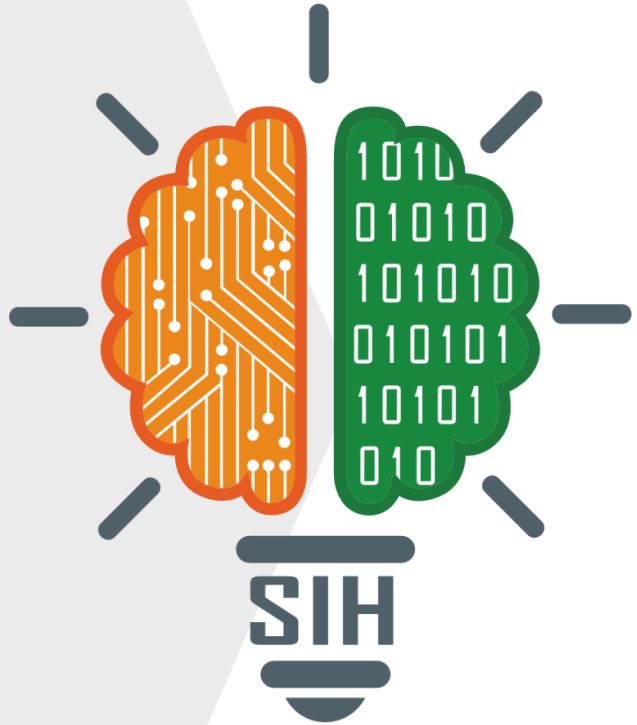
SMART INDIA HACKATHON 2024

- **Problem Statement ID–** SIH1707
- **Problem Statement Title-** Development of a Geolocation-Based Attendance Tracking Mobile Application.
- **Theme-** Miscellaneous
- **PS Category-** Software
- **Team ID-** 788
- **Team Name-** Big Bang

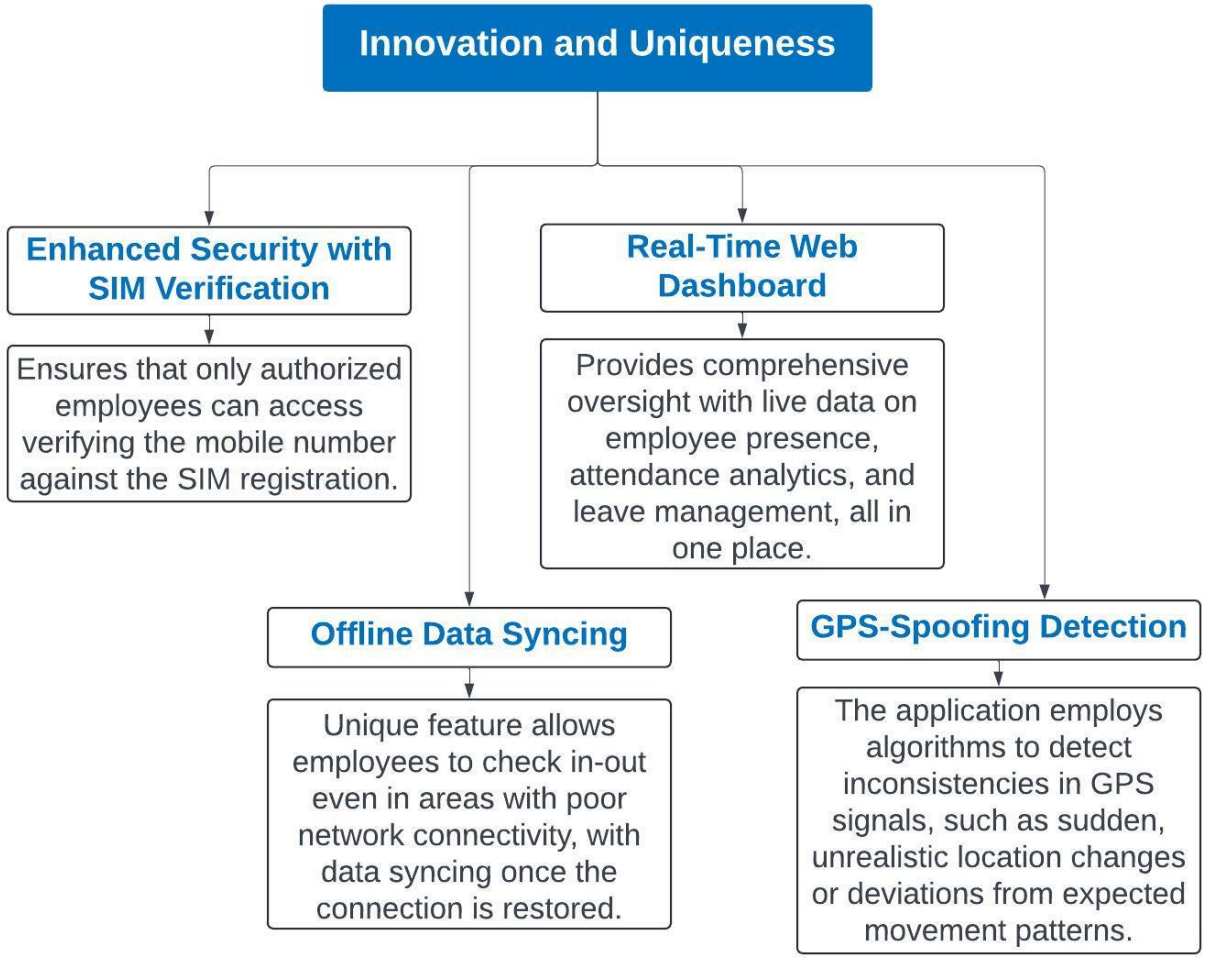


INTRODUCTION:

IDEA/Solution:

Tracking employee attendance accurately and efficiently remains challenging, with existing systems being prone to manipulation and errors. Hence, implementing a geolocation-based, secured attendance tracking system with GPS Precision and Integrity:

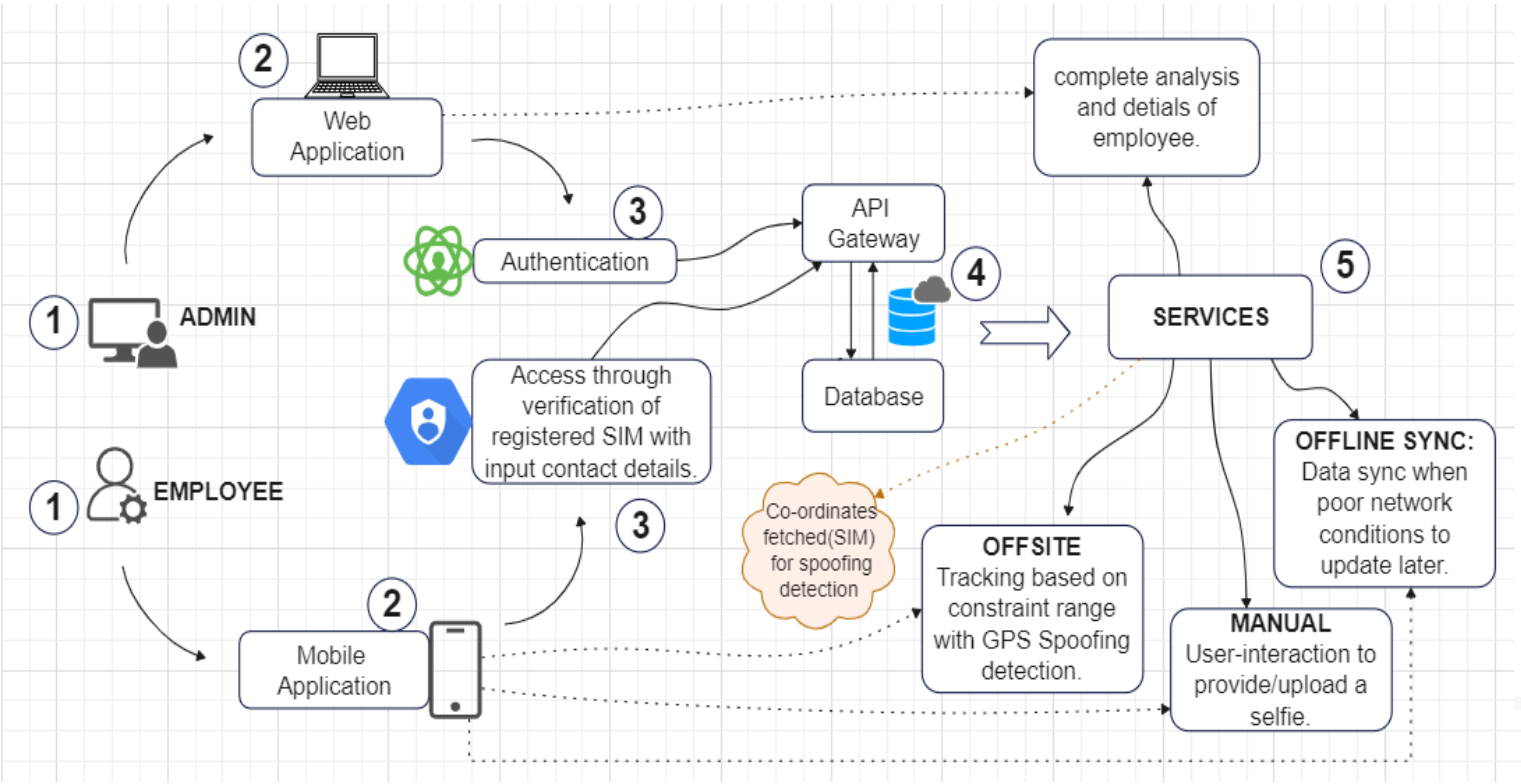
- **Effortless Check-In** through location-based technology to auto-detect employee presence within a precise radius.
- **Offsite Flexibility** Empowering employees to manually log their check-ins/outs through data inputs.
- **Real-time Location**: Continuously tracking employee location with GPS coordinates (longitude/latitude) with spoofing techniques.
- Calculate **Total Working Hours** through attendance logs based on accurate check-in/check-out data.



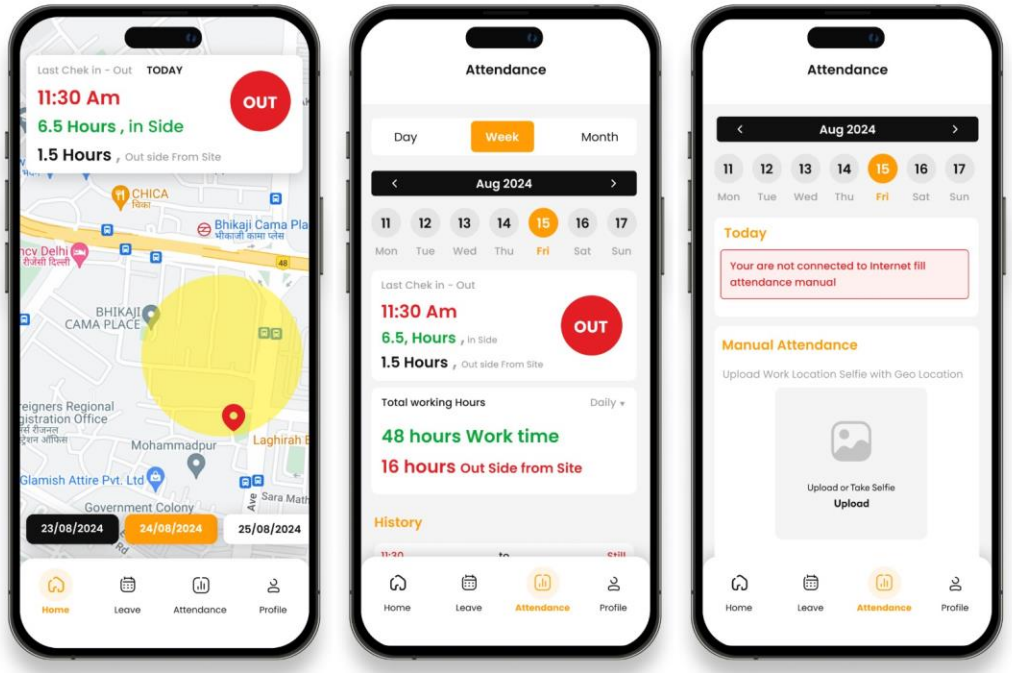
Note: Working Demo of GPS Spoofing Detection in a video

TECHNICAL APPROACH:

❑ System Architecture Diagram:



❑ UI/UX Design:



❑ **GitHub repository:** GAIL(SIH)

❑ Tech-Stack:

Android Application: Using **Flutter** framework to build a mobile application, ensuring cross-platform compatibility.
Web application: With a combination of **ReactJS, Django**, and **Redux** for the web dashboard, integrating open-source UI libraries.
Firebase and **PostgreSQL** are used for authentication, managing structured data and complex queries.

FEASIBILITY AND VIABILITY

Feasibility:

➢ Technical Feasibility

Geolocation Accuracy for precise tracking.

Optimized location checks to **minimize battery drain.**

Cloud-based infrastructure ensures **system scalability.**

➢ Financial Feasibility

Manageable development costs with open-source tools & repos.

Reduces admin costs & improves **operational efficiency**.

➢ Operational Feasibility

Simple, **intuitive design** ensuring easy adoption & minimal training.

Seamless integration with existing HR and payroll systems.

➢ Legal & Ethical Feasibility

Adheres to **data protection** regulations.

Transparent privacy **policies** for trust building.

Potential challenges & strategies:

➢ Geolocation Accuracy

Challenge: GPS accuracy may be unreliable in dense urban areas.

Strategy: Hybrid GPS-Wi-Fi-Bluetooth approach to improve accuracy.

➢ Battery Consumption

Challenge: GPS tracking may drain mobile device batteries quickly.

Strategy: Optimize GPS usage and use low-power location services.

➢ Network Connectivity

Challenge: Poor network can disrupt real-time attendance tracking.

Strategy: Enable offline data storage with automatic syncing once a connection is restored.

➢ System Security

Challenge: Risk of unauthorized access to sensitive data.

Strategy: Use multi-factor authentication(SIM verification + other Credentials) to ensure complete security.

IMPACT AND BENEFITS

Potential Impact on Employees:

- ✓ **Increased Productivity**:

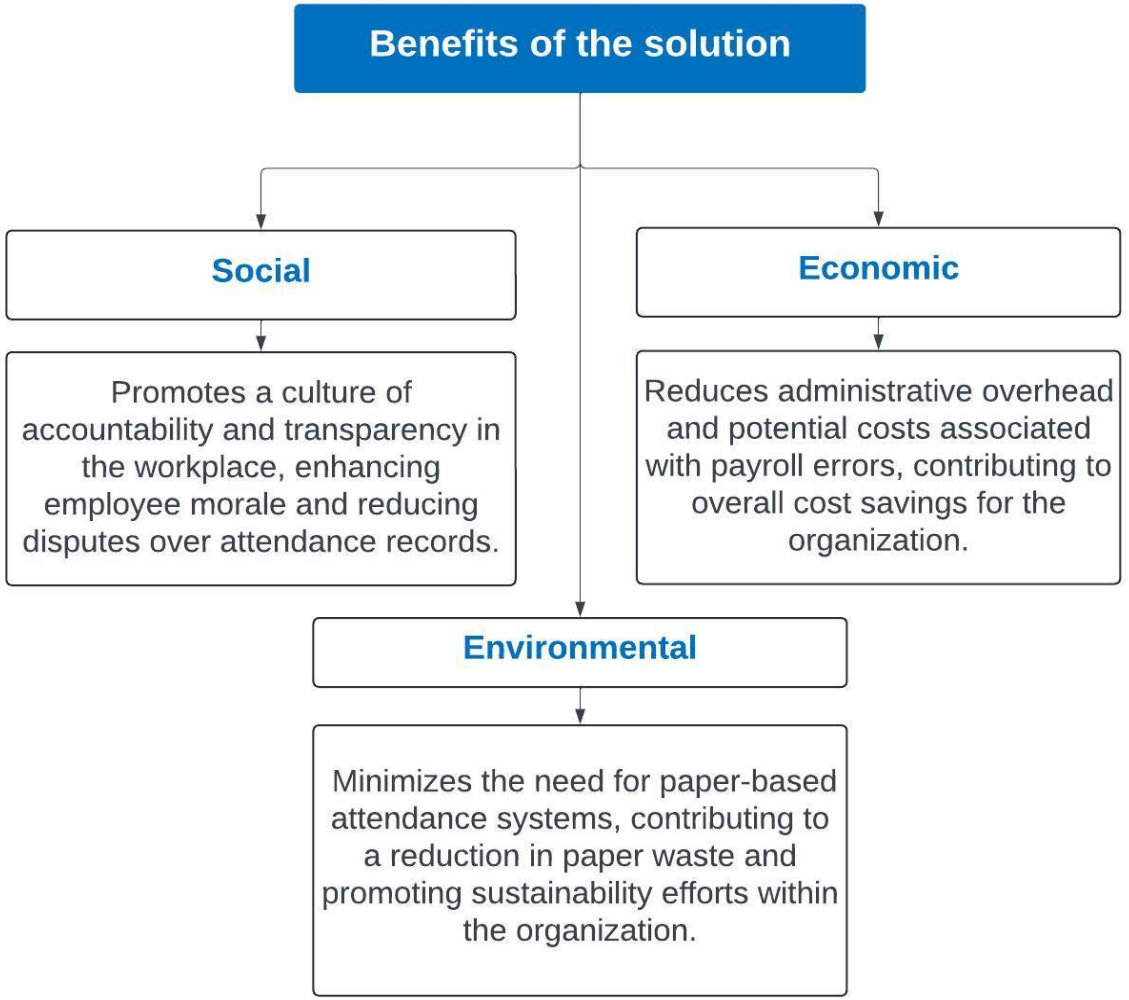
  Automated attendance tracking allows employees to focus more on their work, reducing the time spent on manual check-ins.

- ✓ **Improved Accuracy**:

  Eliminates **human errors** in attendance records, ensuring **accurate** payroll and **compliance**.

- ✓ **Enhanced Employee Satisfaction**:

  Provides a seamless and **transparent** attendance system, improving trust and engagement among employees.



RESEARCH AND REFERENCES

❖ **Geofencing in location-based behavioral research: Methodology, challenges, and implementation (Year:2023)**
https://link.springer.com/article/10.3758/s13428-023-02213-2

❖ **Design and Development of Geofencing Based Attendance System for Mobile Application (Year:2022)**
https://ieeexplore.ieee.org/document/9791781

❖ **Web Based Attendance Management System Using Geo-Location (Year:2023)**
https://ieeexplore.ieee.org/document/10142506

❖ **A Real-Time Attendance Capturing System Using 2-step Authentication (Year:2023)**
https://ieeexplore.ieee.org/document/10151217

❖ **Attendance System Based on Face Recognition and GPS Tracking and Positioning (Year:2020)**
https://ieeexplore.ieee.org/document/9607297

Revenue stream: Subscription Model with Features based plans

Potential Business Market:

1) Manufacturing Sector
2) Finance Sector
3) Government Agencies
4) University & Collages