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Maneuver Movements' Safety Increase Using Maneuver Locomotive Identification and Distance Control

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Abstract

In the article considered different safety support systems to control railway transport movements. Are analyzed some systems working algorithms, especially ERTMS and ITARUS-ATC systems. Considering the above-mentioned systems functionality, a special attention made to use existing algorithms to make maneuvers. Maneuver movements specification, which are conditioned with shunt sections and paths high concentration, led the authors of article seek for a new approaches and algorithms, to control maneuver locomotives. In the article is proposed maneuver locomotives identification and distance control, using RFID technologies passive sensors.

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1. Introduction

An algorithm is a procedure or formula for solving a problem. In mathematics and computer science, an algorithm usually means a small procedure that solves a recurrent problem.

In the article will be some examples of existing algorithms and new proposed, which is based on the RFID technology.

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2. ERTMS LEVEL 2

The European Rail Traffic Management System (ERTMS) is a major industrial project developed by a number of major manufacturers in close cooperation with the European Union, railway stakeholders and the GSM-R industry¹.

ERTMS has two basic components:

- ETCS, the European Train Control System, is an automatic train protection system (ATP) to replace the existing national ATP-systems
- GSM-R, a radio system for providing voice and data communication between the track and the train, based on standard GSM using frequencies specifically reserved for rail application with certain specific and advanced functions

The main advantages of the ERTMS system are safety and interoperability. In addition, Level 2 allows trains to operate at a higher commercial speed, thus improving a train's capacity on the network. ERTMS Level 1 and Level 2 reduce investments costs for cross-border traffic locomotives, as well as the transit time interval, and facilitate the authorization process. The communication between the tracks and the train mainly based on an interlocking structure, which uses ETCS to transmit information. The disadvantages reside in the fact that, in case of high traffic density (railway hubs), the GSM-R capacity may not be sufficient. Another disadvantage is that rail infrastructure managers, who already own a high capacity, will not obtain many benefits with the introduction of ETCS.

Level 2 (see Fig. 1) requires a modern signaling infrastructure. As for the data transmission, level 2 is based on the signaling system and the movements of the train are constantly monitored through the so-called block centre radio. Level 2 constantly monitors the speed of the train, the correct route, the direction of the vehicle and the operating instructions. ETCS Level 2 – the installation of a radio network and RBC. It depends on the infrastructure and on the Level which it can support, considering the number of trains/hour, the maximum speed etc. Also, the transition from one Level to another can easily be done.

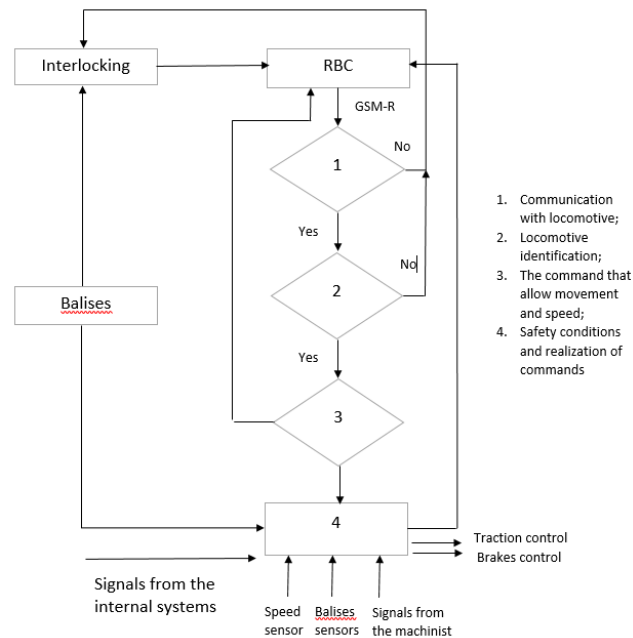


Fig. 1. ERTMS Level 2 algorithm.

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