High-tech integration made easy: innovative sensor technology for mobile robots

Experience seamless development with our advanced automation technology for future-proof AGV systems and mobile robots

SICK
Sensor Intelligence.

When developing mobile robots, it is important to find solutions that are highly functional and at the same time safe and economical. SICK is constantly researching the further development of sensors that reflect the latest technological possibilities. The modularity of the building block system ensures easy integration and individualization along specific application requirements. Compliance with regulatory requirements and the highest safety standards are always ensured. This allows manufacturers of mobile robots to concentrate on their core tasks and quickly achieve precisely tailored solutions for their customers. In this product paper, we use three current product highlights to show how we deliver on these promises.

Safe 3D environment detection with safeVisionary2

Independent detection of the environment with 3D LiDAR sensor multiScan100

High productivity indoors and outdoors with outdoorScan3

New dimension for AVG developers: Safe 3D environment detection with safeVisionary2

Production and logistics processes are particularly dynamic and the need for innovative safety solutions is high. Safety laser scanners based on 2D LiDAR sensors are an essential pillar for area-based hazardous area protection. Until now, they have had difficulty meeting one central challenge in the collaborative environment of mobile robots and humans: the detection of obstacles above the scan field level. This and much more has changed with the introduction of safeVisionary2, the world's first 3D time-of-flight camera.

Performance Level (PL)	Probability of Dangerous Failure per hour (PFH0) 1/h	Available SICK solutions for Performance Level
a	≥10-5 and <1-4 0.001% to 0.01%	___
b	≥3 x 10-6 and <10-5 0.0003% to 0.001%	TiM-S
c	≥10-6 and <3 x 10-6 0.0001% to 0.0003%	scanGrid2, safeVisionary2
d	≥10-7 and <10-6 0.00001% to 0.0001%	microScan3, nanoScan3, outdoorScan3
e	≥10-8 and <10-7 0.000001% to 0.00001%	deTec

SICK has added to its TiM series to include safety-related sensors to satisfy Performance Level b with the TiM-S devices. These support mobile platforms, automated guided vehicles (AGVs), and mobile service robots.

With scanGrid2, SICK is offering an economical safety solution for small line-guided AGC's (Automated Guided Carts), the world's first LiDAR multi beam scanner with safe solid-state technology.

The microScan3 safety laser scanner provides protection for various applications: from stationary to mobile, from simple to complex.

New dimension for AGV developers: Safe 3D environment perception with safeVisionary2.

Extended scan field level

AGVs and mobile robots must avoid collisions and should increase their availability with a fast restart. safeVisionary2 brings significant improvements in both aspects. Thanks to the three-dimensional protective field, the camera also detects obstacles above the scan field level of safety laser scanners in the direction of travel and avoids corresponding collisions. For example, the system detects raised panels or the upper body and upper limbs of persons when they reach or lean over into the danger zone. This often allows safety distances to be reduced.

Safeguarding at head height

safeVisionary2 enables extended protection of the work area at head height. With robots in particular, the force-limiting mode is usually only designed for the permissible values for arms and hands, and when personnel are in the immediate vicinity, a corresponding stand-still occurs. With safeVisoinary2, this now only occurs if the sensitive head region actually moves into the working area. This leads to significantly increased safety and at the same time to improved human-robot collaboration.

Automatic restart, side guarding and precise localization.

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Fall protection

Platforms such as AGVs or mobile robots are often used in unstructured environments. safeVisionary2 not only enables the evaluation of protective and warning fields for route safety, but also the safeguarding of fall edges such as stairs and ramps.

Further advantages at a glance:

✔	**Compact**	Space-saving integration into the machine design thanks to dimensions of 70 x 80 x 77 mm.
✔	**Robust**	Solid-state technology makes safeVisionary2 shock and vibration resistant.
✔	**Simple**	Quick commissioning thanks to mounting brackets, standardized connection technology and Safety Designer software.
✔	**Configurable**	3D protective fields can be easily drawn.
✔	**Optimizable**	Real-time visualization and diagnostic functions ensure fast troubleshooting and optimization.

Services around safety and design

SICK's solutions ensure that manufacturers of mobile robots can comply with the highest safety standards. However, when designing new mobile robots, "pure technology" is often not enough. There are usually many questions surrounding safety and design, and the success of projects depends on the answers to these questions. With its SICK LifeTime Services, SICK offers comprehensive training and further education on the protection of people, machines, and plants, including application- and product-specific sensor knowledge as well as on nomenclature and guidelines. The experts are also on hand to provide advice and support when it comes to finding efficient and cost-saving design solutions for AGVs that also comply with all legal requirements. You can find the entire range of training and consulting services here.

Digital multi-talents for independent detection of the environment: 3D LiDAR sensors multiScan100

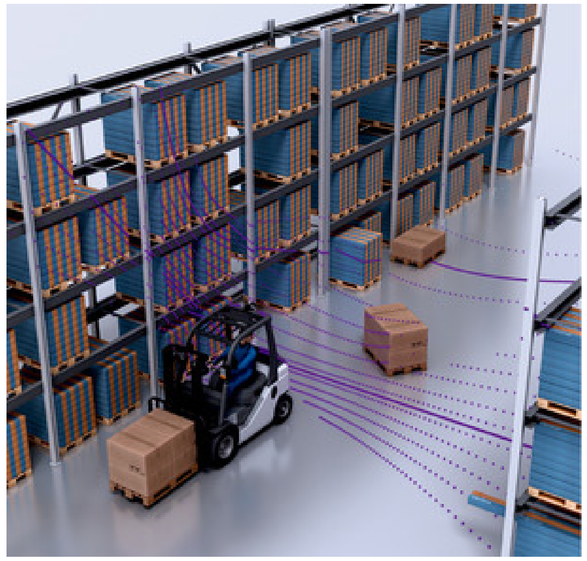
2D and 3D LiDAR sensors from SICK detect, localize, and track objects using time-of-flight measurement. They are suitable for various indoor and outdoor applications - even under extreme weather conditions - and are used here for automatic vehicle navigation, exact location determination, and reliable collision avoidance, for example in logistics centers and factories. With the 3D LiDAR sensors of the multiScan100 product family, AGV developers have access to extremely compact, precise and versatile 3D LiDAR sensors - for indoor and outdoor applications and with a focus on digital software solutions.

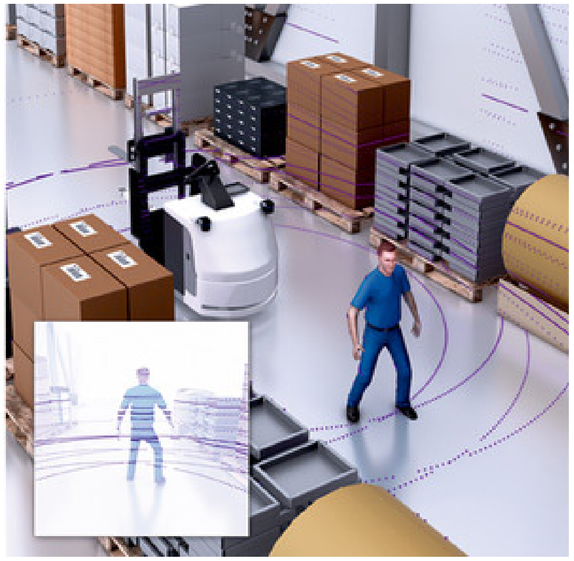
Independent navigation without instruction

With the sensors of the multiScan100 product family, mobile platforms such as AGVs or robots can independently explore new environments. The sensor creates a map that can be used for navigation and localization during production. For this purpose, it provides 3D measurement data in combination with 0° scan data for precise self-localization and simultaneous mapping of the environment via SLAM (Simultaneous Localization and Mapping). The 3D point wave can also be used to detect fall edges and even overhanging obstacles.

Highly precise and ultra-compact

The multiScan136 version provides a 360° all-round view with 16 scanning systems and maximum precision thanks to up to 690,000 measuring points. At the same time, the sensor can be used in a space-saving manner with a compact design of approx. 10 cm and offers a high degree of integration friendliness thanks to industrial interfaces.





Versatile use

Thanks to their rugged design and an IP protection class of up to 69k, multiScan100 sensors are also suitable for particularly harsh environments. This is also ensured by the multi-echo technology, a statistical measurement method as well as particle and fog filters, which enable effortless environment detection even under difficult conditions in outdoor areas. With a horizontal 360° aperture angle and a vertical 65° aperture angle, all objects are reliably detected.

Modular and digital

Thanks to a modular software system, the sensors can be adapted to specific applications. Software functions include filters, multi-echo and reflector detection. The SOPAS software also enables AGV manufacturers to store predefined parameters or configurations at the time of ordering, thus speeding up commissioning.

High productivity indoors and outdoors with outdoorScan3

Demanding weather conditions make the use of automation solutions difficult, especially when a combined indoor and outdoor application is planned. With the outdoorScan3 safety laser scanner, SICK offers sensors that have been developed for precisely these challenges and enable safe cooperation between man and machine. Certification based on the ISO 13849-1 standard as well as IEC 62998 specifically for outdoor applications provides developers with a safe solution for personnel protection for a wide range of applications.

High availability in any weather

outdoorScan3 uses intelligent algorithms and patented safeHDDM® technology to ensure high AGV productivity even in adverse weather conditions. A key advantage of safeHDDM® is its ability to distinguish between real safety risks and disruptive environmental influences. outdoorScan3 operates reliably in sunlight up to 40,000 lx, filters snow and rain by providing accurate measurement data, and stops at fog visibility distances below 50 m.

Accessories for the outdoor area

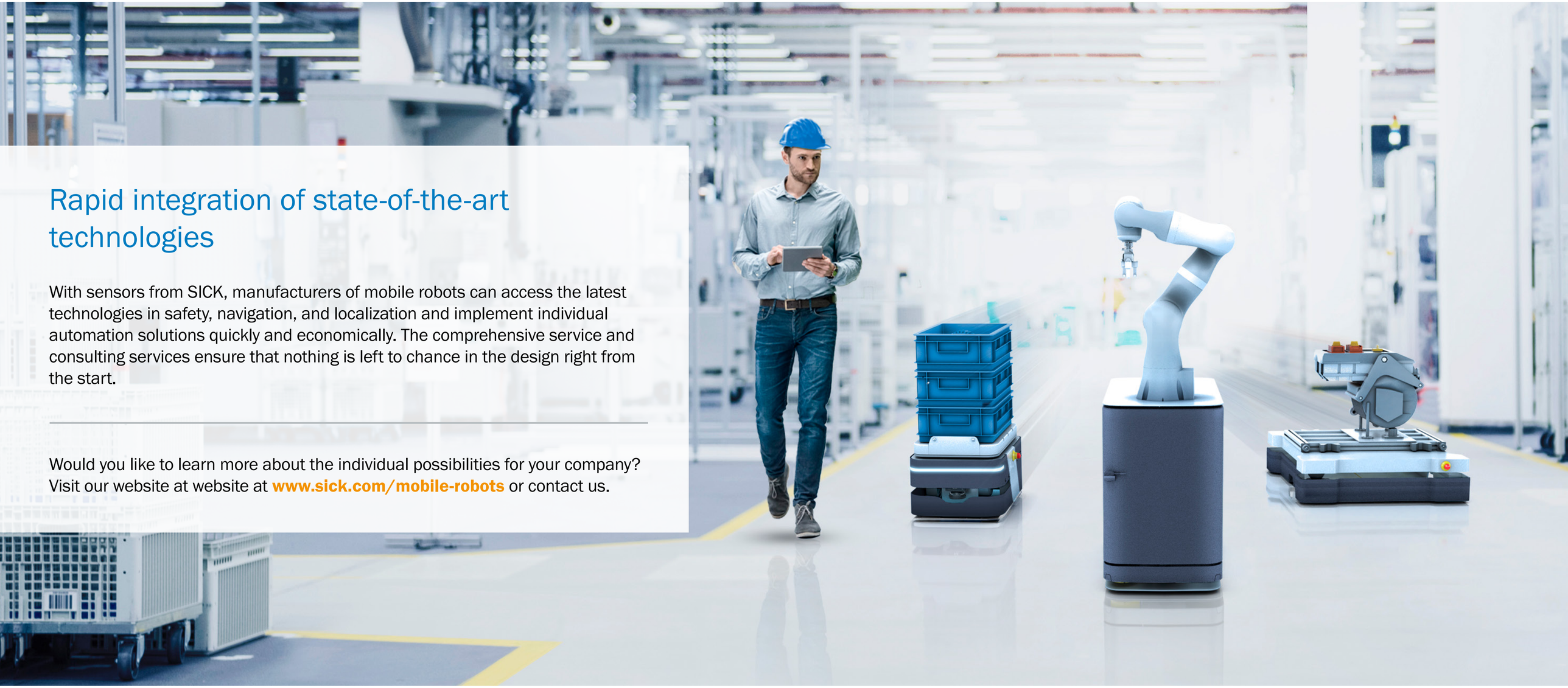
An AirWiper mounted on the safety laser scanner uses air pressure to remove water droplets from the optics hood, increasing availability in rainy weather. In addition, a splash guard with special foam insert and protective hood reduces undesirable downtimes in wet conditions. Appropriate fastening technology ensures smooth interaction of the accessory components and fast integration into the corresponding application solution.

Module for weather-dependent speed

With the AGV Dynamic Weather Assist function module, AGV developers can also ensure that the vehicle reacts to changing weather conditions at an appropriate speed. In this way, the AGV continues to drive at a reduced speed even during heavy precipitation. This ensures reliable material flow even in changing weather. The reduction in unwanted emergency braking also reduces wear. In addition to the outdoorScan3, the system consists of the Flexi Soft safety controller and a matching software module.

Robust design, smart connection, intuitive operation

Suitable for outdoor use, outdoorScan3 has a particularly robust housing. Smart connection technology, the intuitive Safety Designer configuration software and extended diagnostic functions make it particularly easy to use and enable comprehensive application optimization. outdoorScan3 also facilitates operation with clearly visible LEDs and a multicolor display. The 128 freely configurable protective fields can be easily adapted for safe automation processes.



Rapid integration of state-of-the-art technologies

With sensors from SICK, manufacturers of mobile robots can access the latest technologies in safety, navigation, and localization and implement individual automation solutions quickly and economically. The comprehensive service and consulting services ensure that nothing is left to chance in the design right from the start.

Would you like to learn more about the individual possibilities for your company? Visit our website at website at **www.sick.com/mobile-robots** or contact us.