

A Review Paper on the Evaluating cost-effective Railway Level Crossing Protection System

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Abstract: *Railway safety is a crucial aspect of rail operation the world over. Malfunctions resulting in accidents usually get wide media coverage even when the railway is not at fault and give to rail transport, among the uninformed public, an undeserved image of inefficiency often fueling calls for immediate reforms. Rail/road intersections are very unique, special, potentially dangerous and yet unavoidable in the World. During the normal operation also, there is every possibility of accidents occurring even with very little negligence in procedure and the result is of very high risk. The potential for accidents is made higher as the railways control only half the problem.*

This study was carried out based on literature review. Evaluation of the requirements of a Safety Management Information System which adequately addresses the needs of railway management for information on level crossing safety performance. Review the technical attribution and suitability of network

1. Introduction

Railway safety is a crucial aspect of rail operation the world over. Malfunctions resulting in accidents usually get wide media coverage even when the railway is not at fault and give to rail transport, among the uninformed public, an undeserved image of inefficiency often fueling calls for immediate reforms. Rail/road intersections are very unique, special, potentially dangerous and yet unavoidable in the World. Here two different entities with entirely different responsibilities, domains, performances come together and converge for a single cause of providing a facility to the road user. During the normal operation also, there is every possibility of accidents occurring even with very little negligence in procedure and the result is of very high risk. The potential for accidents is made higher as the railways control only half the problem. The other half, meanwhile, cannot really be said to be controlled by one entity, as even though traffic rules and road design standards supposedly exist, the

movements of road users are not organized and monitored by one specific entity as rigidly as rail movements. The railway systems of Asia and the Pacific are no exception to this. Each year, accidents at level crossings not only cause fatalities or serious injuries to many thousands of road users and railway passengers, but also impose a heavy financial burden in terms of disruptions of railway and road services and damages to railway and road vehicles and property. Closure of crossings, grade separation and installation of active protection at level crossings with passive controls are undoubtedly the most effective approaches to reducing the risk of collisions at railway level crossings. However, the feasibility of such approaches is questionable given economic and logistical implications While in-vehicle technologies helping drivers perform the driving task become more pervasive, there is a lack of evaluation of the effects such interventions would have on driver behavior if applied to railway crossings, particularly in the event of an unsafe failure of the technology A very high number of these collisions are caused by the negligence, incompetence or incapacity of road vehicle drivers, who by and large operate their vehicles in environments in which safety consciousness is practically non-existent.

Since it is the railway which must bear the responsibility for ensuring that it is protected from the transgressions by road users (despite the fact that in many countries the law gives it priority of passage over road users), it is the railway which also has to shoulder most of the financial burden of providing this Protection. Similarly, it is the railway, which has most of the responsibility for educating road users on the safe use of its Cost effective system for Railway level crossing protection appears that in many regions, railways are ill-equipped to be in a position to monitor level crossing safety effectively and to take both corrective and pro-active measures to improve the safety of their level crossing installations. Railway is an Eco-Friendly and Popular mode of transport in major cities of the World. Train accidents occur normally due to safety violations resulting from „human errors or limitations“ and „equipment failures“ loosing precious lives. The

Ministry of Railways (Railway Board), Govt. of India has referred many collisions in the past few years and therefore need for research is very important in this field. The current action plan is focusing on eliminating almost all the Broad Gauge unmanned level crossing numbering 6352 in the next 3-4 years. While Indian Railways has eliminated 1148 level crossings and 1253 level crossing in 2015-16, it has scaled up its target and now plans to eliminate 1440 level crossings.

It may be mentioned that substantial funds are required in the task of eliminating unmanned level crossing. Till such time when all the unmanned level crossings are eliminated from the railway network, Indian Railways have been taking measures to prevent accidents at such level crossings. In 2014-15, 50 accidents took place at unmanned level crossings while in 2015-16 it came down to 29. Till 1st April, 2016 a total 4326 Gate Mitras were deployed at vulnerable level crossings.

2. Literature Review

Title:- Pedestrian Safety at Rail Grade Crossings: Focus Areas for Research and Intervention

Author: Paul & Sriraj

This paper reports on findings from the literature and discussions with professionals in the public and private sectors involved in safety at rail grade crossings. Major areas found in need for improvement include (a) advancing consistent standards for warning devices and treatments; (b) advancing consistent approaches for managing non-motorist risk; and (c) continuing commitment to education, engineering, enforcement, and evaluation efforts by enabling stakeholders to provide adequate resources. The paper highlights the multitude of factors related to pedestrian safety in this context, and provides an informed discussion for researchers and practitioners involved in advancing safety initiatives.

Title:- Driving Simulator Evaluation of the Failure of an Audio In-vehicle Warning for Railway Level Crossings

Author: Christian

The effect of the failure of the in vehicle audio warning technology showed that most participants did not experience difficulties in detecting the approaching train even though they did not receive any warning message. This showed that participants were still actively looking for trains with the system in their vehicle. However, two participants did not stop and one decided to beat the train when they did not receive the audio message, suggesting potential human factors issues to be considered with such technology.

Title:- Design and Development of Intelligent Automatic Train Collision Avoidance System

Author: Brinda

The goal of this work is to design and implement a cost effective and intelligent Train Anti Collision System to prevent the train collisions. It aims to efficiently integrate into existing signaling system and avoid accidents in platforms and railway gate crossing. Presently, emergency may be passed through traditional telecommunication systems like Walkie-Talkies or other communication devices. In the traditional communication method, human error or carelessness may lead to severe disasters as noticed in the past. In places where there is no indication of the coming train, most of the people are losing lives.

Title:- A Sensor Platform for the Protection of Railway Infrastructures

Author: Eduardo

In this paper we focus on railway infrastructure protection and we present the details of a sensor platform designed to be integrated into a slab track system in order to carry out both installation and maintenance monitoring activities. In the installation phase, the platform helps operators to install the slab tracks in the right position. In the maintenance phase, the platform collects information about the structural health and behavior of the infrastructure when a train travels along it and relays the readings to a base station.

Title:- Human Behavioral Aspects of Level Crossing Safety with Special Reference to Indian Railways

Author: Kumar

The present paper describes various parameters of behavioral science related to LC. The present study indicates that on Indian Railways, gate closure time on most of the L.C is unusually long and beyond the tolerance of the road users. About 30 % of the vehicle drivers have reaction time more than 2 seconds which results in delayed decisions and actions, sometimes resulting into accidents

3. Scope, Methodology and Purpose

3.1 Scope:-

Following are the objectives of the proposed dissertation work.

- To study the present status of level-crossing accident.
- To study present statistics, indicator, technology & problems relating to the

system adopted for level –crossing protection in practices

- c) To study various alternative system for level crossing protection
- d) To analyze the various alternative systems for level crossing protection & to suggest the best feasible alternatives.
- e) To study the human behavioural aspect of level crossing safety with special reference to Indian railway.

Above work will carried out by taking a case study.

3.2 Methodology:-

For carrying out the proposed work, following Methodology will be adopted for data collecting and analysis.

- a. Evaluation of the requirements of a Safety Management Information System which adequately addresses the needs of railway management for information on level crossing safety performance;
- b. Review of the essential and effective safety, enhancements, measures and priorities for level crossings;
- c. Assessment of level crossing safety performance and safety measures in some countries;
- d. Examination of Cost Benefit Analysis of investments on level crossing safety enhancement;
- e. Review of the technical attributes and suitability of Networked Anti Collision System (ACD) for level crossing protection system;
- f. Recommendations and guidelines for adoption of networked ACD Systems by railways

3.3 Purpose of Dissertation:-

Find out the present status of level-crossing accidents. Analyze various alternative systems for level-crossing protection. The Human Behavioral Aspects of Level Crossing Safety with Special Reference to Indian Railways There is currently considerable research and practical action being taken by the industry to better safety at level crossings and to implement additional controls and upgrades to improve level crossing safety performance. The risk at level crossings is dominated by fatality risk, rather than major or minor injuries. After delegation we should get proper signaling system

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