

# Secured Railway System Based on GPS Tracking

## (Under wireless communication)

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**Abstract:** We are losing lot of lives in train accidents. Human life is so precious. But due to lack of using advanced technologies at railways, it is facing lot of accidents.

Normally train accidents can happen by two reasons. First due to de-railing. And another is train clashing. Train clashing is normally due to signal problems and also due to fault of station keepers by changing the track that already occupied by any other train.

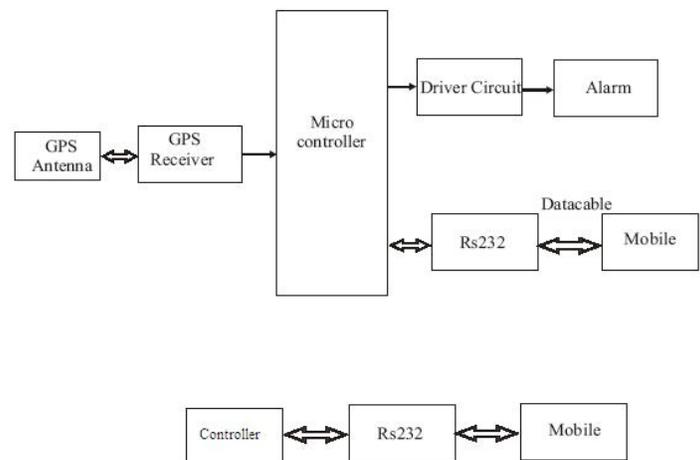
The main aim of our project is to provide a complete security system for railway transport system. Security is given based on the GPS location of trains.

### INTRODUCTION:

Every train must be fixed with a GPS module. When two trains approaching each other on a same track then the GPS value of both are automatically compared at the central station and warning signal must be sent to both the trains. Our proposed system must have a single track.

It can be also applied to two way tracks but in that case it is very simple. Trains approaching may not want to compare because separate tracks are available. In that case if two trains are going on same direction, then when the speed of the train coming at back is high, then the GPS value identified is compared and then the warning signal is given to trains. Now in the case of any crossing in single track system, a train must be kept in a track is sensed by a sensor then the corresponding free track information is sent to the train and hence it can able to run in that free track. Speed along with the GPS location is compared and the information is sent to the trains.

### BLOCK DIAGRAM:



The first block will be kept on all trains and the second block will be kept at control stations.

## **REQUIREMENTS:**

### **Hardware requirements:**

- GPS Module
- Microcontroller
- Sensor(May or may not)
- GSM Module
- Mobile phone/Warning device
- Graphics display

### **Software requirements:**

- Keil\U-Cos
- Mat lab
- Flash magic programmer tool
- Etc

## **USAGE Of HARDWARE COMPONENTS:**

### **GPS Module:**

In our project GPS module is used to identify the location of the train. So by identifying the GPS location of the trains it is easy for us to prevent the accidents by comparing the GPS location of all trains. If any GPS values from train approaches nearer then alert signal will be given.

### **GSM Module:**

It is used for communication purpose. It is used to continuously sending the GPS value to the control station and also send the alert signal to the trains when there is a chance of any accident.

### **Microcontroller:**

The main function of the microcontroller is to control the environment based on the input and the programmes in it. Here microcontroller is used to interface GPS and GSM module at trains and the control station.

### **Sensors:**

We may use sensors to identify the track in which a train is halt in a station and hence the free track information is send to the station master and the approaching trains. But for this purpose we can also use the GPS value itself as there is change in the 9<sup>th</sup> decimal point of the GPS value for every 1.5 meter variation.

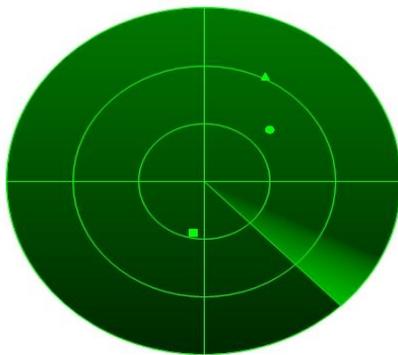
### **MOBILE PHONE OR WARNING DEVICE:**

This is used to send the information to the train driver. By using a mobile phone in every train the alert signal can be send through messages or voice calls whichever suitable for our convenience. By using warning devices like alarms we can generate some sound for driver to identify the approaching train.

In case of free platform information to be send to the driver, it can be send by the messages to mobile phone or even interfacing any indicating device.

**Graphics display:**

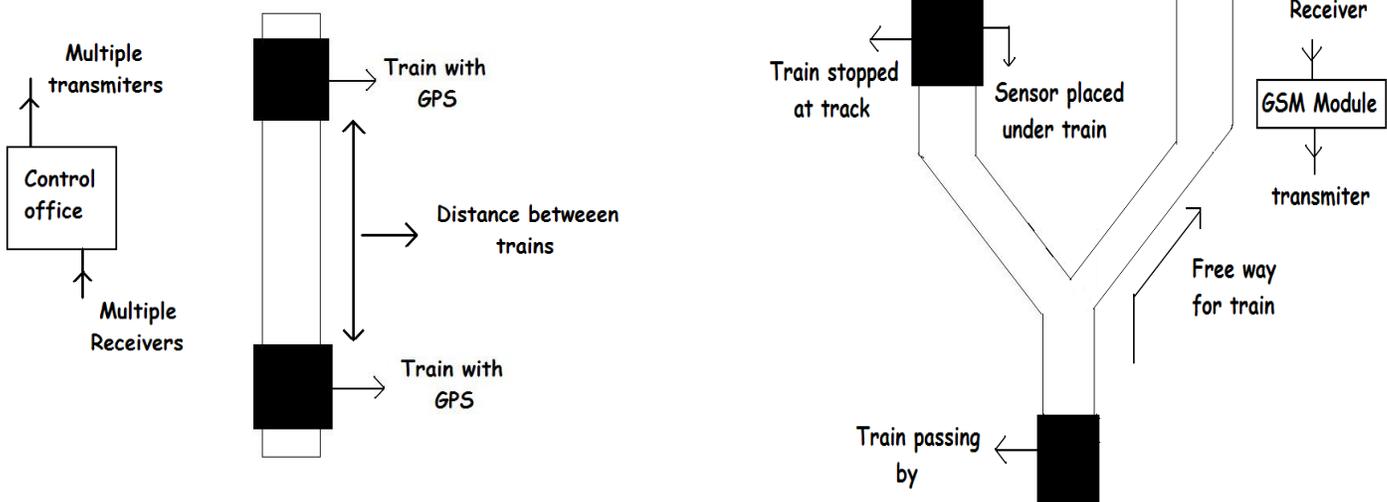
We can replace mobile phones by graphics display. We can able to display the approaching train using the graphics display. According to the GPS limit set in the control office the graphics display will show the approaching trains if they cross the predefined GPS limit.



This shows the first application of our proposed system. By this we can avoid the direct train clashing in single track system. Each train having a GPS modem placed at their corresponding engine. Now consider that two trains are approaching each other in a same track. The GPS kit placed in each train must track its own GPS location. Using the GSM modem interfaced with the GPS kit, the current location of every train is always sending to the control station. So, at control station the location of each and every train is received and hence compared. When the GPS value of any trains approaches near, warning signal is sent to the approaching trains.

The proposed system is for single track system. It can be efficiently implemented for two track system also. In this case train approaching to each other may not be detected. Because they are running in different track. But we have case during fog that there is a chance of train hitting front to back while the train running front is moving in small speed or it halts in a track or any platform and a train approaches back with high speed. In these case, our another application can be used. Its functional diagram is shown.

**Working:**



This shows how the train clashing can be prevented when there is a train already placed in a track.

An example for this kind of train clashing is Sainthia train collision. It occurred on July 19, 2010, at Sainthia railway station in West Bengal, India, when the Uttar Banga Express collided with the Vananchal Express as it was leaving the platform. 66 people died as a result of the accident, and 165 people were reported injured. These kinds of clashing can be prevented by our proposed system. In this application we can use the GPS value itself identify the track in which the train is halting. 9<sup>th</sup> decimal of the GPS value varies every 1.5 meter. Using this calibration the track is identified and a free running track is identified and the information is send to the corresponding station master and the train guard of the approaching train.

### List of some accidents which can be prevented by our system:

- January 2, 2010 –in Uttar Pradesh near the town of Etawah, about 170 miles (270 kilometers) southwest of Lucknow, the capital of Uttar Pradesh state, when the Lichchavi Express entering the station in heavy fog runs into the stationary Magadh Express train stopped there. Ten people, including the driver of one of the trains, are injured. At least 10 people were reported to have been killed.
- January 2, 2010 – The Gorakhdham Express and Prayagraj Express **collide** near the Panki railway station in Kanpur, about 100 kilometers (62 mi) southwest of Lucknow, leave five people dead and about 40 others injured.
- January 16, 2010 – Three people die and around a dozen are injured when **two express trains collide** in thick fog near Tundla, 25 kilometers (16 mi) from Agra, in India's

northern state of Uttar Pradesh. The driver of one of the trains apparently did not react to a signal, slamming his train into another on the same track.

### APPLICATION

1. We can prevent train clashing.
2. Free track information is available to the station master and train drivers.
3. Train speed and location can be identified.
4. Automatic railway gate system can be implemented. Implementation methods.

### ADVANTAGES

- High reliability
- Good performance
- Less manpower
- Less expensive
- Low power consumption

### CONCLUSION:

By this proposed system any type of train clashing can be prevented and it future we may add many applications. By using GPS we have many advantages the we have un interrupted service by nearly 30 dedicated satellites. We can have this system for secondary purpose for signaling and primary source for accident preventing system. As human life is so precious, it is our duty of engineers to give some efficient product for welfare of their valuable lives.

## REFERENCES

- [1] Emad Aboelela, William Edberg, Christos Papakonstantinou and Vinod Vokkarane, "Wireless Sensor Network Based Model for Secure Railway Operations", 2006.
- [2] Cai Guoqiang, Jia Limin, Zhou Liming, Liang yu and Li xi, "Research on Rail Safety Security System", World Academy of Science Engineering And Technology, pp. 1405-1410, 2010.
- [3] R. Pitchai Ramasamy<sup>1</sup>, M. Praveen Kumar<sup>1</sup>, S. Sarath Kumar and R. Raghu Raman," Avoidance of Fire Accident on Running Train Using ZigBee Wireless Sensor Network", International Journal of Information and Computation Technology, Volume 3, Number 6 , pp. 583-592, 2013.
- [4] Kuncham Viswa Teja<sup>1</sup>, Suresh Angadi<sup>2</sup> ," Fire Detection and Notification System inTrains", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 2, Issue 4, pp. me 96- No.25,pp.32-35, June 2014.
- [5] Kalpana Sharma<sup>1</sup>, Jagdish Kumawat<sup>2</sup>, Saurabh Maheshwari<sup>3</sup>, Neeti Jain<sup>4</sup>, " Railway Security System based on Wireless Sensor Networks: State of the Art", International Journal of Computer Applications , Volume 96- No.25,pp.32-35, June 2014.
- [6] Shilpa Bharathan, Shameem B P, Savitha T, Assistant Prof. Mr. P. Vimal Kumar,"Advanced Security System in trains using RF Module", International Journal of Advanced Research in Electronics and Communication Engineering, Volume 4, Issue3,pp.543-547, March 2015.
- [7] 1R. Immanuel Rajkumar, 2Dr.P. E. Sankaranarayanan, and 3Dr.G.Sundari," Real Time Wireless based Train Tracking, Track Identification and Collision avoidance System for Railway Sectors", International Journal of Advanced Research in Computer Engineering& Technology , Volume 3, Issue 6, pp.2172- 2177, June 2014.
- [8] M.D.Anil<sup>1</sup>, Sangeetha.S<sup>2</sup>, Divya.B<sup>3</sup>, Niranjana.B<sup>4</sup>, Shruthi.K.S," Advanced Railway Accident Prevention System Using Sensor Networks",International Journal of Advanced Research in Computer Engineering & Technology, Vol. 3, Issue 5, pp.6730-6732,May 2014.