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RESEARCH ARTICLE

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Vulnerable road user safety: A systematic review and mesh-networking based vehicle ad hoc system using hybrid of neuro-fuzzy and genetic algorithms

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[Correction added on 16 July 2021, after first online publication: Figure 6 to 25 were mistakenly interchanged and have been corrected.]

Summary

Intelligent Transport System (ITS) involves a number of Information and Communication Technology (ICT) interventions for efficient road safety management. Over the last few decades, there has been a significant increase in the safety of Vulnerable Road Users (VRU's). This study aims to identify the most frequent, regularly occurring causes of road accidents and outline actions that can be used as a baseline for improving road traffic safety. The main contributions in this paper include the following: a graphical investigation for finding out the overall rate of road accidents (injuries and deaths) in India. Based on graphical analysis, major loopholes responsible for road accidents in India are summed up. This paper discusses various issues faced by already available pedestrian and vehicular safety techniques. After analysis of the available techniques and their related case studies in a systematic way, it is observed that they are not able to overcome the loopholes (Collision Occurrence, Traffic Congestion, Pedestrian Crossing alert, Red Light violation, and Non-Propagation of Distress Signal) present in the current "Road Transport Management (RTM) System" of India. Finally, after deep analysis of already available techniques, a futuristic approach "Mesh-Networking based Vehicle Ad-Hoc System (MN-VAS) using hybrid of Neuro-Fuzzy and Genetic Algorithm based Load Balancing on Node" is proposed for the safety of VRU's. This hybrid approach has been discussed with domain experts for practical input, and we concluded that this might be a good option for better RTM System in India.

KEYWORDS

collision occurrence, information and communication technology, intelligent transport system, mesh-networking based vehicle ad-hoc system, pedestrian crossing alert, red light violation, road transport management system, traffic congestion