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Kanwariya Sewa: A Smart Logistics and Wellness Platform for Pilgrimage Support Using Real-Time Tracking and Emergency Response System

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Abstract: Large-scale religious pilgrimages such as the Kanwar Yatra involve millions of pilgrims traveling across long routes, which creates challenges in crowd management, emergency response, health support, and facility coordination. Traditional management systems mainly depend on manual monitoring and lack real-time digital support. This paper presents **"Kanwariya Sewa"**, a smart logistics and wellness platform designed to improve pilgrim safety and coordination using modern web technologies. The proposed system provides features such as pilgrim registration, real-time location tracking, SOS emergency alerts, facility mapping, and centralized administration.

The platform is developed using **React.js** for the frontend, **Node.js and Express.js** for the backend, and **MongoDB** as the database. Google Maps API is integrated for route and location services.

The proposed system improves emergency response time, enhances coordination between pilgrims and volunteers, and provides a scalable digital solution for pilgrimage management aligned with Digital India initiatives.

Keywords: Pilgrimage Management, Emergency Response System, Real-Time Tracking, Smart Logistics, Kanwar Yatra, Web Application

I. INTRODUCTION

pilgrimages in India attract millions of devotees every year. Among them, the Kanwar Yatra is one of the largest annual religious gatherings where pilgrims travel long distances carrying holy water. Managing such a massive crowd is a major challenge for authorities due to issues related to safety, medical emergencies, traffic congestion, and communication.

Currently, most pilgrimage management processes are manual and lack technological integration. Pilgrims often face difficulties in locating medical camps, food centers, and resting areas. In emergency situations, response time is slow due to the absence of centralized monitoring systems.

To address these challenges, this paper proposes Kanwariya Sewa, a smart web-based platform that provides real-time tracking, SOS emergency support, and facility mapping for pilgrims. The system aims to improve safety, coordination, and resource management during large-scale religious events.

II. LITERATURE REVIEW

A. Existing Systems

Existing pilgrimage management systems mainly rely on manual crowd monitoring and traditional communication methods. Police departments and volunteers are responsible for handling emergency situations and managing facilities.

B. Limitations of Existing Systems

The current systems suffer from several limitations:

• Lack of real-time location tracking
• No centralized emergency response system
• Limited communication between authorities and pilgrims

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• Difficulty in locating nearby facilities
• Slow response during emergencies

C. Research Gap

Most existing systems focus only on crowd management and do not provide an integrated digital platform for pilgrims, volunteers, and administrators. Therefore, there is a need for a smart and scalable pilgrimage support system.

III. PROPOSED SYSTEM

A. System Overview

Kanwariya Sewa is a web-based smart logistics and wellness platform designed to support pilgrims during large-scale religious events.

The system provides:

• Pilgrim registration
• Real-time GPS tracking
• SOS emergency alerts
• Facility mapping
• Admin dashboard monitoring

B. System Architecture

The proposed architecture follows a client-server model.

Components:

1. Frontend Interface (React.js)
2. Backend Server (Node.js + Express.js)
3. MongoDB Database
4. Google Maps API
5. Admin Dashboard

C. Workflow of the System

1. User registers into the system
2. User logs into dashboard
3. User can view maps and facilities
4. In emergency, user presses SOS button
5. GPS location is sent to server
6. Admin and volunteer are notified
7. Emergency assistance is provided

IV. TECHNOLOGY STACK

A. Frontend Technologies

• React.js
• HTML
• CSS
• JavaScript

B. Backend Technologies

• Node.js
• Express.js

C. Database

• MongoDB

D. APIs and Tools

• Google Maps API
• Firebase Notifications
• Postman
• VS Code

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V. METHODOLOGY

The proposed system "Kanwariya Sewa" follows a structured methodology for developing a smart logistics and wellness platform for pilgrimage support. The methodology includes requirement analysis, system design, implementation, testing, and deployment. The complete workflow of the system is shown below.

A. Requirement Analysis

In the initial phase, the problems faced during large-scale pilgrimages were analyzed. The major issues identified include:

- Lack of emergency response system
- No real-time tracking of pilgrims
- Difficulty in locating nearby facilities
- Manual coordination between authorities and volunteers
- Lack of centralized monitoring system

Based on these challenges, the functional and non-functional requirements of the system were identified.

Functional Requirements

- User Registration and Login
- GPS Location Tracking
- SOS Emergency Alert System
- Facility Mapping
- Admin Dashboard

Non-Functional Requirements

- Security
- Scalability
- Reliability
- Fast Response Time
- User-Friendly Interface

B. System Design

The system follows a client-server architecture. The frontend is developed using React.js to provide an interactive user interface, while the backend is developed using Node.js and Express.js for handling APIs and server-side operations. MongoDB is used for storing user and emergency data.

The system contains three major modules:

1. Pilgrim Module
2. Admin Module
3. Volunteer Module

C. User Registration and Authentication

Pilgrims can create an account using their mobile number or email ID. Authentication is handled securely through backend APIs. After successful login, the user gains access to the dashboard and system services.

The registration process includes:

- Name
- Contact Number
- Route Information
- Emergency Contact Details

D. Real-Time Location Tracking

The system uses GPS and Google Maps API for real-time location tracking. Pilgrims can view their routes and nearby facilities through an interactive map interface.

The location data is continuously updated and stored in the database, enabling authorities to monitor crowd movement efficiently.

Tracking Process

1. User enables GPS
2. Application fetches coordinates
3. Coordinates sent to backend server
4. Data stored in MongoDB
5. Location displayed on map

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E. SOS Emergency Alert System

The SOS module is one of the core features of the proposed system. In case of any emergency, pilgrims can press the SOS button available in the application.

Once activated:

1. User location is captured automatically
2. Emergency alert is sent to the server
3. Admin dashboard receives notification
4. Nearby volunteers are informed
5. Emergency assistance is provided

This process significantly reduces emergency response time.

F. Facility Mapping System

The platform provides information about nearby facilities such as:

• Medical Camps
• Food Centers
• Rest Areas
• Water Stations

These facilities are mapped using Google Maps API. Users can search and navigate to nearby services easily.

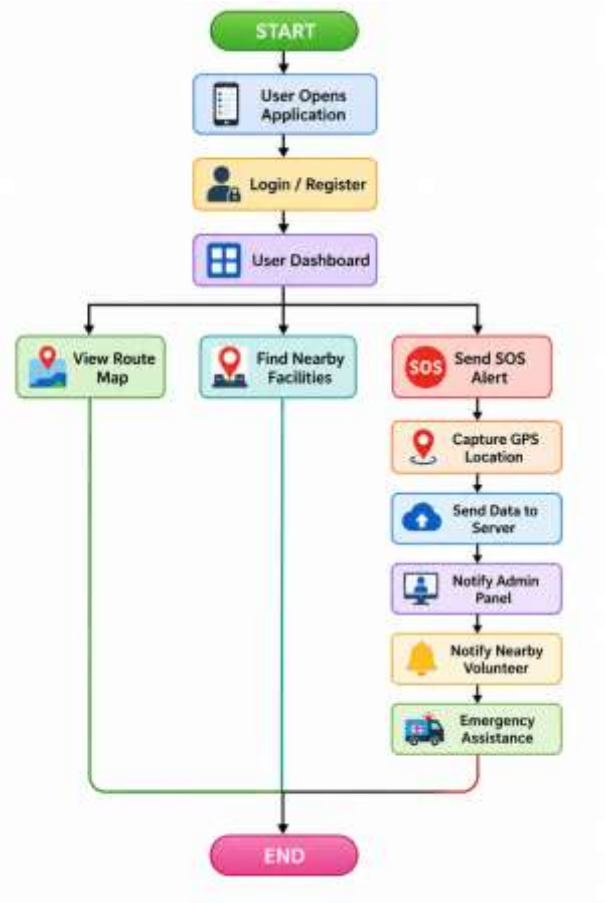
G. Admin Dashboard

The admin dashboard provides centralized monitoring and management functionalities.

The admin can:

• Monitor registered pilgrims
• View live locations
• Handle SOS requests
• Manage volunteers
• Add or update facility information

This improves coordination and resource management during large-scale events.



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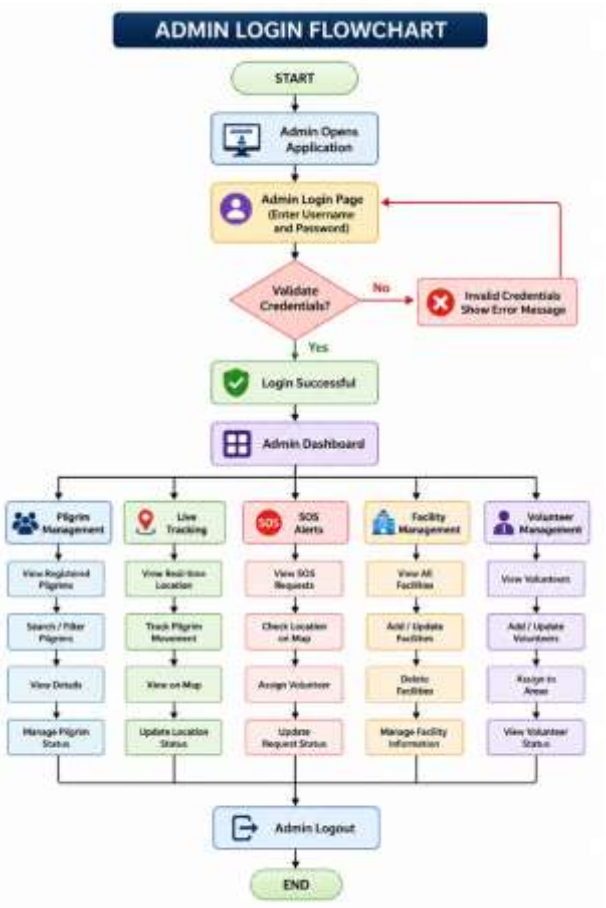

Fig.1. Flowchart of methodology

V. SYSTEM IMPLEMENTATION

The proposed system "Kanwariya Sewa" was implemented as a smart web-based platform to support pilgrims during large-scale religious events. The system was divided into multiple functional modules for better management, scalability, and performance. The implementation mainly focuses on pilgrim assistance, emergency response, and centralized administration.

A. Pilgrim Module

The Pilgrim Module is designed for users participating in the pilgrimage. This module provides all essential services required by pilgrims during their journey.

Features of Pilgrim Module

- User Registration and Login
- Real-Time Route Navigation
- GPS Location Tracking
- Nearby Facility Search
- SOS Emergency Alert System
- Health and Safety Support

Working of Pilgrim Module

1. Pilgrim creates an account using registration form
2. User logs into the platform securely
3. Dashboard provides access to maps and facilities
4. GPS tracking helps users navigate routes
5. In emergency situations, user can press SOS button

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This module improves safety, accessibility, and communication for pilgrims.

B. Admin Module

The Admin Module provides centralized monitoring and management functionalities for handling pilgrimage activities efficiently.

Features of Admin Module

• Monitor Registered Pilgrims
• Track Live User Locations
• Manage SOS Emergency Requests
• Add or Update Facilities
• Manage Volunteers
• Monitor Crowd Movement

Working of Admin Module

1. Admin logs into dashboard
2. Dashboard displays real-time pilgrim information
3. Admin monitors GPS locations of users
4. SOS alerts are received instantly
5. Admin assigns volunteers during emergencies
6. Facility information is updated regularly

The admin dashboard improves coordination, management efficiency, and emergency response during large-scale events.

C. Volunteer Module

The Volunteer Module helps volunteers provide emergency assistance and support services to pilgrims.

Features of Volunteer Module

• Receive SOS Notifications
• View Emergency Locations
• Accept Emergency Requests
• Update Assistance Status
• Communicate with Admin

Working of Volunteer Module

1. Volunteer logs into the system
2. Emergency alerts are received from admin panel
3. Volunteer checks pilgrim location through map
4. Volunteer provides emergency assistance
5. Request status is updated in the system

This module helps reduce emergency response time and improves safety management during pilgrimas

A. Application Setup and Execution

The “Kanwariya Sewa” system was developed and executed using modern web development technologies and tools. The application setup process includes frontend configuration, backend server setup, database integration, and API implementation.

The complete system was executed in a local development environment before deployment.

B. Evaluation Strategy

The evaluation strategy of the proposed system “Kanwariya Sewa” was designed to analyze the performance, reliability, usability, and effectiveness of the application during pilgrimage management and emergency handling.

The system was evaluated using different testing methods and performance parameters to ensure proper functionality of all modules.

A. **Results**

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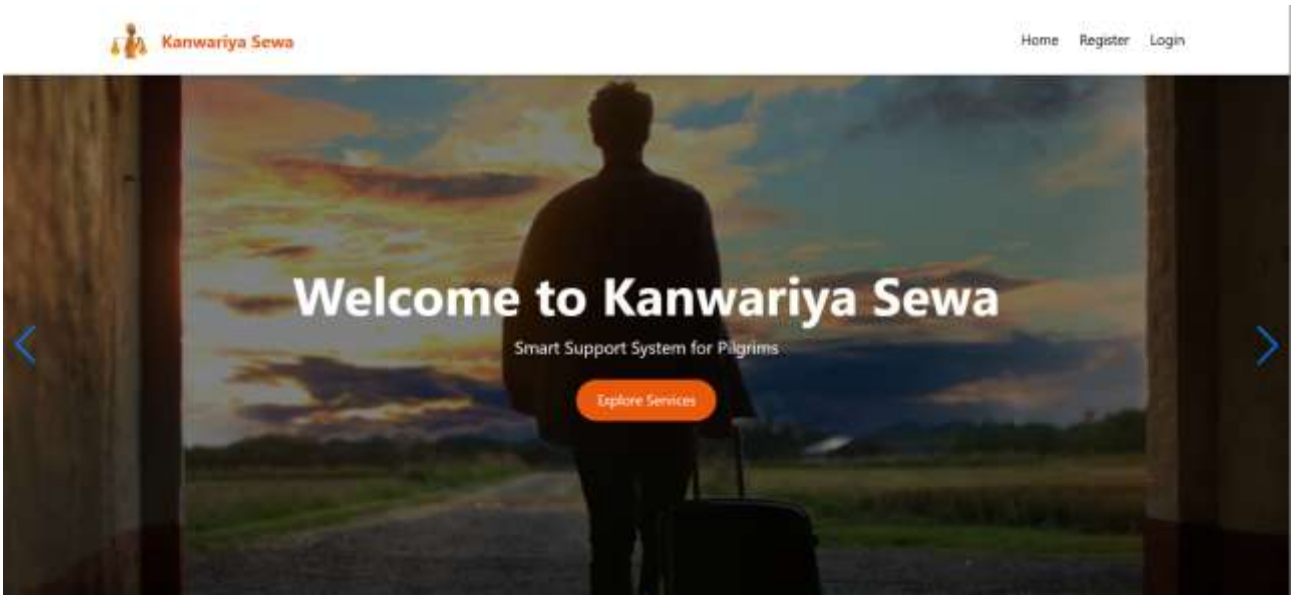

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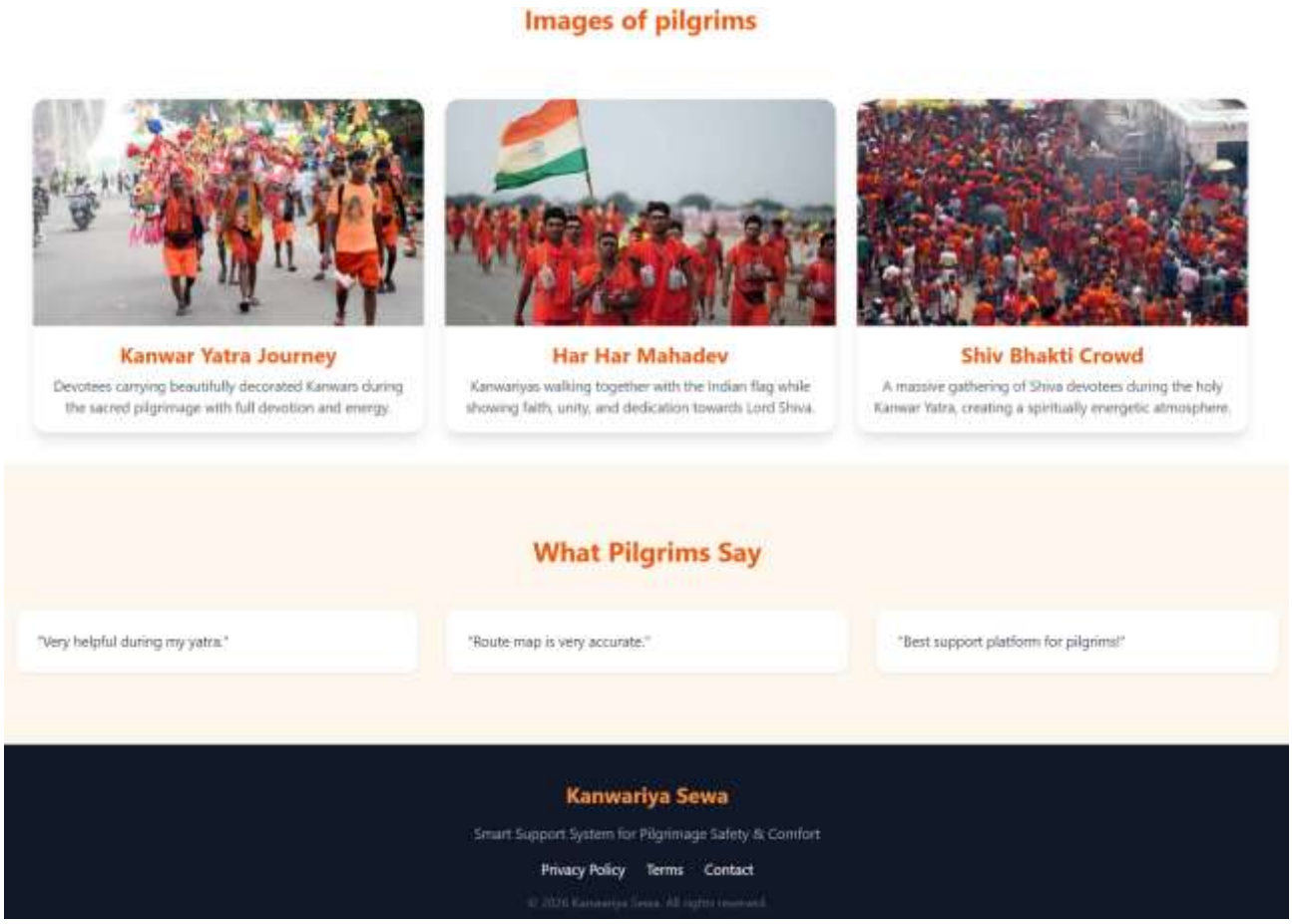

1. Home Page

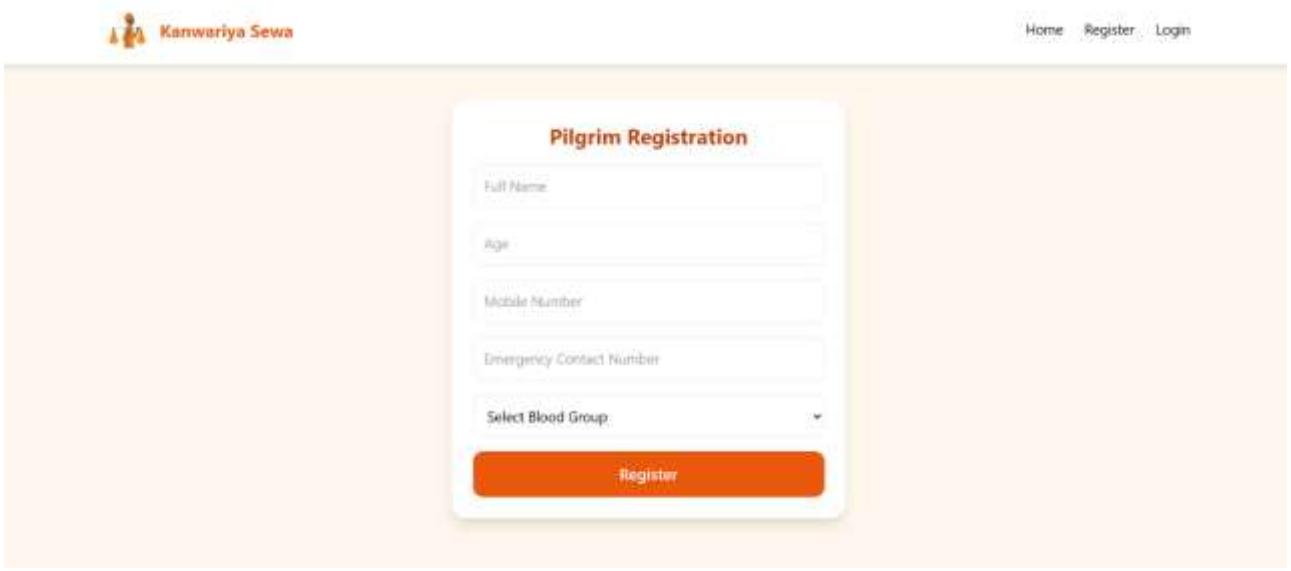

Fig 2. Registration Page

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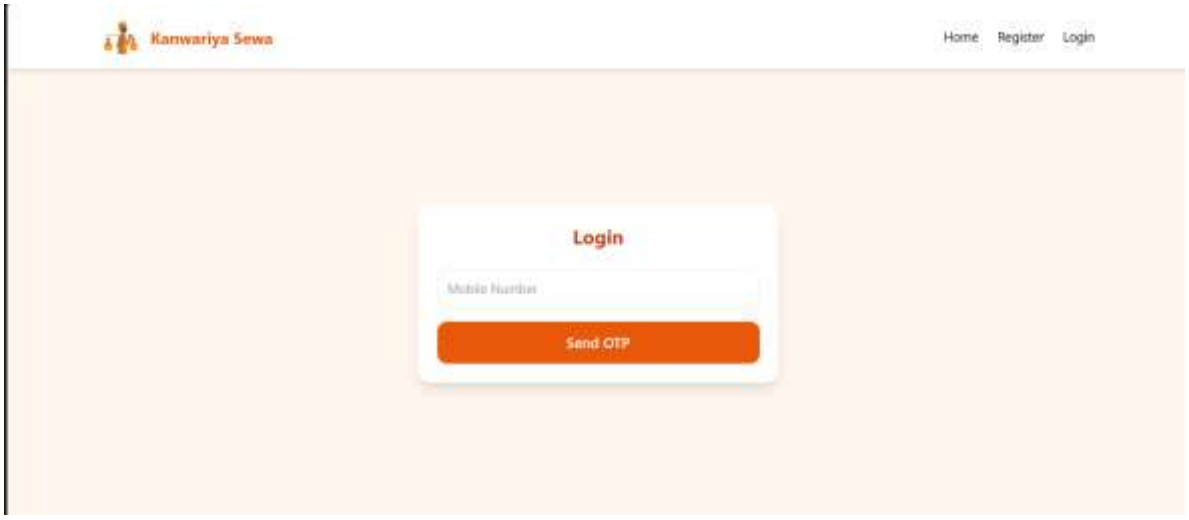

Fig 3. Login Page

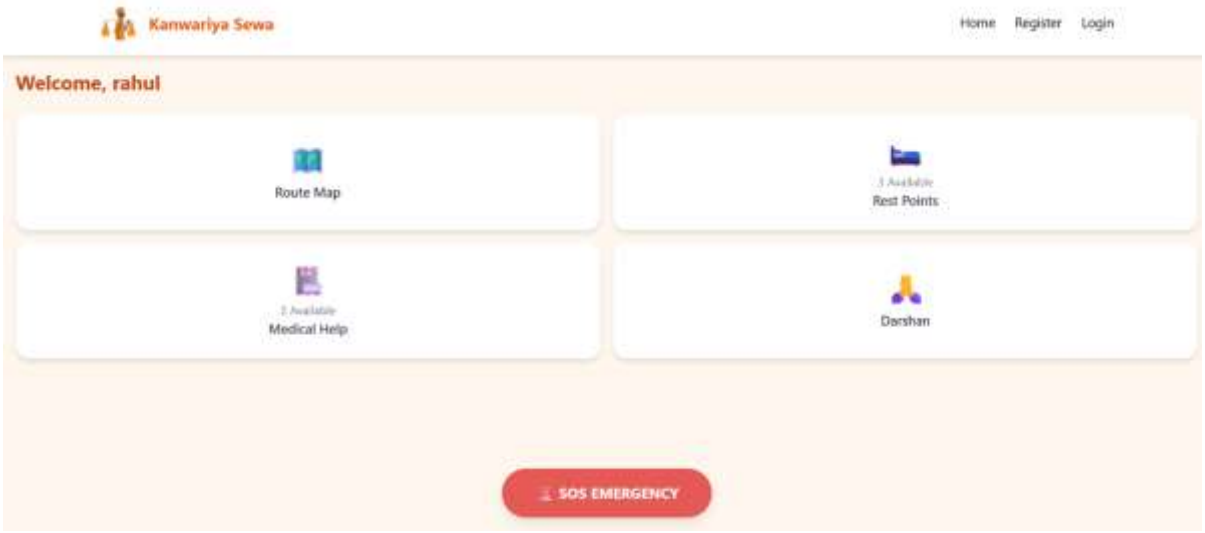

Fig.4 Dashboard Page

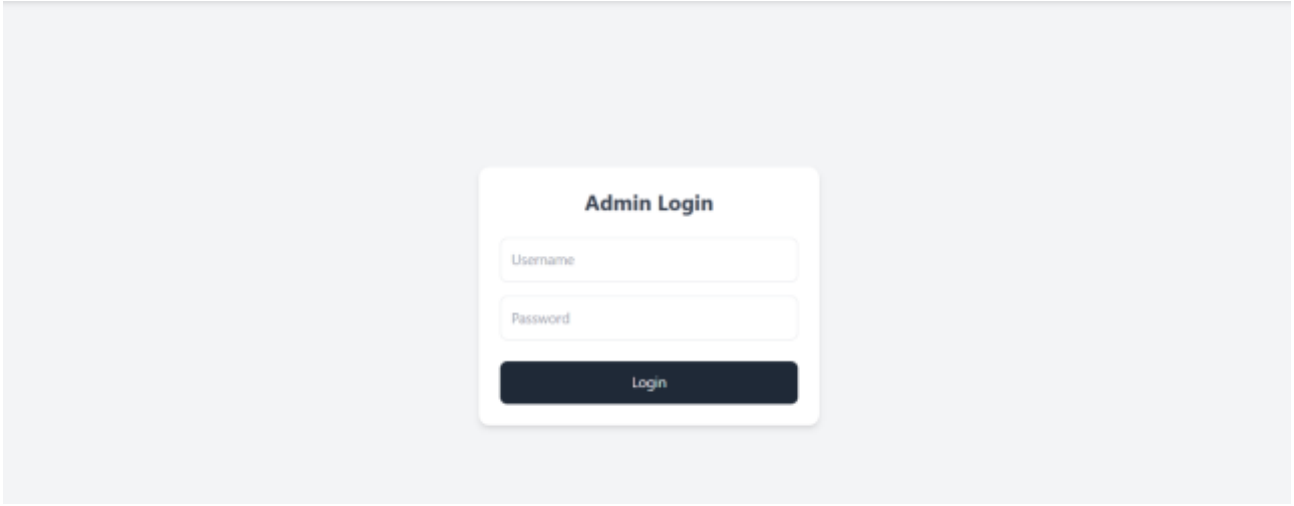

Fig 5. Admin Login

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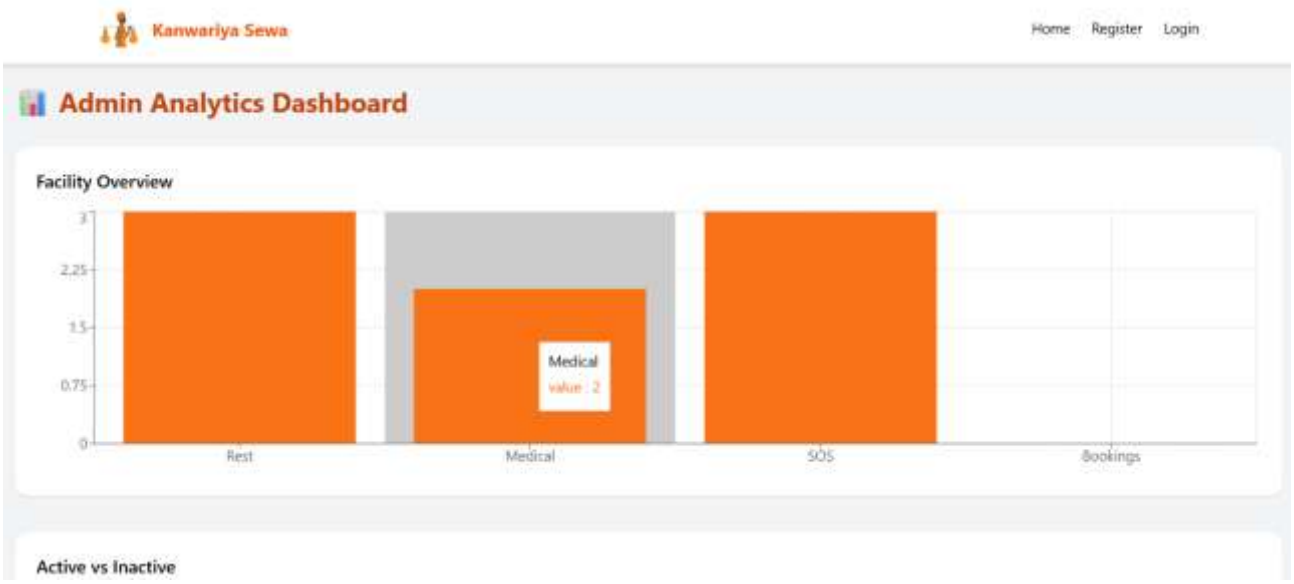

Fig 6. Analytics Page

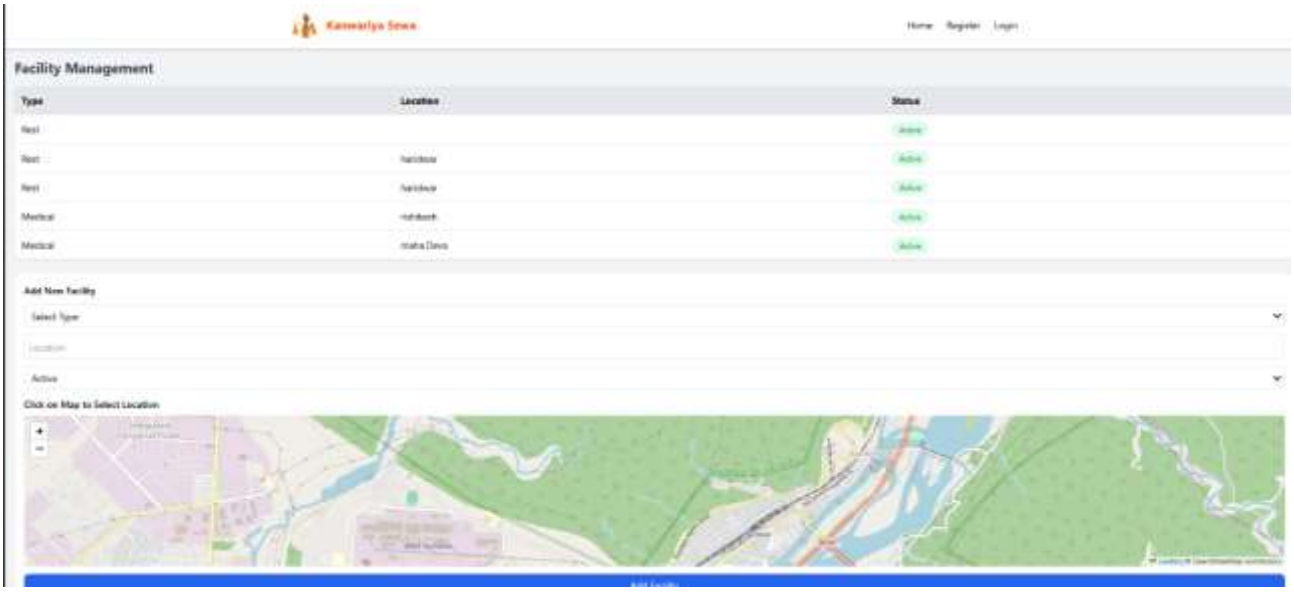

Fig 7. Facility Management Page

VI. RESULTS AND DISCUSSION

The proposed system "Kanwariya Sewa" was successfully designed and implemented to improve pilgrimage management and emergency support during large-scale religious events. The developed platform provides a centralized digital solution for pilgrims, volunteers, and administrators.

The system was tested on different modules including user registration, GPS tracking, SOS emergency alerts, and facility mapping. The results demonstrate that the platform effectively improves communication, coordination, and emergency response.

A. User Registration and Authentication Results

The registration and login module successfully allows pilgrims and administrators to create secure accounts and access the system functionalities. The authentication process ensures secure access to user data and administrative controls.

Observed Results

- Fast and secure login process
- Easy user registration
- Reduced manual data management

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• Improved accessibility for users

B. Real-Time Tracking Results

The GPS-based tracking module successfully tracks user locations in real time using Google Maps API. Pilgrims can view routes and nearby facilities directly on the map.

Benefits Achieved

• Accurate location tracking
• Better crowd monitoring
• Improved route navigation
• Easy identification of user locations during emergencies

The tracking system helps administrators monitor crowd movement effectively during pilgrimage events.

C. SOS Emergency System Results

The SOS emergency feature performed successfully during testing. When the SOS button is pressed, the system captures the GPS location and sends alerts to the admin dashboard and nearby volunteers.

Outcomes

• Faster emergency response time
• Immediate location sharing
• Improved communication during emergencies
• Better coordination between volunteers and authorities

This feature significantly enhances pilgrim safety.

D. Facility Mapping Results

The facility mapping system allows users to locate nearby medical camps, food centers, water stations, and resting areas through an interactive map interface.

Advantages

• Easy navigation to facilities
• Reduced confusion among pilgrims
• Improved accessibility to emergency services
• Better resource management

E. Admin Dashboard Performance

The admin dashboard successfully provides centralized monitoring of pilgrims, SOS alerts, volunteer management, and facility information.

Dashboard Features Tested

• Live user monitoring
• SOS alert handling
• Volunteer assignment
• Facility management

The dashboard improves operational efficiency and simplifies event management.

F. System Performance Analysis

The proposed system demonstrated good performance in terms of speed, responsiveness, and scalability.

Performance Parameters

Parameter	Result
Login Response Time	Fast
SOS Alert Response	Immediate
GPS Tracking Accuracy	High
User Interface	User Friendly
Database Performance	Efficient

G. Discussion

The implementation of Kanwariya Sewa demonstrates how modern web technologies can improve the management of large-scale religious gatherings. The integration of GPS tracking, emergency alerts, and centralized administration provides a scalable and efficient solution for pilgrimage support.

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Compared to traditional manual systems, the proposed platform improves safety, reduces emergency response time, and enhances communication between pilgrims, volunteers, and authorities.

The project also supports the vision of Digital India by introducing technology-driven public management solutions.

VII. CONCLUSION

Kanwariya Sewa provides a scalable, reliable, and technology-driven solution for pilgrimage management and emergency support during large-scale religious events. The proposed system successfully addresses major challenges faced by pilgrims and authorities, including crowd management, emergency response, facility accessibility, and communication coordination.

The platform integrates modern web technologies such as React.js, Node.js, Express.js, MongoDB, and Google Maps API to create a centralized and user-friendly system. Features like real-time GPS tracking, SOS emergency alerts, facility mapping, and admin monitoring significantly improve safety and operational efficiency during pilgrimage events.

The implementation and testing results demonstrate that the system effectively reduces emergency response time and improves coordination between pilgrims, volunteers, and administrators. The platform also enhances accessibility to essential services such as medical camps, food centers, water stations, and rest areas.

In addition, the project highlights how digital technologies can be utilized to solve real-world public management problems and support smart event management systems. The proposed solution aligns with the vision of Digital India by promoting technology-based public safety and resource management.

Overall, Kanwariya Sewa represents an innovative and practical approach toward improving the safety, management, and overall experience of pilgrims during large religious gatherings.

VIII. FUTURE SCOPE

The proposed system “Kanwariya Sewa” provides a smart and scalable solution for pilgrimage management and emergency support. Although the current system successfully improves safety and coordination, several advanced features can be added in the future to further enhance the performance and usability of the platform.

A. Artificial Intelligence Based Crowd Prediction

Future versions of the system can integrate Artificial Intelligence (AI) and Machine Learning algorithms to predict crowd density and movement patterns. This will help authorities manage traffic, avoid overcrowding, and improve safety during large religious gatherings.

B. Wearable Health Monitoring Devices

The platform can be integrated with wearable health monitoring devices such as smart bands and fitness trackers. These devices can monitor health parameters like heart rate, body temperature, and oxygen level in real time, allowing faster medical assistance during emergencies.

C. Government and Emergency Service Integration

The system can be connected with government emergency services, hospitals, police departments, and disaster management systems. This integration will improve coordination and provide faster emergency response.

D. Mobile Application Development

Currently, the system is implemented as a web-based platform. In the future, dedicated Android and iOS mobile applications can be developed to provide better accessibility, push notifications, and offline support.

E. Multi-Language Support

To improve accessibility for users from different regions, the system can include multi-language support. Pilgrims will be able to use the platform in their preferred language, making the application more user-friendly.

F. Offline GPS and Navigation Support

Future improvements can include offline GPS tracking and navigation services for areas with poor internet

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connectivity. This feature will ensure uninterrupted support during long pilgrimage routes.

G. Cloud-Based Scalability

The system can be fully deployed on cloud platforms to support millions of users simultaneously. Cloud deployment will improve scalability, reliability, and real-time performance during large-scale events.

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