Railway Traffic/Collision Control System

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Abstract: **Railway transportation is the foremost and most popular means of transportation among population. Railway transportation traffic control in India is centralized which sometimes delay the action on its accidental situation. In case of failure or any emergencies in between stations, immediate information can not be given and a particular problem will escalate with valuable time loss.**

Wireless sensor network systems will suit the railways much more. In this laser sensing and wireless communication proposition there can be an alternative to control the trains from many hazardous accidents causing loss of life and property.

Keywords: Traffic Control, Railway Traffic, Centralized Control, Laser sensor.

I. INTRODUCTION

Management and control of railway traffic has been an appealing field of research in recent years. Reliable and fast train traffic control systems are needed to cope with the increasing traffic density and high speed trains of today.

Before going further in details we present some railway descriptions and notations.

Indian railways has seventeen zones (including Konkan). These zones are further divided into smaller parts called divisions. Currently sixty nine such divisions exist. Train-running operations are the main responsibility of divisions. For train-running operations, one division the further smaller sections. These sections are called "Control Sections". Around thirty to forty sections come under one control section controlled by Chief Traffic Controller (CTC) and several section controllers.

Section controllers has very limited information about the scene beyond his control section. So, section controller runs the train as a short sighted person. Most of the time section controllers is unaware of the situations in the neighboring sections and hence due to lack of complete input section controller may not be able to run the trains in optimal manner. One major reason of this lack of information is insufficient communication.

Due to this lack of information transfer sometimes major constraints occur. So, for drivers concern as he is the one controlling train railway has its own signaling system.

1. Signal system in the railway network designed to convey information to the driver has evolved and improved from time to time as to improve train moment and make it safe.

2. Railway places different signals at different locations equally distanced from each other to notify driver and enable train movement in safe manner sometimes stations are occupied and trains way collide but signaling schemes play important role in determining the action train drivers in slowing down the train.

Figure 1. A Typical Control System Railway

If a train driver operates a train by just checking signals, there is a possibility of accidents due to mistakes.

II. PROBLEMS WITH SIGNAL SYSTEM

A. There can only be one train at a block at a time to fulfill that purpose the train arrival and departure is rested on the shoulders of station master who ensures the arrival of complete train before permitting the next train. Any failure in that part of observation can be disastrous.

B. HIGH COST: At present the signal controls are done through cable connections to control the information. So, many cables are required to realize this complex control. But the cost of laying cables and replacing them on damage is very costly.

C. MISTEAKES IN CABLE CONNECTIONS: Information is transmitted by cables, so cables should be correctly matched. Whenever there is an error in connection, there has been an crash accident a derailment had occurred many times in past. This signaling equipment is installed near the track , this matching operation should be done quickly so the possibility of human error is very high.

III. WIRELESS RAILWAY COMMUNICATION NETWORK

Sensors are small battery operating devices with sensing capabilities that communicate by the means of short range

wireless transceivers. Recent advances have enabled the development of low cost, low power multi-functional sensors that are small in size that communicate within a short distance. The tiny sensors are capable of sensing, data processing and communicating.
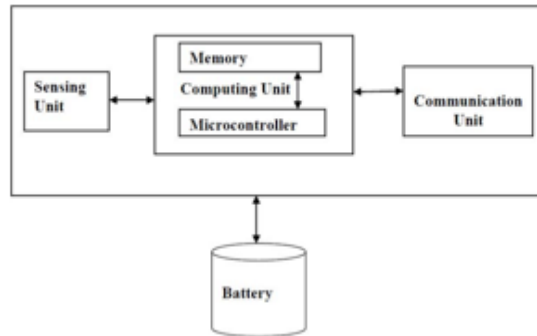

Fig 2. Architecture of wireless sensor node

This sensor network is improvement over traditional network.

This wireless network is relying on very constraint resources like energy, bandwidth and capabilities of storing and processing data. As it can be left unattended for a long period of time so energy efficiency is a major issue.
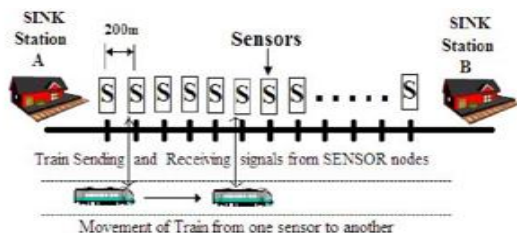
IV. SYSTEM PARADIGM/ARCHITECTURE

Fig 3. Proposed system architecture

In the figure the wireless node is situated at railroad side at a distance of 200 to 300 meter from each other (0*100 family sensor)- for example sensors are provided with permanent energy source as most of the railway lines are equipped with. All sensors sends data in adhoc manner and provides inter station communication and we further improvised with a stop switch with the sensor acting as the transmitter and the train as receiver.

In this proposition an automatic stop function is installed with automatic train control which put breaks on permissible speed. Furthermore, it transmits information of stop point, where the train will stop and train recognizes its own position.

In this proposition an automatic stop function is installed with automatic train control which puts break on permissible speed. Further more it transmits information of stop point where the train will stop and train recognizes its own position.

Train also automatically controls the breaks properly whenever necessary.

If any grounds men find a situation where a train is in need of stoppage he can do that by himself even at nights even if he is unable to show a red flag.

We also purpose to install laser or optical sensors like opto NCDT ILR which are capable of sensing objects by reflection at a distance of up to 3000m. If by any chance they come head to head or station master fails to depart the train fully from the station the other train will stop automatically or at least in worst case it will slow it down to reduce the impact of collision.

V. CONCLUSION

This paper presents wireless sensor network in railway system. As wireless network can work in remote areas and easy to deploy. If you compare it with traditional scheme, it will improve the efficiency of railways. It will increase safety and accuracy of people and economy.

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