IXPERTA

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Research project:
Detection Unit for Railway Vehicles
Reliable Detection of Obstacles on Railway Tracks

Our innovative detection unit for railway vehicles brings a new aspect to railway safety with advanced obstacle detection technology. It monitors the track within a train's driving profile and alerts the driver if an obstacle is detected. Serving as an assistance interface for train drivers, this unit significantly improves operational safety. A functional prototype was developed during a research project partially funded by TAČR (Technologická agentura ČR).

Key features of the product or service:

The detection unit can recognize the size of obstacles, measure the distance to obstacles, classify obstacles into defined categories (such as human, vehicle, animal etc.), determine the danger level of obstacles by categorizing them into red and yellow zones based on their distance from the center of the tracks, calculate the detection confidence, and detect signals from railway signals.

The functional unit can detect obstacles:

- with dimensions up to 50 x 50 x 50 cm
- at a distance of 200 - 500 meters (depending on the size of the object)
- both day and night
- at tested speeds up to 90 km/h (not yet tested on faster tracks)
- with an accuracy of approximately 97%

Key features

Implementing the product in real-world railway operations can lead to significant improvements in both safety and efficiency. Moreover, the detection unit has the potential to play a crucial role in the future development of autonomous rail transport. By accurately identifying and assessing obstacles, the unit can contribute to the safe and reliable operation of driverless trains. This would not only increase the safety of rail networks but also reduce operational costs and improve the consistency and reliability of train schedules.

Technical specifications and product details

The functional prototype of the obstacle detection system consists of a combination of optical cameras, lidars (for measuring the size of obstacles and determining their distance), thermal cameras (for detecting living objects even in poor visibility), and the necessary computing power. The outputs from the sensors are processed by a specially designed neural network. This neural network is trained to recognize only dangerous obstacles and does not classify non-threatening objects, such as flying newspapers or birds, as threats.

Reference

https://starfos.tacr.cz/en/projekty/FW01010274

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