

Case Study

Satellite Imaging for Railway Tracking

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Executive Summary

Indian Railways in partnership with IIT Kanpur has launched a Satellite Imaging for Rail Navigation project through which passengers can know the real time position of a train. Better known as project SIMRAN, this system heralds a new era of using ICT for monitoring railway operations.

Passengers can know the exact position of a train by sending an SMS or logging on to the website <http://www.simran.in>. A GPS device on the train helps in tracking down the exact location and speed of the train.

Compared to the earlier system of manual collection of data, this new railway tracking system provides accurate train running information. Currently in its first phase, SIMRAN covers only a few trains, however there are plans to scale up the initiative for tracking all trains across India.

Project SIMRAN is addressing a vital lacuna in the operation of Indian railways. The real time train running information it provides to passengers and railway authorities is very crucial and can play a very important role to smoothen the operation of Indian Railways and also tremendously increase passenger/public satisfaction.

Methodology

The Governance Knowledge Centre (GKC) documents best practices in governance in India in support of further replication. For this purpose, select initiatives that are significantly contributing towards the betterment of public service delivery are identified by the GKC research team. The team conducted extensive secondary research using credible web sources to establish the suitability of project SIMRAN as a best practice. This research reflected the manner in which the effective utilization of ICT tools under the project is strengthening the operation of Indian railways and benefitting passengers and railway authorities alike.

Having recognised SIMRAN as a best practice, the next step was to collate all the information gathered through secondary research for this documentation.

Efforts have been made to provide objective information in the document. However, since stakeholder interviews haven't been conducted, there is a possibility of the omission of certain facts.

Background

India boasts of having the second largest railway network across the world. Often touted as the lifeline of the people, the railways of the country play a very crucial role in facilitating transportation across the length and breadth of the country. In the era of the growing usage of ICT tools for the provision of various services across the country, it is but natural for Indian Railways to take the ICT route too.

While reservations facilities, schedules and other train details are now available through the Internet and mobile technology, a significant feature that has been lacking so far is the failure to provide accurate train running information to the public. Currently, to keep track of trains, station masters call up the control room at the divisional headquarters every time a train passes their station. Because of this manually controlled system, there remains a large scope for the provision of inaccurate information to enquiring passengers/ public. Such information is vital for passengers to plan their travel and can save a lot of their time and energy. It can also help in addressing bottlenecks that arise in managing train traffic, routes and assist in building a tightened railway monitoring mechanism.

In order to rectify this problem of the provision of inaccurate information to passengers at most railway inquiry counters across the country, Indian railways decided to launch a satellite-based train tracking system . Better known as project SIMRAN, this new system will provide accurate information on movement of passenger trains in each zone of the railways.

Indian Railways has introduced the first phase of this real time train information system. Work on Project SIMRAN started in April 2006 and its pilot was launched in September 2011 with the tracking of four trains. This new system was jointly developed and launched by the Research Design and Standards Organization (RDSO), Lucknow, and Indian Institute of Technology (IIT), Kanpur under the Technology Mission for Railway Safety (TMRS) which aims to address all aspects of safety on Indian Railways¹.

Under the new system, Indian Railways will install Global Positioning System (GPS) devices in all locomotives and stations to receive dynamic data on train movement through satellite. Name of the incoming train, speed, time duration and all relevant information required by passengers will be made available automatically once the system becomes operational. For this purpose, digital mapping of 8,177 stations of Indian Railways has so far been done.

¹ 'Technology Mission on Railway Safety '. Press Information Bureau. 6 December. 2007. Web. 29 March. 2012. <<http://pib.nic.in/newsite/erelease.aspx?relid=1383>>

The system is currently on its trial period and is tracking up to 35 train routes including Rajdhani and Shatabdi routes. Eventually, SIMRAN will replace the manual tracking system by connecting about 8,000 trains and 8,177 stations through GPS technology across the country in a phase-wise manner.

Objective

Project SIMRAN aims to:

- Provide accurate train running information to passengers in order to avoid causing any inconvenience to them
- Equip authorities with adequate information to analyse and improve the functioning of various train routes as well as strengthen the train monitoring mechanism within Indian railways.

Project Design

Key Stakeholders

- Research Design and Standards Organization (RDSO), Lucknow, and Indian Institute of Technology (IIT), Kanpur have jointly designed and deployed the technology used under project SIMRAN.
- The funding for project SIMRAN was shared by Ministry of Railways and the Ministry of Human Resources Development.

Technology Adopted

Project SIMRAN by leveraging appropriate ICT tools seeks to provide the following information to passengers:

- Train speed
- Closest station and the next stop.
- Train status (Late/Before Time/Approaching).

In order to provide the above information, project SIMRAN is utilizing satellite imaging



Figure 1: Box containing GPS equipment installed in trains
Source: PPT from RDSO and IIT Kanpur

technology. For this purpose, trains are fitted with a specially designed Global Positioning System (GPS). This GPS equipment is designed in a manner that it is able to capture details like the trains speed and location every second and then transfer it to the central railway web server. The data acquisition process under Project SIMRAN is fully automatic; it does not require any manual feeding of train running information (time in/time out) at stations, control offices and National Train Enquiry System (NTES) terminals.

The transfer of information from the GPS device to the central server happens through the use of Global System for Mobile (GSM) communication technology that is used in mobile phones and also through General Packet Radio Service (GPRS) and Short Message Service (SMS) technology. In other words, GSM, GPRS and SMS technology create a proper communication channel between the GPS equipment installed in the train and the central computer.

Information Dissemination

The train running information that is collected using the above technology is disseminated through the following mediums:

- at stations through passenger information display panels.
- through passenger information display panels within the train.
- through the Internet at <http://simran.in/>. This website is multi-lingual.
- through an Interactive Voice Response System (IVRS)
- through mobile phones : information seekers can send an SMS ,T <Train No.>' to the numbers 09664139139 & 09415139139.

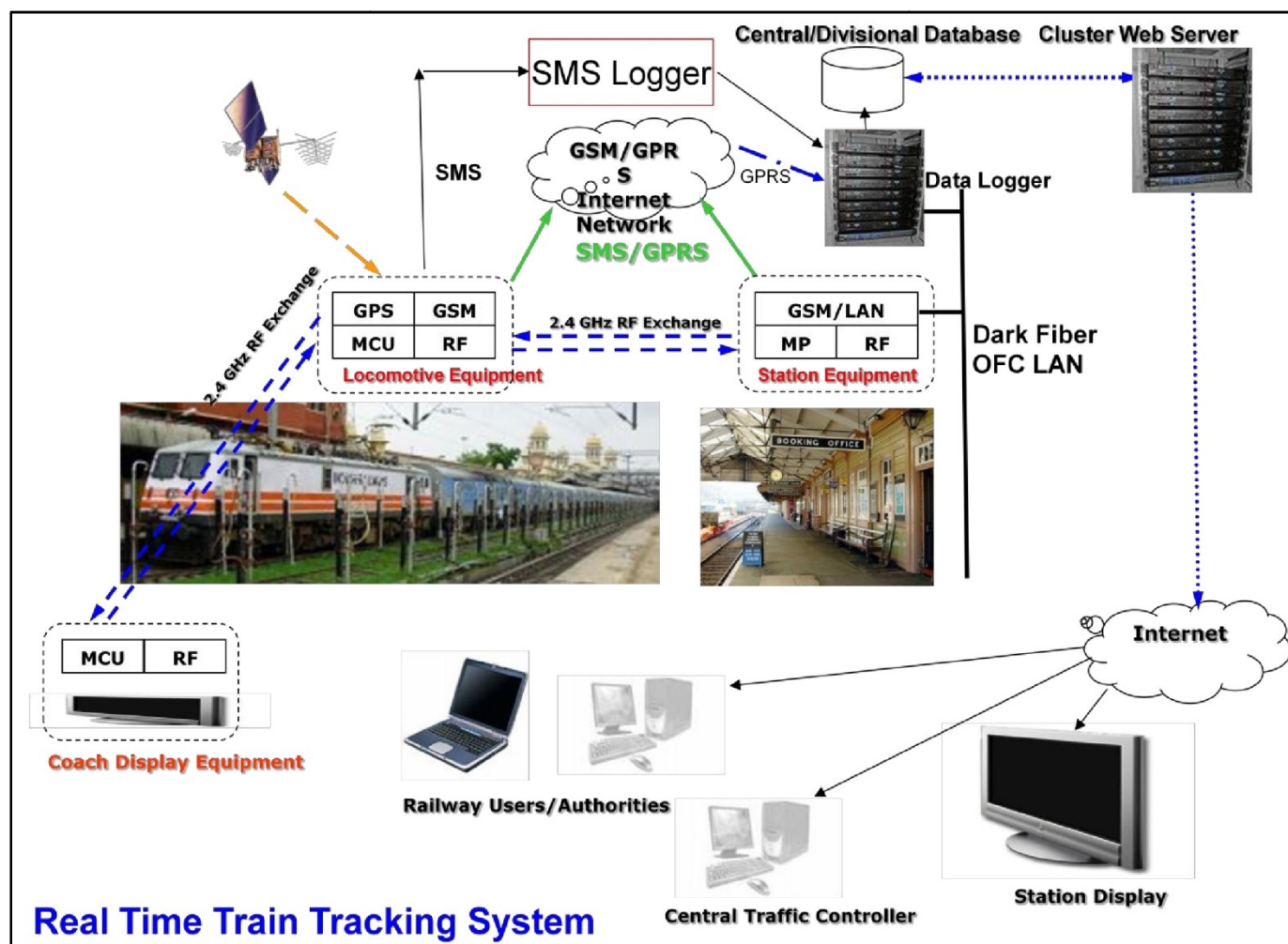


Figure 2: Diagram showing the complete information flow under project SIMRAN
Source: PPT from RDSO and IIT Kanpur

Funding

Project SIMRAN is sanctioned under the Technology Mission for Railway Safety (TMRS) which aims to address all aspects of safety on Indian Railways. Its cost is being shared equally by the Ministry of Railways, and the Ministry of Human Resources Development.

Achievements

Project SIMRAN is addressing a vital lacuna in the operation of Indian railways. The information it provides to passengers and railway authorities is very crucial and can play a very important role to smoothen the operation of Indian Railways and also tremendously increase passenger/public satisfaction.

Some of project SIMRAN's key benefits include:

- Increase in passenger convenience by saving their time and helping them plan their travel adequately.
- Train running information like location, speed, direction on real-time basis can be analysed and used to improve the management of train traffic across different routes.
- Continuous tracking of trains will help in prevention of accidents and development of early warning systems.
- The correct information of train timings can also facilitate the accurate usage of the maintenance block/ train sheds without leading to overlaps between various trains resulting in consequent delays.
- Tracking of cargo trains will help concerned industry professionals to keep a check on the location of their consignment on real time basis and plan their unloading accordingly. This will prove to be both time and cost saving for them.

Conclusion

While project SIMRAN definitely marks the inauguration of a new information process in the operation of Indian railways, the challenge is to now upscale the initiative to the entire railway network. It must also be kept in mind, that technology today is being constantly upgraded hence the possibility of a much more efficient technology that GPS should be explored. The Mobile Satellite Service (MSS) technology used in coast guard vessels is being tested to monitor certain railway lines in the country². Results so far show that MSS marks an improvement over the GPS technology and is capable of providing much more accurate information. The possibility of integrating this technology under project SIMRAN should be tested. That said, project SIMRAN takes the use of ICT in the operation of Indian Railways to a new level from where we can only expect move ahead.

Research was carried out by OneWorld Foundation India (OWFI), Governance Knowledge Centre (GKC) team.

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² Now, satellites to keep track of trains'. The Times of India. 23 January. 2012. Web. 27 March. 2012. <
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