Intelligent Railway Infrastructure: Current developments and future trends

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Abstract

In the field of Intelligent Railway Infrastructures, we face (among others) three major challenges: how railway infrastructures can perceive their condition, how they can make optimal and timely decisions, and how they can keep learning to improve their performance over time systematically. In this presentation, we will show current trends on how the railway infrastructure can be treated as a living being that needs intelligent methodologies to develop its digital brain. The research in this field is inherently multidisciplinary, and it is in the interface between railway engineering and different research areas such as computational intelligence (neural networks, fuzzy logic, and evolutionary computation), structural health monitoring, maintenance of engineering structures, control of railway systems, asset management of transportation infrastructures, big data, optimization, among others. Finally, preliminar findings on current developments and future trends will be discussed.

Biography

Alfredo Núñez is an Associate Professor in Intelligent Railway infrastructure at the Delft University of Technology in The Netherlands. Dr. Núñez received a Ph.D. in Electrical Engineering from the University of Chile in 2010, was a postdoctoral researcher with the Delft Center for Systems and Control, and has been a visiting scholar at universities in Slovenia, Italy, Spain, Chile, Colombia, China, and the USA. Dr. Núñez has published over a hundred international journal and international conference papers in the field of intelligent transportation systems, including the fields of intelligent railway infrastructure, railway engineering, computational intelligence (neural networks, fuzzy logic, and evolutionary computation), structural health monitoring, maintenance of engineering structures, control of railway systems, asset management of transportation infrastructures, big data, and optimization. The research of Dr. Núñez has been funded by the Dutch Research Council, the Dutch Railway Infrastructure Manager (ProRail), and various other sources, including European projects such as NeTIRail-INFRA and In2Track3, for which Dr. Núñez was task leader in the development of wayside, onboard and crowd-based railway measurements technologies, and railway track simulations, monitoring and maintenance. Dr. Núñez belongs to the Editorial Board of the journals IEEE Transactions on Intelligent Transportation Systems - IEEE (Associate Editor), Applied Soft Computing - Elsevier

(Editorial Board Member) and Intelligent Transportation Infrastructure - Oxford Academic (Editorial Board Member), has been guest editor of two special issues in the journal Wear - Elsevier (CM2018 and CM2022), and guest editor for other journals.