Collision Avoidance of AGVs in All Weather Conditions

Radar Sensor with Integrated CAN Interface for Driverless Transport Vehicles

At a Glance

- Integrated CAN interface

- Performance level c (PL c)

- Collision avoidance of AGVs to the front and rear (optionally to the side)

- Radar technology is particularly suitable for difficult weather conditions

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The Application

In the chemical industry, automated guided vehicles (AGVs) are used in many places on company premises. However, the routes are also used by other vehicles. If the AGVs are moving in unclear terrain in all weather conditions, it must always be ensured that they avoid collisions with other vehicles or objects that may be in their path of travel on all relevant sides.

The Goal

The vehicle must be stopped safely before an imminent collision and, if necessary, a route correction must be carried out. To make this possible, sensors must monitor the route at a great distance. If an obstacle is detected, the sensor transmits a corresponding signal to the control unit and the AGV is decelerated.

In addition, the sensor technology used must guarantee object detection in adverse environments. In the chemical industry, steam often rises from the wastewater system. Despite this steam, objects must be detected so that the AGV can avoid a collision. Such external conditions pose a challenge for photoelectric sensors, which can easily be circumvented with radar technology. Radar sensors can withstand challenging weather conditions and function reliably in the presence of dirt, moisture, fog, or other interference.

Depending on the hazardous situation, the safety system must meet a certain performance level (PL) or safety integrity level (SIL). This requires absolutely reliable detection or distance measurement in the relevant area. The application should therefore achieve a performance level c (PL c).
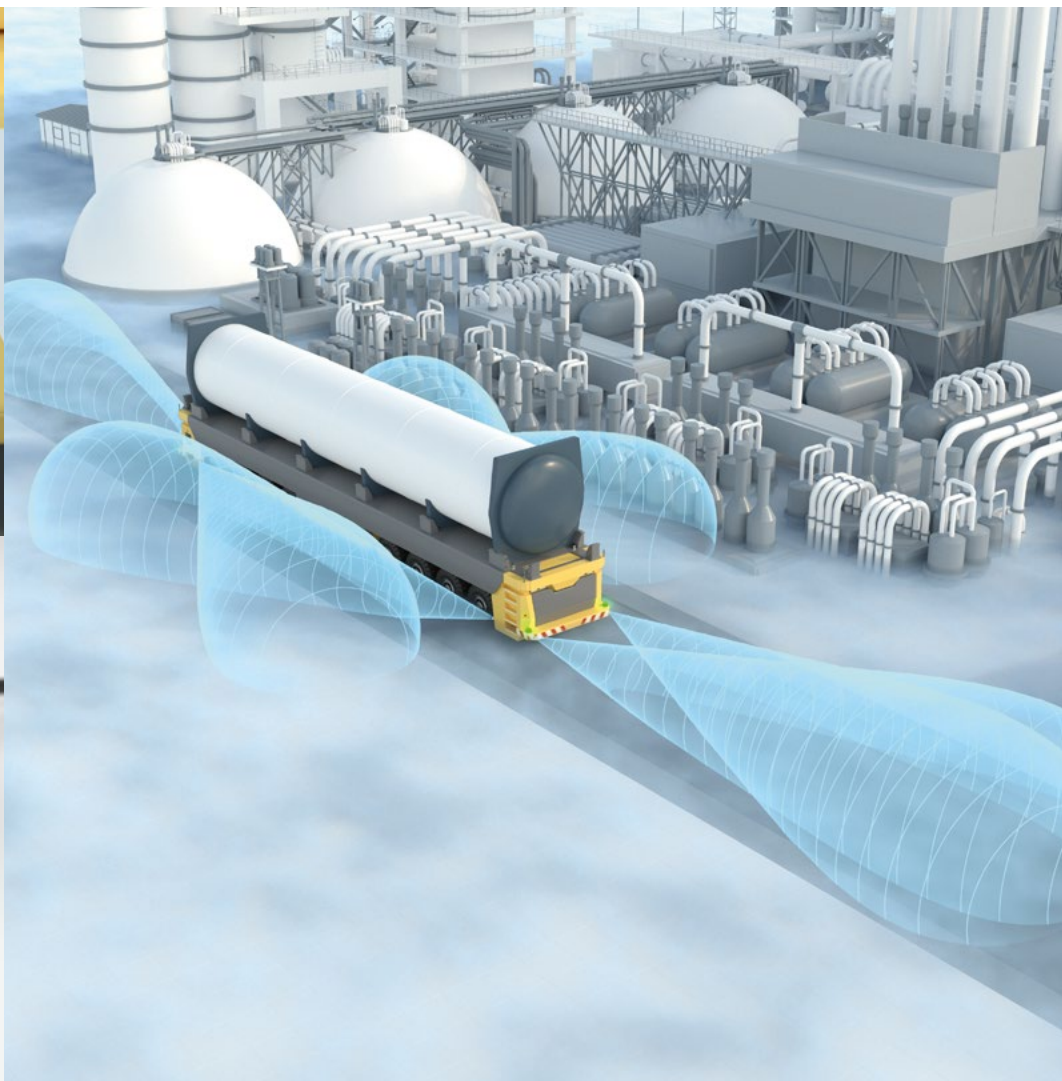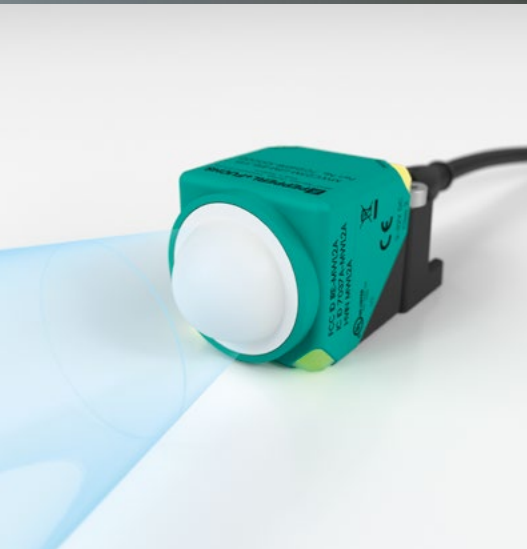
The Solution

Frequency-Modulated Continuous Wave (FMCW) radar sensors are perfectly suited to ensure optimum monitoring of the main driving directions even under these harsh environmental conditions. Regardless of the weather or other external influences, the MWC25M-L2M-* series sensors reliably measure natural objects and accordingly detect potential collisions in advance.

The sensing range can be adapted to the surroundings due to foreground and background suppression. Depending on the application, it is also possible to switch between a total of three measurement modes. The "first object" mode is used for collision avoidance in AGVs, in which the object closest to the sensor is always detected. With its high sampling rate of up to 200 Hz, the distance to objects in the field of view (FOV) and their relative speed can be reliably measured.

Depending on the required performance or safety integrity level, the radar sensors from the MWC*-L2M-B16 series can be used in a single or redundant configuration. A customized safety concept in combination with a diagnostics-capable controller confirms the suitability of the sensors for safety-relevant applications and makes it easier for the user to provide the corresponding proof.

The Benefits

The integrated CAN interface of the series allows easy integration into the CANopen bus system of the vehicle. In addition, status information about the sensor is made available, e. g. the "producer heartbeat" and the validity of the measured distance value. This data can be used in a safe control system to check whether the sensor is working correctly. This makes it possible to achieve a performance level c (PL c) Category 2 and therefore to solve the application safely, even for retrofitting. Parameterization is easy via the CANopen parameterization software and PACTware DTM.

Technical Features

- Measuring range: 0.5–25 m
- Working frequency: 122.25 … 123 GHz
- Degree of protection: IP68/IP69
- Dead band: 0–0.5 m
- Temperature range: –40 °C … +70 °C
- Extended EMC, comparable to
  E1 level and pulses

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