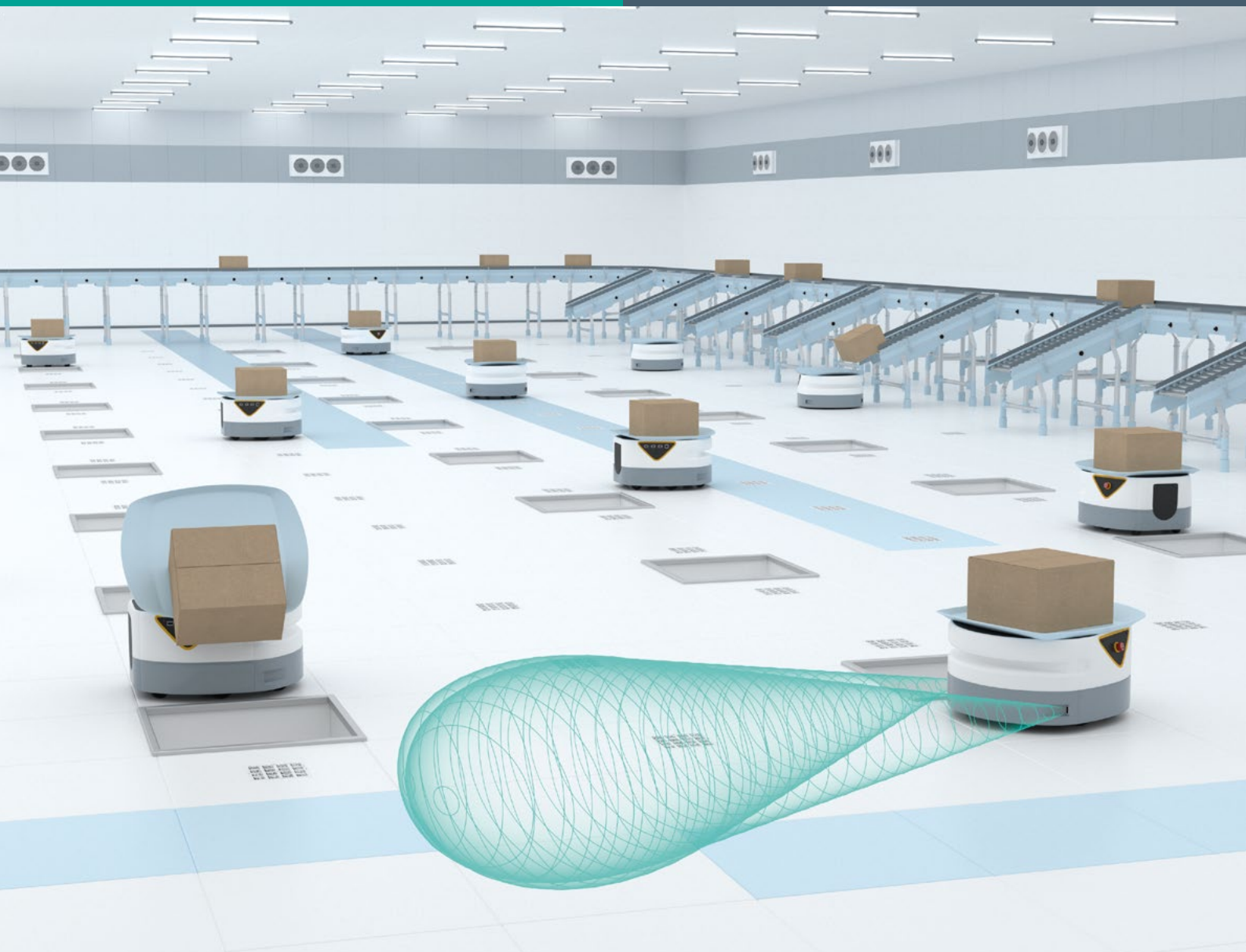


Travel Path Control for Autonomous Transport Bots in Logistics Centers

Compact USi-industry Ultrasonic Sensor System Ensures Reliable Collision Protection

At a Glance

- Reliable detection of all objects and contours in the extensive elliptical sensing range
- Detection regardless of surface properties, contours, and materials
- Insensitive to dirt and visual effects
- One evaluation unit for two ultrasonic transducers
- Compact design enables flexible mounting

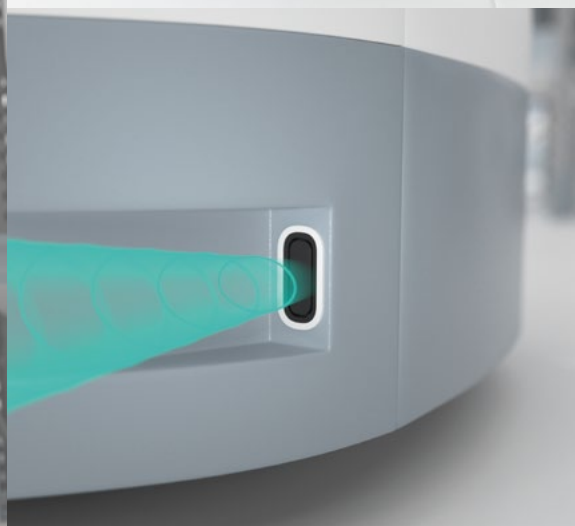


The Application

In logistics centers, shipping packages are picked for individual orders. The same process takes place in warehouses in the manufacturing industry, where transport containers are loaded to meet requirements for product supply. In modern plants, the finished packages or trays are then individually transported to the next station by autonomous mobile robots (AMRs). In large warehouses and shipping centers, hundreds of these bots—which are usually quite small—can be on the move at the same time. The quicker they can travel and the shorter the transport cycle, the greater the throughput and efficiency of the processes. In an ideal situation, the vehicles can move at full speed and only a few centimeters apart.

The Goal

The bots must not collide with one another or with other objects, meaning their travel paths must be monitored in real time. The sensors required for this must be as small as possible so that they can be accommodated even in very confined spaces, and their function must not be affected by external influences such as dust, dirt, and moisture.



The Solution

The USi-industry ultrasonic sensor system has a three-dimensional sensing range in which it detects all objects reliably and without contact. The contours of the objects, the material, and the optical properties have no influence on the signal-generating sound waves. Similarly, the function of the sensor is not affected by dust, dirt, vapors, or moisture. The ultrasonic transducers—the sensor units of the system—are very small, decoupled from the evaluation unit, and can be mounted anywhere in the bot with minimal space requirements. Their elliptical sound field, with an opening angle of $\pm 17^\circ$ and $\pm 5^\circ$, monitors an extensive area in the travel path for obstacles during transport.

The Benefits

Up to two ultrasonic transducers with their own channels can be connected to the USi-industry evaluation unit, which reduces investment costs. The transducers can be parameterized differently via PACTware with two switchable parameter sets each (e.g., for distance, evaluation, outputs). This means, for example, that one parameter set is available in the application for high-speed transport and a second set is available for reduced speeds, which can be switched depending on the situation.

Automatic interference echo suppression allows the USi-industry system to be used in encounters with other bots. A physical connection between the systems is therefore unnecessary. In teach-in mode, the function of the USi-industry system is adapted to the environment. This also allows defined reference points—for example, fixed machine parts in the sensing range—to be taught in so that the system can be checked for functionality or tampering.

Technical Features

- Sensing range: up to 2500 mm
- Degree of protection: ultrasonic transducer (IP69), evaluation unit (IP65)
- Operating temperature: -30°C ... $+70^\circ\text{C}$
- Operating voltage: 9 V DC ... 30 V DC
- Compact dimensions (ultrasonic transducer $27 \times 13 \times 21$ mm, evaluation unit $98 \times 77 \times 35$ mm)
- Elliptical sound field (opening angle of $\pm 17^\circ$ and $\pm 5^\circ$)

