Development of customize techniques to improve Level Crossings

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Motivation

The Institute of Transportation Systems (ITS) of the German Aerospace Center (DLR) in Braunschweig investigates the situation of secondary railway lines. In particular, technical and operational solutions, which result in cost reducing improvements for the operating companies, will be analyzed.

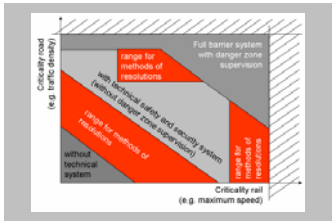

Fig 1: Range for methods of resolution for customize technique

Fig 2: Dangerous situations at LC

One approach to improve the safety systems by an economical way is found in the adoption of imaging methods at level crossings (LC). A high number of LC exists today without any obstacle detection at the danger zone. The ITS identified that the missing of a danger zone supervision at half barrier LC is one of the root causes of most accidents. With this knowledge what the root causes are, we are able to eliminate these things by interposing new technologies. Therefore the ITS investigates the options for technical realized vacancy detection for the danger zone of LC besides full barriers, by means of imaging methods in combination with operational rules.

Functionality

1. Permanently train side localization via GNSS
2. Activating the LC safety system by wireless transmission
3. Starting the safety system
   a) Activating the flash lights, b) Activating the imaging based system, c) Closing the barriers
4. Obstacle detection while closing the barriers
   a) If there is an obstacle between the barriers, the signal ÜS will not be activated an the train has to stop, b) If no obstacle between the barriers, activating of the signal ÜS
5. Obstacle detection after closing the barrier → the train will be stopped automatically
6. When end of train is detected, the LC safety system switch off

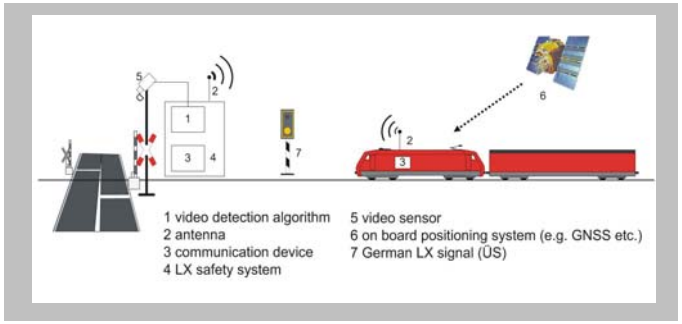

Fig. 3: Layout of the customize technique at AHB

Cost-Benefit Analysis

No.	Benefit	Cost-reduction	Cost
1	Minimization of cable	Cost for Cables	One set of imaging and communication technology
2	No track side sensors	Cost for Cables and Sensors	
3	Optimized activation time	Waiting time reduction for road traffic	
4	Detection of road traffic users between the barriers	Reduction of no. and severity of accidents (incl. GNP loss)	
5	ÜS with obstacle detection	Cheaper technology for danger zone supervision	
6	Minimization the severity of accident	Reduction of no. and severity of accidents	
7	End of train detection → de-activating LX	Cost for cables and Sensors	

Fig. 4: Example of a cost-benefit-analysis

Outlook

The ITS of the DLR building up a demonstration unit to analyze the alternatives in realizing technical protection of level crossings in economical efficient ways without reducing the safety. To show the possibilities of such a technology, the ITS will realize all the upon shown functionalities and further applications, as we will identify during the demonstrations. First field test are done.

Fig. 5: First field tests

Fig. 6: LC for the demonstration unit

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