Rugged Collision Protection for Cleaning Robots

Ultrasonic Sensors Work in All Conditions and on All Surfaces

At a Glance

- Function is not impacted by dirt or environmental influences
- Reliable detection regardless of surface structure and optical properties of obstacles
- Complete protection field in the direction of travel with minimal dead band
- Compact and rugged design
- Easy and flexible mounting

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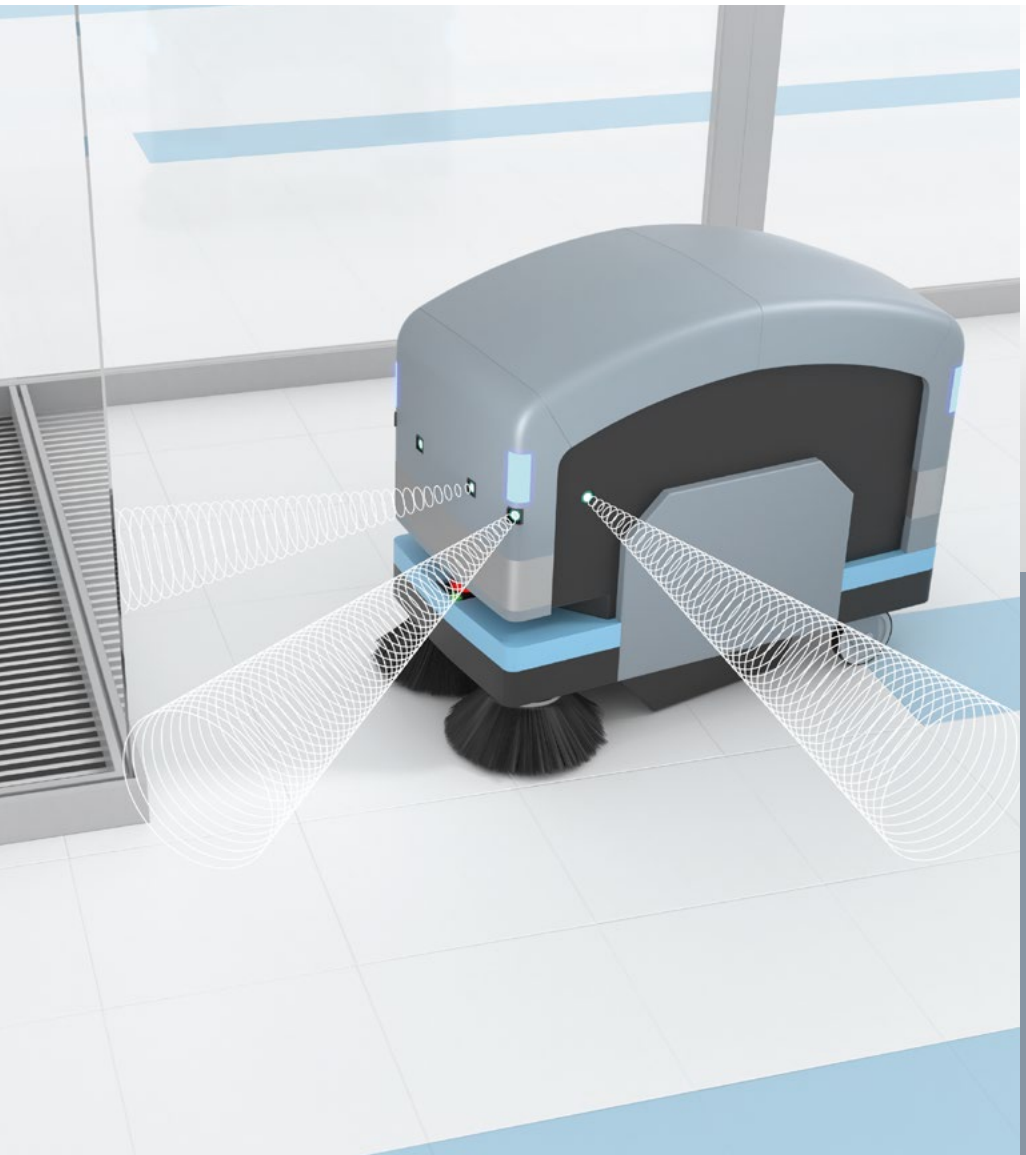
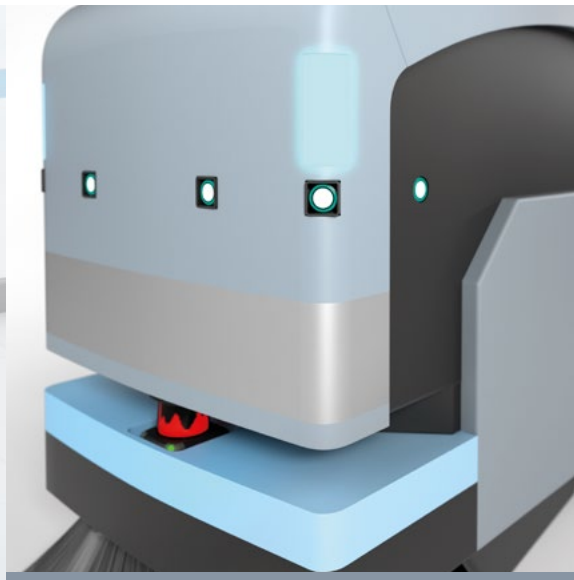
The Application

Self-driving cleaning robots are increasingly being used in office buildings and shopping centers. After closing time, they move in a defined grid pattern over the floor areas to be cleaned. Obstacles are automatically detected and circumvented. However, some obstacles present a challenge for detection. For example, glass doors and walls are difficult for optical sensors to see. Shiny and very dark surfaces can also be difficult to detect.

The Goal

The cleaning robots must never collide with obstacles, so even transparent surfaces must be detected. The sensor used for collision protection must not only reliably detect the obstacles, but also output the corresponding signal quickly enough that the self-driving robot can brake or change direction in time. A complete protection field in the direction of travel with a minimal dead band is required. If multiple sensors are used to establish this protective field, they must not interfere with each other.





The Solution

Ultrasonic sensors such as the 30GM and L2 series detect objects regardless of their optical properties. They reliably detect transparent, reflective, and irregular surfaces, as well as surfaces where the color could be a problem. Detection is not affected by the material or the structure of the obstacles. The devices are compact; there is easily enough space for several sensors even on smaller cleaning robots. Depending on the size of the front of the vehicle, the sound cones of one or more sensors can set up a complete protective field. The devices are automatically synchronized so they do not interfere with each other's functioning. The dimension of the sound cone can be parameterized.

The Benefits

Ultrasonic sensors are designed to be extremely rugged and reliable. Obstacle detection by ultrasonic sensors not only works independently of the obstacle's surface structure, but is also unaffected by dirt build-up or the environmental and weather conditions. They can therefore be used outdoors as well as indoors. Installation and parameterization are easy to carry out. Synchronizing multiple sensors establishes a continuous sound field in front of the cleaning robot. The devices meet all quality requirements with regard to object detection and EMC resistance.

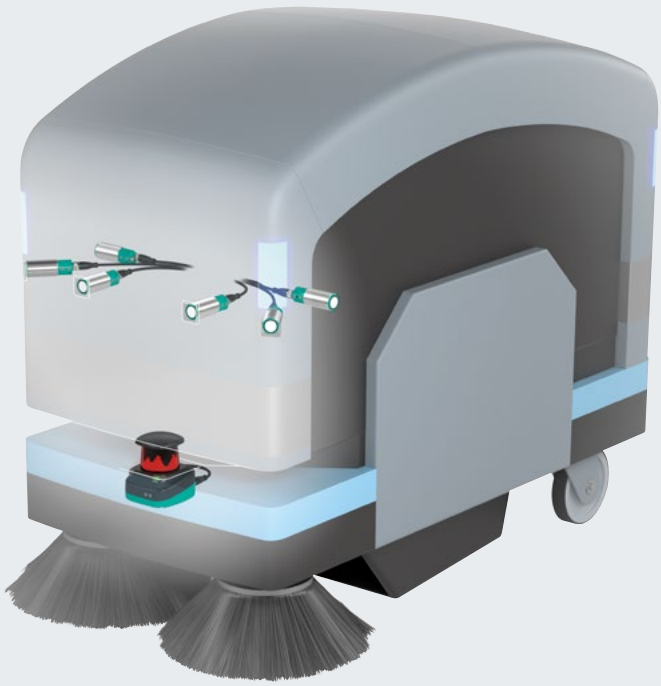
Technical Features

30GM Series

- Sensing principle: diffuse mode sensor
- Sensing range: max. 6000 mm
- Operating voltage: 10 V DC to 30 V DC
- Type of output: 1 switching output (PNP or NPN)
- Synchronizable
- IP65 degree of protection

L2 Series

- Sensing principle: diffuse mode sensor
- Sensing range: max. 4000 mm
- Operating voltage: 10 V DC to 30 V DC/ 12 V DC to 30 V DC (with analog voltage output)
- Type of output: 1 switching output (PNP or NPN)/ 2 switching outputs (both PNP or both NPN)/ 1 analog output (current or voltage)
- Synchronizable
- IP67 degree of protection



For more information, visit: **pepperl-fuchs.com/px-ultrasonic-sensors**