**SMART SOLUTION FOR RAILWAYS**

**Introduction:**

Transportation systems are complex with respect to technology and operations due to the involvement of a wide range of human actors, organisations and technical solutions. There is a need to apply intelligent computerised systems for the operation and control of such complex environments, such as computerised traffic control systems for coordinating advanced transportation.

Industry 4.0 is enabled by smart systems and Internet-based solutions. Maintenance is one of the application areas of self-learning, and smart systems can predict failure and trigger maintenance by making use of the Internet of things [(IoT)](https://www.metrorailnews.in/urban-transport-and-climate-change-role-of-rail-based-transport-system/).

There is no established path for success of any emerging technology, but creating a roadmap can help the rail and aviation industries to bring a more digital and connected future. The need for these industries to be smart is there because Industry 4.0, or the fourth generation of industrial activity, ensures reliability and safety to these sectors. With automation of the manufacturing industry, these sectors will realise efficiency, capacity and cost benefits of Industry 4.0. Enhanced industry-wide condition monitoring will also help reduce unplanned maintenance. Both sectors are in constant search for improvements to deliver better and secure customer experience.

**Digital Railway Solution:**

The digital railway programme is focussed mainly on digital signalling technology, which aims to enhance safety and speed up train movement in a congested network. If all data from signalling, rolling stock and passenger traffic control systems is brought together on a common platform, the entire network will be able to communicate seamlessly and instantaneously. The key to digitisation is the interoperability of systems while retaining a critical approach to data security.

Rail service information could even be integrated with other transport modes, such as bus and taxi services, to guide passengers through smooth door-to-door journeys. Holistic data management could lead to the transformational change in real-time intelligent traffic management and in-cab signalling. This could improve customer satisfaction, with station information systems and personalised messaging providing passengers with all the relevant information they need.

**Digitisation of Railway Includes:**

* B-scan ultrasonic rail flaw detection (both non-stop and stop-and-verify systems) and track inspection with automated high-speed test trains.
* Train control system levels 2 and 3 for high-density routes to increase network capacity and maintain the required safety standards.
* Increased surveillance of personnel with both interior and exterior locomotive-mounted video surveillance to improve monitoring.
* Track-laying machines for mechanisation of construction.
* Electrification through machines such as self-propelled overhead electrification laying trains.
* Complete train scanners for improved diagnostics and maintenance.
* Use of distributed power to improve the efficiency of train operations with coordinated acceleration and deceleration.
* Establishment of smart railway stations by implementing access control at entry points.
* e-ticketing with services such as infotainment and app-based systems.
* Use of training simulators and virtual reality (VR) training systems to improve personnel capabilities.

**The IoT - connected trains :**

The IoT can interconnect all objects and devices that were previously not part of a network for predictive analytics. Its application increases safety, efficiency and ease of use with train management systems. Control and surveillance systems reduce the risk of collisions and regulate speed. Advanced consumer technologies help maximise connectivity and allow passengers to continue their activities on smart devices while travelling. Train-to-train communication through the cloud enables operators to transmit data about equipment, tracks and stations among themselves.

The IoT enables monitoring of areas on railway crossings remotely, such as barrier operations and end positions, switch end positions, space between barriers, system operations, connections and signals. This allows users to accelerate their projects, from engineering and runtime to maintenance with fast detection and localisation of errors and faults.

Here are some potential use cases presented by rail operators for using IoT to create a connected railway.

**Solutions for Smart Railways for future**

it can be designed to reduce the work load of the user and it is also the use of paper. Here in this project, we have all the features are like a Web page is designed for the public where they can book tickets by seeing the available seats. After booking the train, the person will get a QR code which has to be shown to the Ticket Collector while boarding the train. The ticket collectors can scan the QR code to identify personal details. A GPS module is present on the train to track it. The live status of the journey is updated in the Web app continuously All the booking details of the customers will be stored in the database with a unique ID and they can be retrieved back when the Ticket Collector scans the QR Code.\