Implementation of an obstacle detection system in an autonomous model train

Current state:

While fully automated driving in rail vehicles has been the state of the art for decades, autonomous driving is the subject of current research for application areas in which the operation mode is driving on sight (e.g. inner-city trams, in-house shunting). For this purpose, a test vehicle in the form of a model railway vehicle (scale 1:24) was built at the IFS.

Within the scope of this work, the software of the test vehicle is to be extended by an intelligent evaluation of the sensor data (TOF camera, ultrasound). The evaluation includes an image recognition by means of OpenCV and possibly sensor fusion. Afterwards, the test vehicle should be able to decide independently whether a situation poses a danger and whether emergency braking must be initiated.

Possible content:

- Literature research on approaches to environmental monitoring in rail transport
- Familiarization with the functionality of the test vehicle
- Image processing of the TOF camera, e.g., by means of OpenCV
- Sensor fusion with depth data of the TOF camera and ultrasonic sensors
- Possible adaptations of the hardware
- Documentation

Other notes:

- An independent and methodical approach to work is required
- Content and scope can be coordinated

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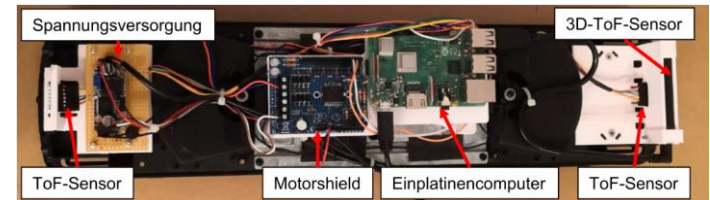
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