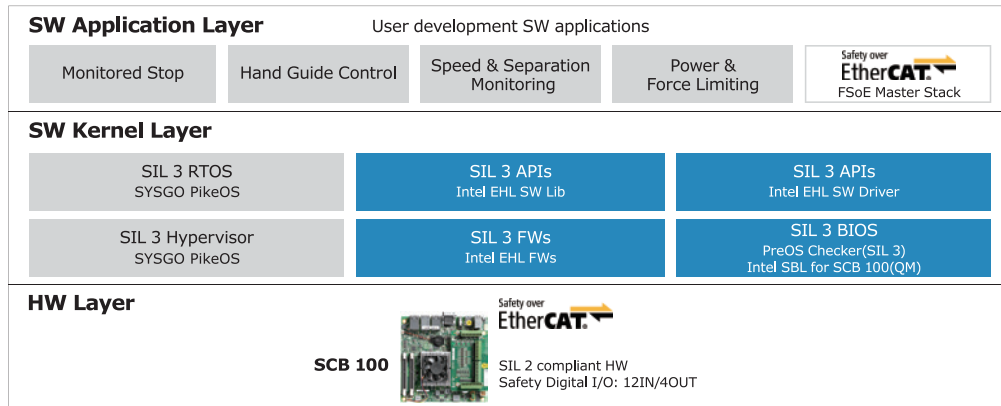 - Certification Kit for Security Common Criteria (IEC 15408)

- **Safety**
  - Safety Certification Kits are available for several markets including Industrial for IEC 61508

- No export restrictions (ITAR free)

System Architecture

www.sysgo.com

neXCOBOT   SYSGO
EMBEDDING INNOVATIONS

SW Application Layer	User development SW applications			
Monitored Stop	Hand Guide Control	Speed & Separation Monitoring	Power & Force Limiting	Safety over EtherCAT. FSoE Master Stack

SW Kernel Layer

SIL 3 RTOS SYSGO PikeOS	SIL 3 APIs Intel EHL SW Lib	SIL 3 APIs Intel EHL SW Driver
SIL 3 Hypervisor SYSGO PikeOS	SIL 3 FWs Intel EHL FWs	SIL 3 BIOS PreOS Checker(SIL 3) Intel SBL for SCB 100(QM)

HW Layer

SCB 100   Safety over EtherCAT.

SIL 2 compliant HW
Safety Digital I/O: 12IN/4OUT

BENEFITS FOR THE INDUSTRIAL MARKET

There is a new legal requirement for industrial robot coming up in end 2022 with more FuSa strict requirements. The joint solution offers a SIL 2-certifiable software and hardware platform jointly with NexCOBOT. Certification artifacts from Intel, SYSGO and NexCOBOT help reducing the time to market for industrial robot systems with a real- time dynamic Safety system. Additionally, SYSGO has achieved the Common Criterial EAL5+ certificate based on its PikeOS 5.1.3 separation kernel in 2022. This helps combining Safety and Security requirements in a modern software stack adapted to the demands of IoT 4.0 and higher.

Joint Solution:
- Combination of Intel x6000FE series Atom processors with its functional Safety island and PikeOS hard real-time OS including mixed criticality pre-integrated on SCB100
- PikeOS also offers support for hardware virtualization on Intel CPUs, which allows near native performance of guest OS (e.g. for Linux)
- Intel offers SIL 2 certification artifacts for the upper layers of its FuSa stack
- NexCobot has a pre-certified hardware available for SIL 2 requirements in the Industrial market
- SYSGO ported the lower layers of FuSa layer on PikeOS with a path to certification
- Jointly we can reduce effort and risk to certify multi-core based systems
- SYSGO offers a PikeOS BSP and RTOS with some pre-certified components

Joint Customer Values:
- Consolidate FuSa applications on Intel Atom (IA) without the burden of hardware and/or software redundancy
- Access to production-ready and FuSa capable solutions
- Quicker start in the development phase by providing software and hardware certification artifacts such as in IEC 61508 with SIL 2 for Industrial
- Easy scale across IA silicon platforms and use cases to cover the entire product portfolio
- With PikeOS, customers can start with feature development - certification can come later
- Reduced effort in the qualification and certification process for Safety and Security expertise

About NexCOBOT - NexCOBOT is committed to being your trustworthy partner in building open and modular intelligent robot control and motion control solutions. NexCOBOT provides key components for any robot systems, from industrial, collaborative application to specific task application. We have experience in robot controller for over 10 years. Our products are in-house designed by own R&D teams. Also, we provide high-quality after services with trustable FAE teams. With these core strengths, NexCOBOT aims to provide flexible open platforms for customers to get their robot system from concept to market faster! Contact us at sales@nexcobot.com

About SYSGO - Founded in 1991, SYSGO became a trusted advisor for Embedded Operating Systems and is the European leader in hypervisor-based OS technology offering worldwide product life cycle support. We are well positioned to meet customer needs in all industries and offer tailor-made solutions with highest expectations in Safety & Security. Contact us at sales@sysgo.com

www.nexcobot.com   **www.sysgo.com**