

Integrated safety functions in the automatic transport system of Oeiras

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Abstract

The Automatic Transport System of Oeiras (SATU-Oeiras) is a public transport system in operation since 2004, which has innovative features on both technology and environmental aspects. The present paper is focused mainly in the safety and security related aspects of this automatic transportation system. A general description of the system will be presented, covering both the transport system itself and the associated buildings, along with the fundamental design and development steps and the supervision of special entities. The essential safety and security related subsystems are analysed, as well as their integration in a supervisory context, not forgetting the human factors involved in safety and security functions. Some conclusions are drawn relatively to the system design and development and the real experience of the whole system in operation.

KEYWORDS:

SATU – Sistema Automático de Transporte Urbano (Company's name acronym), LNEC – Laboratório Nacional de Engenharia Civil (Independent entity), ATP – automatic train protection, cable traction, electromagnetic cable control, HMI – human-machine interface.

1. Introduction and general description

The Automatic Transport System of Oeiras (SATU-Oeiras) is a cable traction transportation system, presently with about 1.2 km of extension in a steep trajectory, in operation between a railway station (Paço de Arcos) and a business and tertiary zone (Forum station), with an intermediary station (Tapada), connecting important residential zones and, thus, providing a social service. The existing system is the first phase of a future goal of connecting two main railway lines – Sintra and Cascais. It has an innovative nature on both technology and environmental aspects, being environmentally clean, safe, secure, comfortable, with total accessibility, functional and reliable. This paper is mainly focused on the safety and security aspects of this automatic transportation system.

The infrastructure of SATU-Oeiras consists of elevated viaducts connecting station buildings, as shown in fig. 1; the indicated slope of 12 % dictated the option for a cable traction system. Presently there are three stations and two viaducts. The vehicles are guided in a railway track and moved by cable loops driven from a ground based motorization in the terminal station of Navegantes (Paço de Arcos). Each station is provided with access control doors, ticketing equipment, permitting a totally closed transport system, increasing the safety and security of passengers and reducing the fraud. The boarding platforms to access the vehicles have glass