PROJECT DEVELOPMENT DELIVERY OF SPRINT-3

TEAM ID	PNT2022TMID54425
PROJECT NAME	SMART SOLUTIONS FOR RAILWAYS

Efficient and Secure Operation with Better Passenger Experience:

Rail is one of the most cost and time-effective ways of moving people around urban areas, between cities or across countries. It has evolved from steam-powered engines to high-speed light rail that can carry passengers over massive distances in hours.

The rail market has begun to recover from the effects of the pandemic. Global News wire estimates that global commuter rail and public bus services will be worth more than $400 billion by 2025 compared to $285 billion in 2021.

Mobile ticketing has gained traction on the back of improved internet access and developments in 5G technology, satisfying demand for contactless payments while offering commuters a range of information about their journey from balance details and route planning to real-time tracking and the ability to use their mobile as a ticket via a validator tap or other means. Rail operators are increasingly introducing mobile ticketing to enhance data management and personalisation of services and make their businesses attractive to partners and investors.

- **E-ticketing: paperless, contactless:** One of the best ways to enhance the rail passenger experience is to deploy automated fare collection, which makes payments and fares transparent while allowing rail operators to set fees and manage their operations centrally via a web portal. According to Allied Market Research, the global automated fare collection system market was valued at $6.6 billion in 2019 and is projected to reach $12.8 billion by 2027, a CAGR of 11.6%.

- **Digital Onboarding:** A major benefit of automated fare collection is digital onboarding of passengers. Improving the passenger experience is not an easy task, but some rail operators offer additional features such as seat and e-ticket management or early-bird or last-minute ticket purchases. To raise the experience level even higher, service operators could introduce open-loop payment methods to allow users to pay with QR codes biometrics, NFC or cards., which increases onboarding and journey flexibility.

- **IoT – The Internet of Trains:** The concept of the internet of things is well established. A new sub-concept of the 'internet of trains' has now emerged, which means connecting all smart and mobile devices together under one platform via Wi-Fi, merging the commuter with the train operator to provide a transparent digital experience while giving the rail operator access to increased customer information for operational management.

- **Big data unlock new experiences:** Those rail operators who manage to gather, analyse and utilise big data will gain a competitive edge. The use of data paves the way for effective predictive analytics, passenger management and platforms. The ability to anticipate passenger volumes and shifts in demand and station loads will further allow rail operators to adapt their businesses and maintain their competitive edge.

Transforming Indian Railway, Enhancing Passenger Experience

By embracing digitalisation in all spheres of its operations — such as asset management, signalling, manufacturing and passenger information system — the Railways is on track to improving its revenues and passenger experience

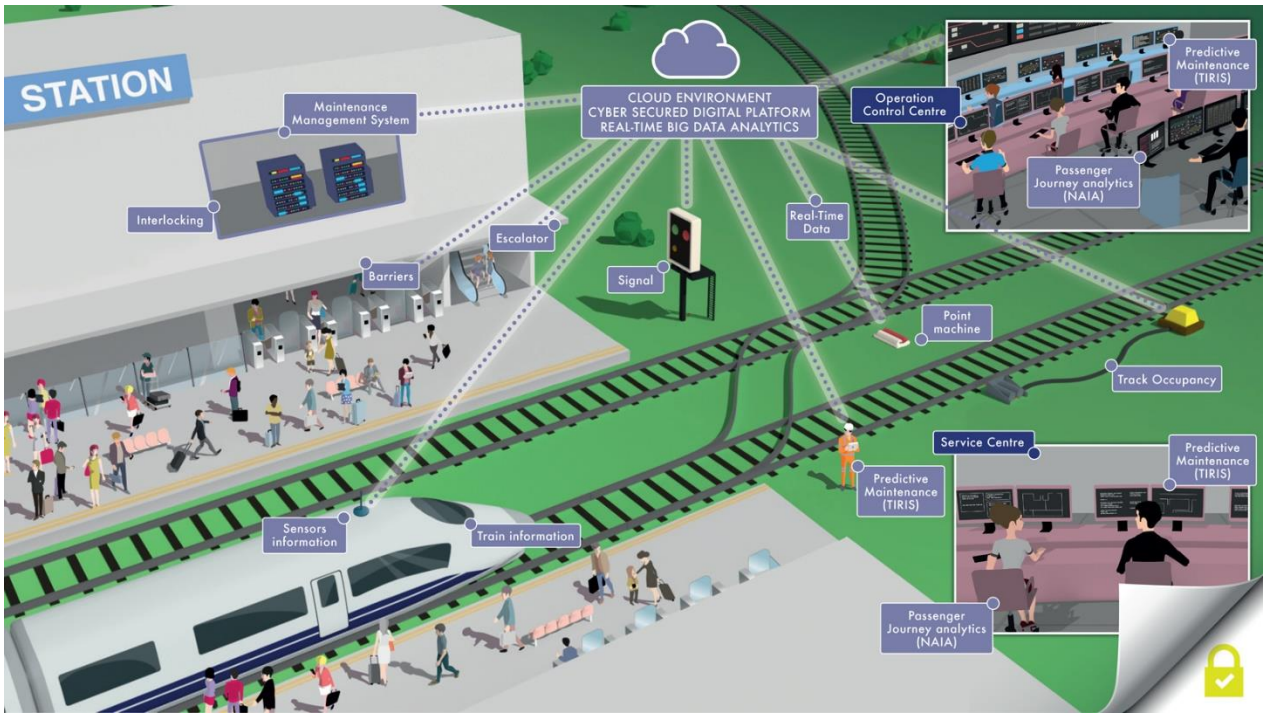
Safety Enhancements

- Technological upgrades to minimize human errors, enhance safety of train operations & to enable higher throughput.
- Automatic Train Protection against passing signal at danger, over speeding collision.
- Elimination of manned level crossings from Golden Quadrilateral – Golden Diagonal (GQ-GD) route.

Improved Passenger Experience

- High–speed rail corridors for speedy train services.

- Real-time passenger information systems, and advanced digital signalling for punctual & reliable train services to passengers.
- Improved e-ticketing system.
- Free Wi-Fi at all A1 category stations.



VG710:

● High-speed and reliable LTE CAT6/CAT4 network, dual SIM redundancy.

● Rich in-Vehicle networking: Gigabit Ethernet, 2x2 MIMO Wi-Fi5, CANbus.

● Compliant with railway standards EN50155, EN50121, EN61373, EN45545, etc., immune to challenging railway environments, including vibration, fire/explosion risks, electromagnetic disturbance, etc.

● Extensive interfaces for connection to different peripherals on board.

● Global GNSS with Dead reckoning keep track of the vehicle.