

LITERATURE SURVEY

SMART SOLUTION FOR RAILWAYS

S.NO	PAPER	AUTHOR	YEAR	METHOD AND ALGORITHM
1	5G Key Technologies for Smart Railways	<i>Bo Ai; Andreas F. Molisch; Markus Rupp; Zhang-Dui Zhong</i>	2020	Fifth-generation (5G) technologies could be a promising solution to dealing with the design challenges on high reliability and high throughput for HSR communications. Based on our in-depth analysis of smart rail traffic services and communication scenarios, we propose a network slicing architecture for a 5G-based HSR system. With a ray tracing-based analysis of radio wave propagation characteristics and channel models for millimeter wave bands in railway scenarios, we draw important conclusions with regard to appropriate operating frequency bands for HSRs. Specifically, we have identified significant 5G-based key technologies for HSRs, such as spatial modulation, fast channel estimation, cell-free massive multiple-input-multiple-output (MIMO), mmWave, efficient beamforming, wireless backhaul, ultrareliable low latency communications, and enhanced handover strategies. Based on these technologies, we have developed a complete framework of 5G technologies for smart railways and pointed out exciting future research directions.
2	Towards the Internet of Smart Trains	<u>Paula Fraaga-Lamas</u>	2022	Advantages of the latest generation of broadband communication systems (e.g., LTE, 5G, IEEE 802.11ad) and the emergence of Wireless Sensor Networks (WSNs) for the railway environment are also explained together with the strategic roadmap to ensure a smooth migration from GSM-R. Furthermore, this survey focuses on providing a holistic approach, identifying scenarios and architectures where railways could leverage better commercial IIoT capabilities. After reviewing the main industrial developments, short and medium-term IIoT-enabled services for smart railways are evaluated. Then, it is analyzed the latest research on predictive maintenance, smart infrastructure, advanced monitoring of assets, video surveillance systems, railway operations, Passenger and Freight Information Systems (PIS/FIS), train control systems, safety assurance, signaling systems, cyber security and energy efficiency. Overall, it can be stated that the aim of this article is to provide a detailed examination of the state-of-the-art of different technologies and services that will revolutionize the railway industry and will allow for confronting today challenges

3	<i>Smart Railways: A Charging Strategy for Railway Towards Energy Storage Systems</i>	Vítor A. Morais,, João L. Afonso, António P. Martins	2020	The huge power requirements of future railways require the usage of energy-efficient strategies towards amore intelligent railway system. The usage of on-board energy storage systems enables better usage of the traction energy with a higher degree of freedom. In this article is proposed a top-level charging controller forthe on-board and wayside railway energy storage systems. Its structure comprehends two processing levels: a real-time fuzzy logic controller for each energy storage system, and a genetic algorithm meta-heuristic, that remotely and automatically tune the fuzzy rules weight. As global results, the reduction of regenerated energy is 22.3% with the fuzzy logic controller. With the optimization strategy, this reduction can be further extendedto 28.7%. The need for a smart railway framework is also discussed towards a realistic implementation of such charging strategy. Thus, with a high degree of flexibility, the efficiency of railway energy systems can be increased with the proposed framework.
4	Smart Phone & IoT-Based Intellectual Messaging of Platform Details in Railways	J.DHIVYA ROSE	2022	Indian Railways provide many useful services to its passengers like ticketing, PNR status checking, and train status. The intension of our work is to provide an additional service to India's biggest railway transportation network. The work contributes in the use of IoT along with other technologies like the RFID tags and QR. The RFID tags that are attached to every train by the transportation department acts as a transmitter. Each station has a receiver RFID tag that receives the signals of the passing and halting trains and sends it further to the microcontroller. In addition, IR sensors are used to identify the platform number. Along with the RFID signals, IR sensors also sense the interrupt signal and send this signal to the microcontroller. This controller processes the received signals and identifies the platform in which the train arrives. technology or the QR technology could be used to alert the commuter through a message who has logged in to the application with the handheld device. In addition, the coach position and the nearest entry gate to reach the platform is also communicated in advance before the train reaches the railway station.
5	<i>Smart Rail for Smart Mobility</i>	RUI CRUZ	2018	Urban mobility is facing significant challenges nowadays; several factors affect the way people move, mainly but not only, within cities and large metropolitan areas. These factors are usually related to the way of life and mobility needs of the human being, leading to social constraints and environmental issues, overcrowding the undersized transportation networks and infrastructures. The pressure for better planning, improved sustainability and governance on transportation is therefore higher, with a shift in focus to technological changes in order to improve policies for all stakeholders involved on mobility. In this scenario, rail is one of the most affected transportation modes (mainly within large urban and metropolitan areas), having to deal with increasing demands in limited infrastructures, a situation that leads to congestion on operations and safety problems. Improvement or evolution in rail is traditionally done at significant costs, and is highly dependent on political decisions, making it difficult for rail

				<p>to be in line with the evolution of mobility systems. However, the modal shift towards public transport and the high potential of rail within green and sustainable transport modes, gives it the opportunity to grow, according to the "Smart Rail" vision.</p>
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