

Technology Stack (Architecture & Stack)

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2.

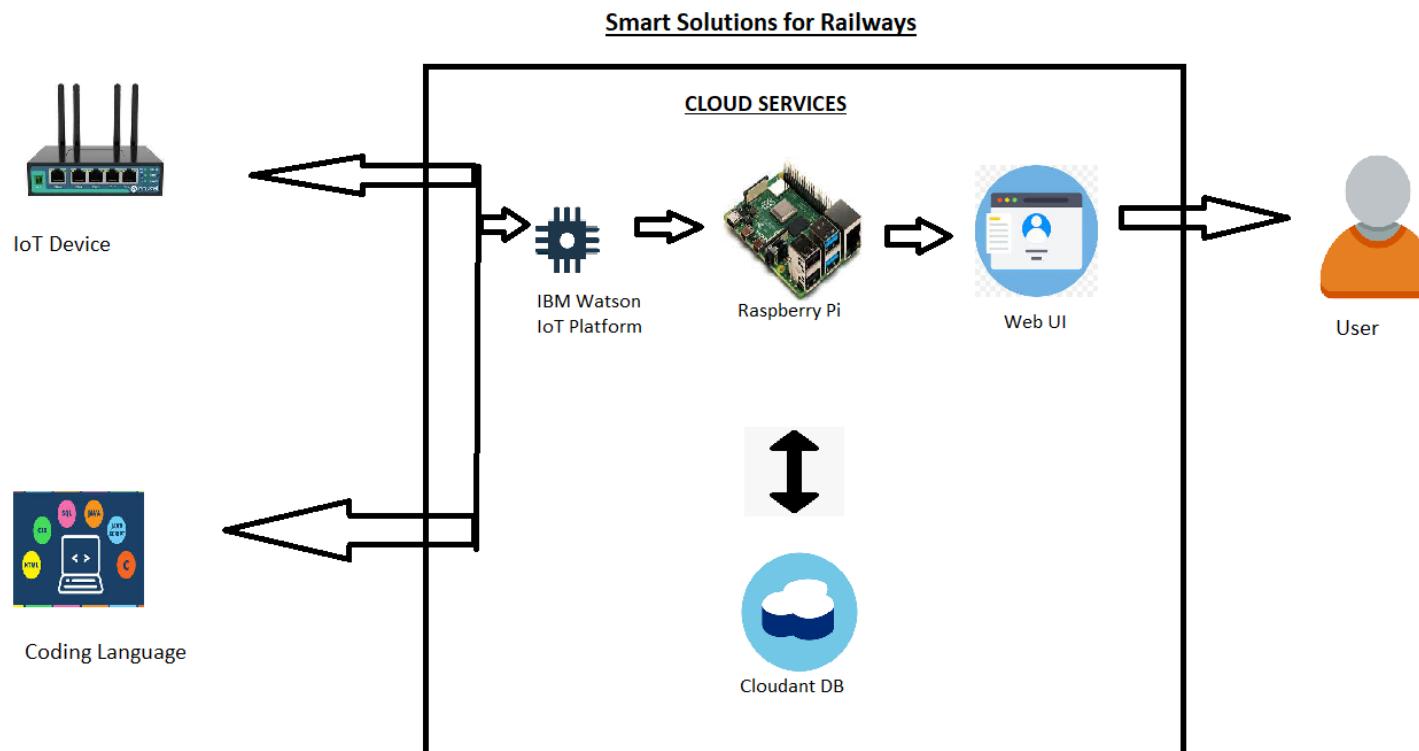


Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	<p>It implies a set of new-generation solutions, services, and modern transportation with the help of Information and Communication Technology (ICT).</p> <p>It combines software products to make more intelligent use of all rail assets, from tracks to trains. Trends such as regulation, sustainability, demographics (growing traffic and aging population), economics (limited public funding and price sensitivity), mobility, and Information Technology (IT) innovations are impacting the rail industry.</p> <p>As a result, every aspect of the value chain — from passenger service to the back-end organization — is changing.</p>	Predictive maintenance and Computerised maintenance management system (CMMS).
2.	Application Logic-1	<p>By using RASPBERRY PI controller performing the processing of real time data obtained from sensors, Smart junction using Raspberry pi based light control system is implemented as key role.</p> <p>This concept is that incoming vehicles at a junction is outfitted with a retractable barrier.</p>	RASPBERRY PI
3.	Application Logic-2	<p>Cloud technology offers a service-oriented architecture, reduced information technology overhead for the end-user, greater for flexibility, reduced total cost of ownership, on-demand services, and many other things.</p>	CLOUD TECHNOLOGY

		The railway department will use the cloud technology to achieve sharing of railway information resources and to improve the capacity of information processing.	
4.	Application Logic-3	Arduino microcontrollers are a great addition to model railroading, especially when dealing with automation.	ARDUINO
5.	Cloud Database	Cloud storage stores data on the Internet through a cloud computing provider who manages and operates data storage as a service. It's delivered on demand with just-in-time capacity and costs and eliminates buying and managing your own data storage infrastructure.	IBM DB2, AWS etc.
6.	File Storage	The passenger data is primarily collected from the passengers in reservation/cancellation Requisition Forms and fed into the system in the form of manual entry. However, in case of online ticketing system, and other queries, the manual entry of passenger data still exists. To bypass the huge overhead of manual entry of this passenger data and to update the existing system to a more efficient one, a new model based on linkage through unique identity is proposed.	Cloud storage
7.	Infrastructure (Server / Cloud)	Cloud computing infrastructure collects hardware and software elements needed to enable cloud storage. It includes computing power, networking, and storage, as well as an interface for users to access their virtualized resources.	Local, Kubernetes etc.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	The open-source framework is a one-stop solution to the constraints, and it enables scalability and superior levels of flexibility. Many open-source IoT frameworks can be downloaded for free and installed quite straightforwardly across the applications. In our project we use Arduino, cloud etc.	Technology of Opensource framework like Arduino etc.
2.	Security Implementations	Ultrasonic sensor is used to detect the crack in the rail track with measuring the distance from track to sensor. Ultrasonic technique is the most effective method which detects cracks on a railway track.	Ultrasonic sensor.
3.	Scalable Architecture	We are using cloud platform, which is virtual, so it doesn't occupy physical space and easy to retrieve. Sensors are easy to handle and maintain.	Cloud platform
4.	Availability	Our idea is to make the crack alert to all the trains passing through that fault-prone area. Introduction of the Internet Of things (IOT) into the existing railway technology, with the help of cloud platform and smart sensors.	IOT with Cloud.

References:

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3581751

[https://www.academia.edu/46925664/Smart Railway Track and Crossing Gate Security System Based on IoT](https://www.academia.edu/46925664/Smart_Railway_Track_and_Crossing_Gate_Security_System_Based_on_IoT)

<https://www.ijert.org/research/a-review-paper-on-smart-railway-crossing-using-microcontroller-IJERTV9IS020070.pdf>

[https://www.researchgate.net/publication/268153491 Application of Smart Computing in Indian Railway Systems](https://www.researchgate.net/publication/268153491_Application_of_Smart_Computing_in_Indian_Railway_Systems)

<http://troindia.in/journal/ijcesr/vol5iss4part3/42-57.pdf>