ANTI-COLLISION SYSTEM

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The anti-collision system (ACS) is designed as a complement to the tram control system (TCMS), with which it is connected via ETH communication lines.

The ACS needs odometry data, GNSS data and HD map for its operation. It receives information about obstacles from a sensor set consisting of a LiDAR, and camera. Interfacing with the tram control system and driver display is required. In the first version, the system is delivered in CWNB (Collision Warning No-Braking) configuration then it will be possible to upgrade to CWAB active braking configuration by software change.

The ACS functionality is based on a video camera and LiDAR. LiDAR works on the principle of emitting laser infrared beams to scan the surrounding area in horizontal and vertical directions.

The range depends on the size of the obstacle. For large obstacles (cars), the range of the beams is normally at least 100 metres.

For smaller objects, such as a person, system can detect an obstacle up to 50 meters. The camera is primarily used for its ability to provide much greater image resolution and colour depth.

The anti-collision system uses an HD three-dimensional map of the track surroundings, which contains an accurate geometric description of the route onto which a virtual tunnel is projected, which then helps with the prediction of colliding objects. Another functionality for which the ACS uses the HD map is vehicle localization on the track.

KEY FEATURES

- Precise vehicle positioning in the city thanks to LiDAR-based mapping even in tunnels
- Low false alarm rate
- Continuous evaluation of the driving profile with prediction of object direction and movement within it
- Detection of all objects regardless of their type or category
- Precise visual localisation based on HD maps, GNSS, IMU unit, and odometry
- Flexible braking strategy – working with all types of brakes based on customer requirements → Increased comfort for passengers