

# AUTOMATIC EMERGENCY AND SECURITY SYSTEM FOR RAILWAY TUNNEL USING PLC

**Yuvraj K jagdale<sup>1</sup>, Niraj A Awasarkar<sup>2</sup>, Rahul R Kukkar<sup>3</sup>, Aadesh B Sawale<sup>4</sup>,  
Rajashree S Kadam<sup>5</sup>**

<sup>1,2,3,4</sup>students, Electrical Department, Guru Gobind Singh Polytechnic, Nashik, Maharashtra, India

<sup>5</sup>Professor, Electrical Department, Guru Gobind Singh Polytechnic, Nashik, Maharashtra, India

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**Abstract** - In this project we introduce the PLC based railway alarming security system by its application. These applications are automatic gate control i.e. open and close operation of railway gate. Tunnel power saving, ends of tunnel are always ON. Middle lamps become ON when train is passes from the tunnel. Anti-collision system, in that when two tracks are joining at a point and train is arriving from both tracks we give green signal to fast train and red signal to slow train. When fast train is crosses outside sensor it gives green signal to the slow train.

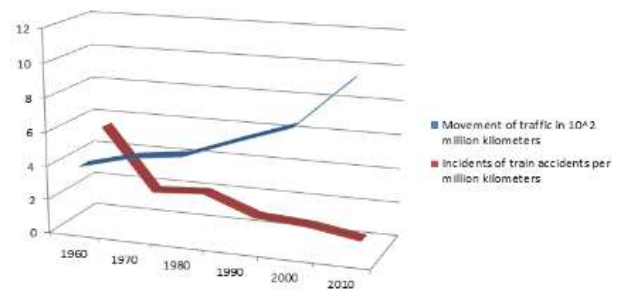


Fig No 1 Occurrence of Accidents in Railways

The proposed idea provides both monitoring and control of all the above said parameters with the provision of issuing automatic control in the locomotive itself using PLC. Programmable Logic Controller (Keyence) senses the input from its respective sensors and according to the ladder program it issues the necessary control automatically.

**Keywords:** *Senso, PLC, DC Motor, Buzzer, Smoke Sensor.*

## 1. INTRODUCTION

Now a days Indian Railway use Route Relay Interlocking (RRI) system for controlling of train operations. In RRI system operations of controlling requires large number of relays, which make system complicated as well as unreliable. Also RRI system requires large man power. To overcome this problem we introduce new system which is PLC Based Railway Intelligent Safety Alarming Security System. In the project we use various sensors for controlling action of train. It helps to increase accuracy, speed of operation and reliability of the system. To demonstrate the gravity of the problem, official statistics say that there have been 14 accidents in 2011, 15 accidents in 2012.

Added to these are the acts of sabotage by misguided elements spanning the whole country. Thus utmost vigil is safety in operations and also security of the traveling public is accorded by the Railways. Railway safety is a crucial aspect of rail operation over the world. The chart below shows the relationship of movement of traffic to that of the occurrence of accidents from 1960 to 2010.

## 1.1 Objectives

1. To save the human life
2. Reduce risk of accidents
3. Reduce the suffocation due the exhaust fan

## 2. LITERATURE SURVEY

ITS (Intelligent Traffic System) is a topic of huge concern to our developing world and a lot of prior research has been done but due to diversities of technologies and fields. The absence of a unified system exists. Acy M. Kottalil et.al proposed a model of Automatic Railway Gate Control System using IR sensors for detection of trains at railway crossings and controlling level crossing gates accordingly[3]. But the system is considered to be very less reliable due to the presence of very highly sensitive IR sensors which is considered to compromise with the sensing in the presence of sunlight. Anjali Jain et.al came up with a Collision Detection and Avoidance System in Railways Using WiMAX the system incorporated 4G WiMAX with GPS for calculation location of equipped locomotives the system is able to clarify the fact that one to one collisions can be avoided by using it however a decrement in one to one collisions is observed with the use of advanced automatic signaling in railways[4]. Since this system might not be able to report collisions at level crossing considering accidents at level crossings are considerably trending the capital invested in the system will not be efficient enough. Another microcontroller based approach was discussed by Krishna et.al using 8952 microcontroller and sensors to sense the location of train

and act accordingly to control the movement of level crossing[6].

But the use of a small scale approach for a really complex network will not be sufficient enough to uphold the requirements of railways also the reliability of the system will not be good enough. A PLC based approach was followed by Mahesh Nandaniya et.al with real time monitoring using SCADA the approach is reliable but the capital investment in every level crossing by single PLC will result inefficient in a way since there is a very large quantity of level crossings and controlling every level crossing with a PLC of its own will increase the capital cost by many folds[7]. Subrata Biswas et.al discussed an approach for Pressure Sensed Fast Response Anti-Collision System for Automated Railway Gate Control the system.

### 3. QUANTITATIVE ANALYSIS

The term "accident" covers a wide area of occurrences with or without significant impact on the system, Consecutive train accidents include mishaps with serious outcomes in terms of loss of human life and injury, damage to railway property or interruption in rail traffic. These consequential train accidents include collisions, derailments, fire in trains, road vehicles colliding with trains at level crossings, and certain specified types of "miscellaneous" train mishaps.3.1Collisions and Derailments The graph below depicts the collisions and derailments in Indian railways due to the failure of the staffs from 1965 to 2010[11]

#### 3.1 COLLISIONS AND DERAILMENTS

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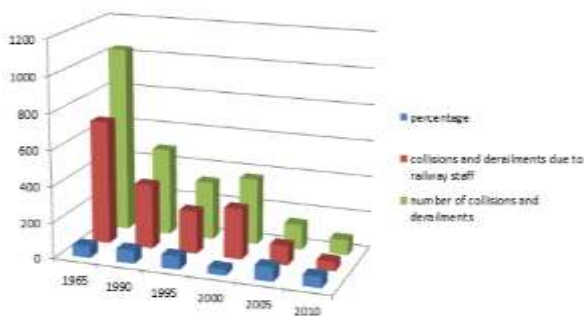


Fig No 2 Collisions and Derailments

## 4. PROPOSED SYSTEM

### 4.1 Block Diagram

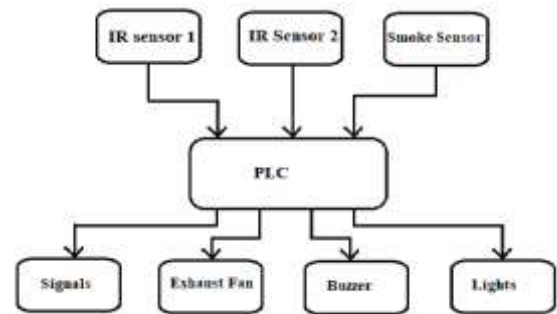


Fig No 3 Block Diagram of System

### 4.2 Working

In this project we are trying to make tunnel system more safe and secure by using Automation. Here we are designing a system in which automatically signals will indicate that some train is inside the tunnel or not so that another train will not enter in the tunnel. When the train will enter in tunnel all the lights will get on automatically and a buzzer will on before the train enters in the tunnel so that if any person or animal is present in the tunnel they will be alert about the train.

If in any case fire catches in the tunnel than some buzzers outside of tunnel will get on and exhaust fans will get on to exhaust smoke out from tunnel and buzzers will indicate danger in tunnel so that persons outside of tunnel will come to help them. And the lamps in the tunnels are working on the solar energy.

## 5. APPLICATION

This system is used in railway tunnels

## 6. CONCLUSION

This system is more efficient and secure system. It gives total security to the trains which are coming at a junction are secured by using IR sensors which gives appropriate signals to the trains to ensure secure traveling path to all the trains coming towards the junction. In automatic gate control when train arrives towards the gate and sensor senses it and gives signal to the PLC which generates output and close gate. When train departs from gate then exit sensor senses it and gives another signal to the PLC and gates are open. We can save electrical power by using tunnel light saving for operation of train inside the tunnel. Initially the lamps of both ends of the tunnel are ON. The particular lights will glow and turn OFF when train passes through tunnel. The total security and reliability are achieved by using anti-collision and gate control respectively with tunnel power saving.

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## REFERENCES

- [1] Ministry of Railways, Outcome and Performance Budget 2013-14, p. 46.
- [2] Executive Summary, Working Group Report for 12th Plan -Railways Sector, pp.17, 51. Available: [www.planningcommission.nic.in](http://www.planningcommission.nic.in).
- [3] Acy M. Kottalil "Automatic Railway Gate Control System," International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Volume 3, Issue 2, February 2014, 2320-3765
- [4] Anjali Jain, "Collision Detection and Avoidance in Railways Using WiMAX," Indian Journal of Computer Science and Engineering (IJCSE), Volume 3, Number 6, Dec 2012-Jan 2013, 0976-5166.
- [5] Krishna "Automatic Railway Gate Control Using Microcontroller," Oriental Journal Of Computer Science & Technology, Volume 6, Number 4, December 2013, 0974-6471.
- [6] Mahesh Nandaniya "A Review Paper of Automatic Canal Gate Control of 3- $\phi$  Induction Motor with PLC and VFD, Powered by Solar System and Monitoring by SCADA," International Journal of Emerging Trends in Electrical and Electronics (IJETEE), Volume 1, Issue. 1, March-2013.
- [7] Subrata Biswas "Pressure Sensed Fast Response Anti-Collision System for Automated Railway Gate Control," American Journal of Engineering Research (AJER), Volume-02, Issue-11, pp-163-173, 2320-0936.
- [8] Cai Guoqiang "Research on Rail Safety Security System," World Academy of Science, Engineering and Technology, Volume 4 Number 8 2010.
- [9] Emad Aboelela "Wireless Sensor Network Based Model for Secure Railway Operations," IEEE 1-4244-0198-4/06/©2006 IEEE.