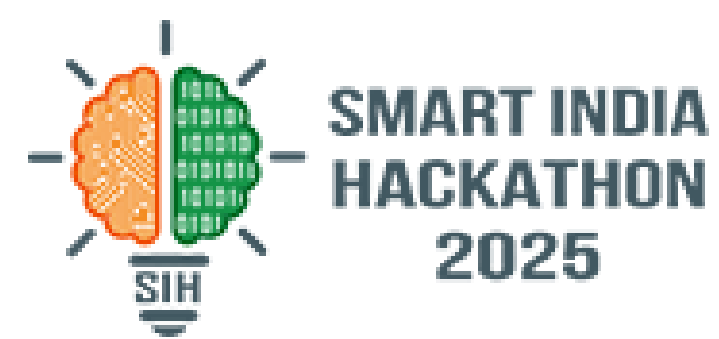# SMART INDIA HACKATHON 2025

INDIAN RAILWAYS

- **Problem Statement ID** - 25022

- **Problem Statement Title** - Maximizing Section Throughput Using Al-Powered Precise Train Traffic Control

- **Theme** - Transportation & Logistics

- **PS Category** - Software

- **Team ID** - ####

- **Team Name** - Techtiks

AI- POWERED TRAFFIC CONTROL

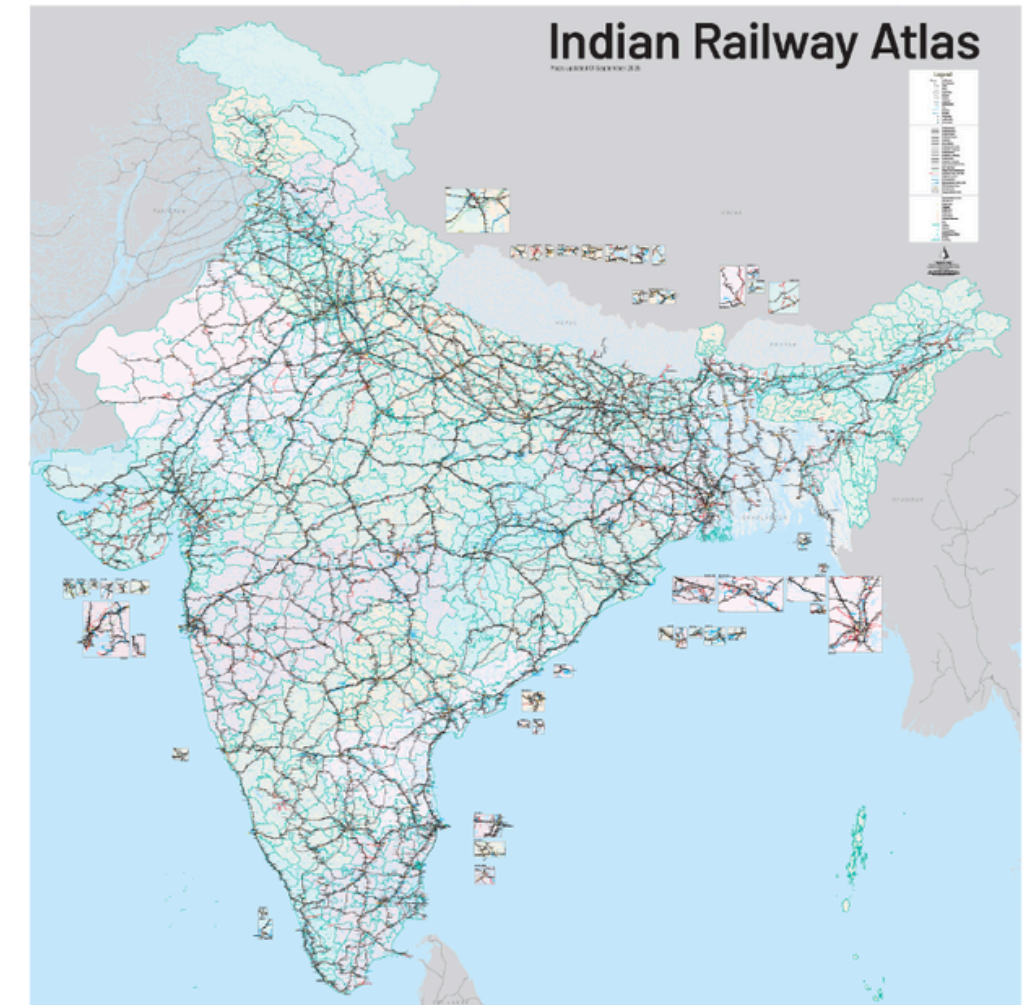○ **<u>Detailed Explanation of the Proposed Solution:-</u>**

- Mapping of railway network.
- Decision making for precedings and crossings (continue or halt or re-route) using following data:
  - Rolling stock status using GPS and GIS.
  - Priorities of various trains according to the railway board .
  - Schedules and time tables of all the trains.
  - Track health (including incidents or cautions), train delays, weather conditions and according to the info provided by the railway staff.
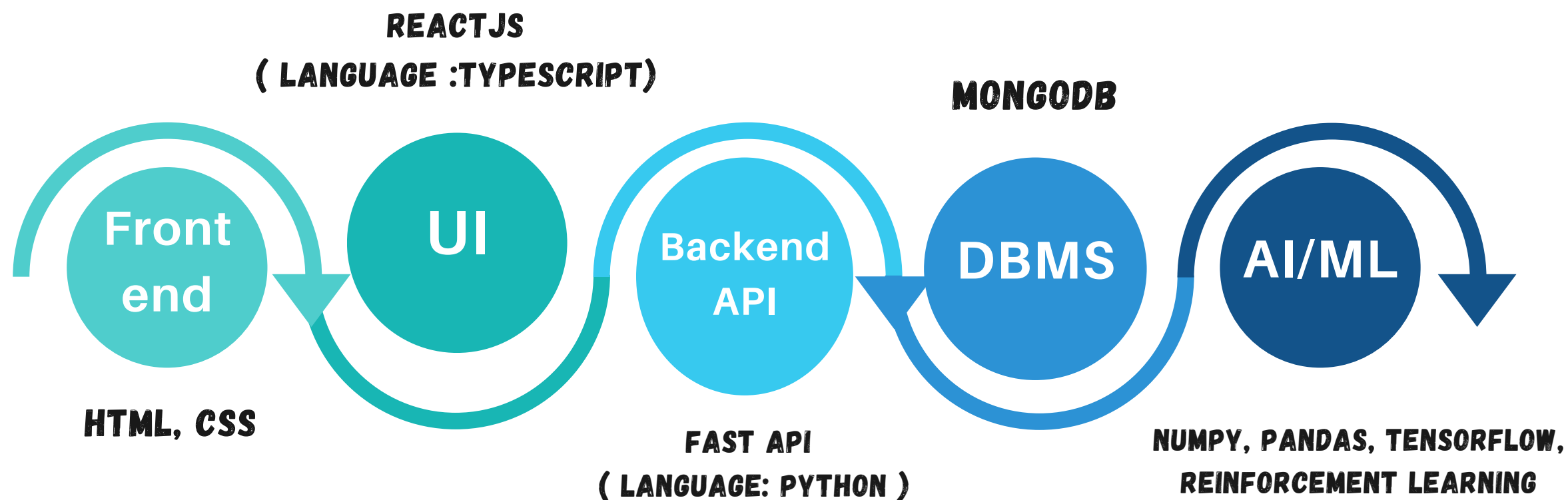
○ **<u>How It Addresses the Problem :-</u>**

- AI constantly re-optimizes train paths using real time data integration to avoid delays and conflicts.
- It can minimize the human errors with predictive analytics & conflict resolution.
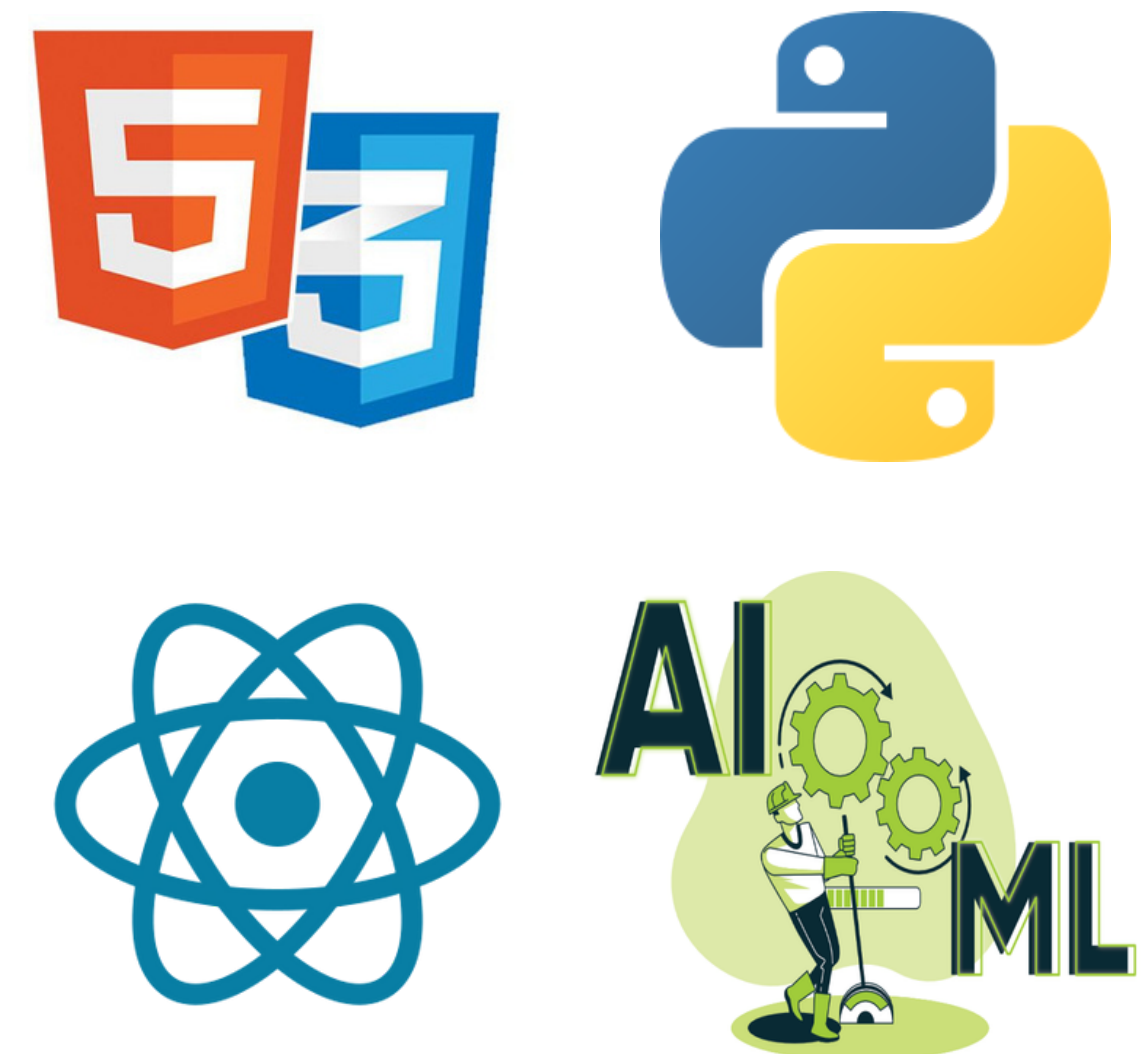
○ **<u>Innovation & Uniqueness of the Solution :-</u>**

- Precision and speed in decision making.
- Timetables and schedules available offline.
- Includes option to override decisions.

Indian Railway Atlas

TECHNICAL APPROACH

- ## Technologies to be used :-

REACTJS
(LANGUAGE :TYPESCRIPT)

MONGODB

Front end **UI** **Backend API** **DBMS** **AI/ML**

HTML, CSS

FAST API
(LANGUAGE: PYTHON)

NUMPY, PANDAS, TENSORFLOW,
REINFORCEMENT LEARNING

- ## Methodology and process for implementation :-

Data Integration & acquisition → **Mapping of the railway network** → **AI-ML model building for Decision Making**

FEASIBILITY AND VIABILITY

○ **Analysis of the feasibility of the idea :-**

- The feasibility of AI-powered train traffic control is high due to rapid technological advancements and the potential benefits outweigh the costs and challenges.

○ **Potential challenges and risks :-**

- If an accident occurs, determining who is at fault becomes a complex legal & ethical dilemma.
- Integrating the real-time mammoth data into a unified platform is a major technical and logistical challenge.
- Railway staff and their unions might oppose it, fearing it could change their roles or lead to layoffs, leading to operational and organizational friction.

○ **Strategies for overcoming these challenges :-**

- We need to create clear laws that define who is responsible if an AI-controlled train has an accident.
- To solve the technical integration issues, a single, unified data platform should be built.
- To address staff and union resistance, railway workers should be involved early in the process and offered training to take on new roles.

IMPACT AND BENEFITS

4

Significant energy and cost savings (efficiently...)

3 Maximized o/p from already available resources & infrastructures.

5 Less carbon footprints due to reduced urban congestion & energy consumption.

2 Improved safety & risk reduction (monitoring all variables & preventing human errors).

6 Boost to public transport with a more predictable, safe, cheap and reliable journey.

1 Less delays & more predictable service (for both passenger transportation & freight logistics).

7 An adaptive & resilient network for unforeseen disruptions, such as weather or incidents.
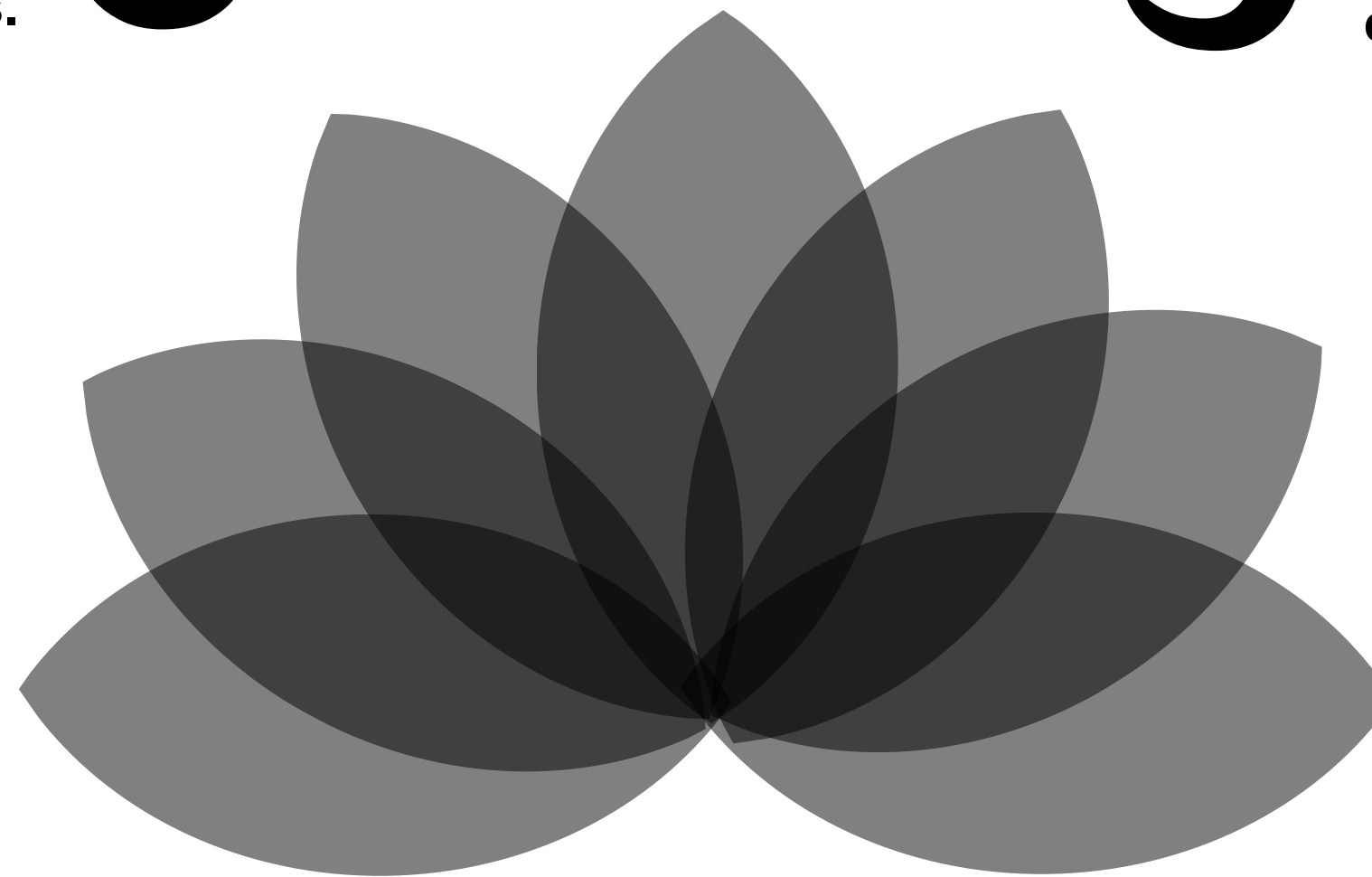
- ○ Wikipedia
- ○ Google Images
- ○ Indian Railways
- ○ python.org
- ○ Pager Duty
- ○ GeeksforGeeks

Thank You !!