# Safety and Rapid Automatic Disaster Helpline Intimation (SARADHI)

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**ABSTRACT:**
The combination of Disaster Management and the Hospital Management System is a platform that provides and supports comprehensive assistance after the occurrence of natural disasters such as earthquakes, floods, tsunamis and as well as manmade health situations such as road, fire accidents, and medical emergencies. It integrates real-time live alerts for real notifications. The project is GPS enabled safe-route navigation helps people reach safety locations and needy points such as grocery stock etc effectively, while shelter identification guarantees access to secure locations. SOS (Save Our Soul) services provide safe zones and shelters with offline functionality with lower internet areas. Multilingual support, is provided by Natural Language Processing (NLP) using i18n, ensuring language barriers having access to critical information such as locations etc. This language feature is more important in illiterate areas such as rural areas. These robust features enables it improving the gap between users and other external resources in disaster response, guaranteeing safety for all the citizens. By providing assistance, navigation, and support, it plays a significant role in saving lives and improving disaster impact. Not only the disaster management, but also concentrate on medical emergency management making this app performs dual role and easy to use for even illiterate people. This platform's accuracy lies within its ability to provide critical information such as disaster type, location and services, facilitating a more adaptable and responsive society application. The Disaster Management System is a major component of disaster response, boosting safety and saving lives in terms of both the emergency alert tracking and disaster management.

**Keywords** Artificial intelligence; natural language processing; i18n; SOS service

## I. INTRODUCTION:

The system provides comprehensive disaster assistance, supporting both natural disasters such as earthquakes, floods, cyclones, and man-made disasters such as fire accidents and road accidents. It includes real-time live alerts to deliver timely notifications, while GPS-based safe route navigation helps to guide users with the safest paths/routes after emergencies. The platform also responsible for shelter identification by government volunteers and help users navigate to nearby safe zones, and SOS services that offer emergency. It is designed for resilience, which ensures offline functionality to maintain application even in low or no internet conditions. Also, this application provides multilingual support through NLP-based language selection while registration and follow that language for that particular user.

Thus, the system enhances accessibility for rural, coastal, and linguistical diverse communities. The system could deliver accurate and localized warnings to help people take immediate action. This app would also include GPS-based safe-route navigation, which automatically identifies the safest and shortest escaping routes during emergencies with safe zone identification. The users could easily locate safe zones, shelters, or hospitals based on their current location. To support rescue coordination, the application allows volunteers, and victims to communicate and share real-time updates through this application, making rescue operations more natural, efficient and organized. SOS services help users to send signals to track location or contact emergency responders with one tap or one button to ensure help quickly as possible.

## II. LITERATURE SURVEY OF EXISTING PAPERS

The recent studies exhibit strong interest in improving ambulance functionality and route optimization using various intelligent techniques as mentioned in the following papers. In *Ambulance Location for Service Coverage in an Urban–Rural Area in Chiang Rai using Machine Learning*
(2025), they used clustering methods with Geo Sensors to improve ambulance accessibility across urban and rural regions. Their approach promised to deliver accuracy by updating the models, and also require high computational power and was sensitive to noisy and dirty spatial data [1]. In a related direction, *Dijkstra's Algorithm on Semigraph* (2024) modified the shortest path to work with semi-graph structures for better modelling of complex networks. This approach depended on well-structured datasets and careful parameter adjustments [2].
Several researchers have concentrated on improving path planning algorithms. The study of *Optimal Path Planning Method for IMU System Level Calibration Based on Improved Dijkstra's Algorithm* (2023) developed improvements in Dijkstra's algorithm to achieve shorter route prediction and accuracy. Although, the method requires huge amounts of data and significant tuning for practical implementation [3]. For challenging terrains and mountains, *Cluster Path Planning Method in Mountainous Areas Based on Optimal Timeliness* (2025), this paper introduced combination of A* search and LIDAR technology to improve accuracy of navigation in hilly and mountainous regions. While the results were short and the system demanded perfection in configuration and longer training periods [4]. Similarly, *A Method for Ship Route Planning Fusing Ant Colony Algorithm and A* Search Algorithm* (2023) combined Ant Colony
Optimization and A*(A-Star) Algorithm to detect efficient sea routes. Even though the algorithm efficiently identified shorter paths, environmental impacts reduced the overall location accuracy [5].
Trajectory correction and map-matching techniques have also been explored in this paper. In
*High Accuracy Off-Line Map Matching of Trajectory Network Division Based on Weight Adaptation HMM* (2019) paper used a Hidden Markov Model (HMM) to improve offline movement of tracking network matching performance. This model has given reliable results but did not useful for seasonal or human-induced disasters [6]. The paper, *Map-Matching Using Shortest Paths* (2020) relied on shortest-path principles to correct GPS(Global Positioning System) trajectories, the effectiveness of the approach depended on accurate preprocessing of spatial data [7].
Environmental influences on spatial and transportation systems have been discussed in both geological and physical research. *Earth's Axial Tilt and Its Climatic Implications* (2018) examined how axial tilt affects global climate behaviour, improving the complexity in modelling the climate[8]. The research paper or studies such as *Earth's Axial Tilt and Seasonal Variation* (2019) and the paper named

*Astronomical Events: Equinoxes and Solstices* (2020) explains about how astronomical factors create trend patterns in seasons, offering insights such as environmental variations that can affect transportation and emergency planning [9], [10]. Also, *Seasonal Patterns and Climate Change* (2020) analysed trends in climate and their regional impacts, suggesting the need for more localized studies [11].

The paper *Evaluating Multiparameter Response to Seismic Thermal Anomalies From Global Major Earthquakes* (2025) highlighted the importance of integrating many environmental parameters while analysing disaster-prone scenarios. Although the results demonstrated the value of multiparameter monitoring, the approach required sensors and high computational capacity [12].

In summary, this research contributed to allocation of ambulance strategies, shortest path algorithms like Dijkstra and A*(A-Star) and offline map-matching using HMM (Hidden Markov Model), and environmental modelling. Many of these face challenges such as high computational requirements, less adaptability to real-time conditions, and integration of disaster-related factors and environmental factors. These limitations shows necessity for more integrated emergency management capable of combining efficient route minimization and with real-time environmental awareness to improve response effectiveness.

## III. PROPOSED SYSTEM *A. DESCRIPTION*

The proposed system is designed for combination of Disaster Management and Rescue System to rescue people and improve coordination between people using different sources. The sources include maps which help coordination between hospital, user, ambulance systems which improves disaster management and hospital rescue management. The system focuses on taking input from user information needed for decision-making such as location, issues such as fire accident/road accident/medicinal usage etc and also the key details such as the type of disaster, how severe it is, the location, and roads are accessible are chosen using a method called Forward Selection algorithm. These helps the system focus only on useful features, making predictions faster and more reliable.

Google maps use A*(A-Star) Algorithm, Ant Colony Algorithm and Dijkstra's algorithms to calculate the safest and quickest routes by considering road conditions such as traffic conditions and risks during rain etc. Also, the machine learning models helps to analyse the data to predict dangerous areas, while Natural Language Processing (NLP) is used to create warning messages in multiple languages such as Telugu, Hindi, English so that people can understand and communicate easily in rural areas.

Finally, the system is tested to see how well it performs by measuring accuracy, response time, and how it is for user-friendly for users to access the information. To improve results, the techniques such as grid search are used to improvise the models. This project gets special attention towards adapting alerts for regional and local languages and spoken by rural areas, making the system more effective during emergency situations.

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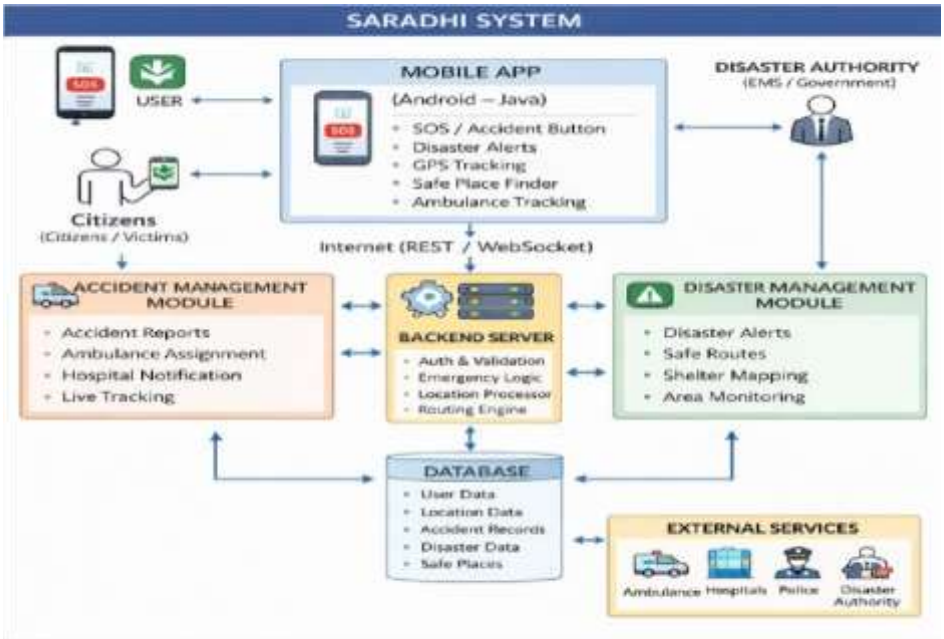
***B. ARCHITECTURE DIAGRAM***



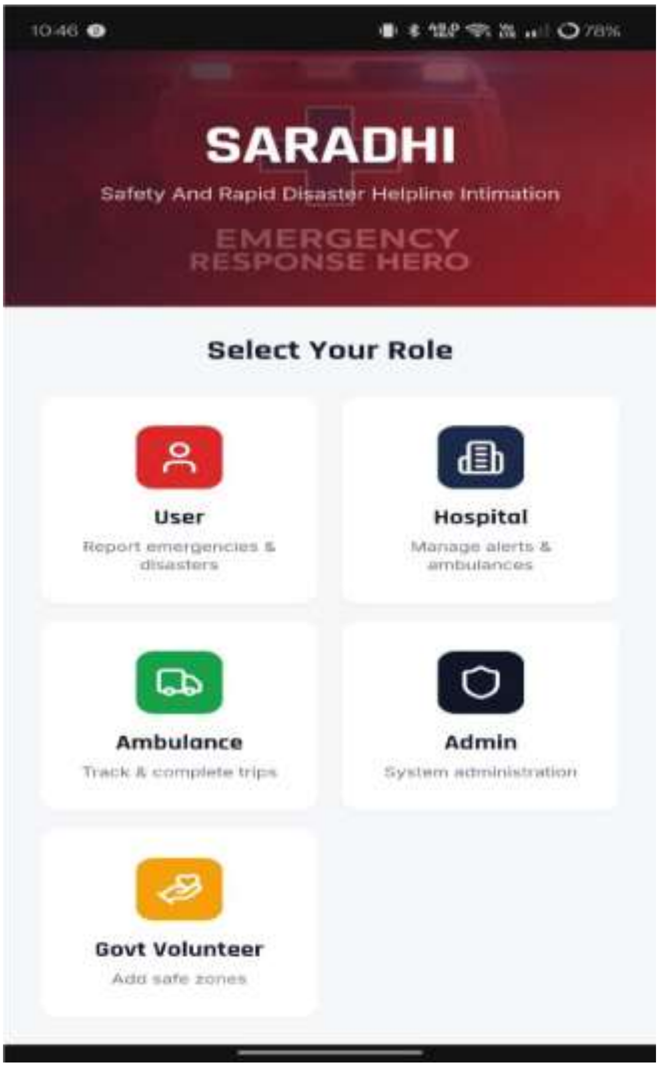

The diagram shows the overall block diagram of SARADHI system, a disaster and accident management platform is designed to help citizens respond quickly and stay active during emergencies. The system is a mobile application used by citizens and victims which makes the user use the application in effective manner and the app can be used by illiterates as well. Through this app, users can send SOS (Save Our Ship) alert message or accident alerts and share their GPS location and find safe places nearby provided by volunteers and receive disaster warnings, and track ambulances. This app communicates with the system through the internet using REST APIs or Web Sockets to ensure real-time data exchange.

The key part of the system is to handle alerts through backend servers and APIs. The backend performs user authentication and authorization, processes emergency logic, handles location data, and also suggests safe paths and routes. It connects to a central database that stores important information such as user details, location data, accident records, disaster information, safe place locations, hospital details and ambulance details and also the patient details which makes the administration of the application to handle data. This data helps the system more accurate and take timely decisions during emergencies.

The server manages two major modules: the Hospital Management Module and the Disaster Management Module separately. The Hospital Management Module focuses on handling road accidents, fire accidents and medical injuries or issues such as surgeries, operations by assigning ambulances to users and notifying hospitals with live tracking of ambulance vehicles. The second module focuses on the Disaster Management

Module which deals with emergencies such as manmade or natural disasters like floods or earthquakes by sending disaster alerts, identifying safe routes and navigating to those mapping shelters, and continuously monitoring affected areas. The system interacts with external services such as ambulances, volunteers, hospitals and emergency services. Emergency services can monitor situations in real time and coordinate responses more effectively and vastly. It ensures fast communication between citizens, emergency responders, helping save lives and reduce damage during dangerous situations due to this combined design.

### *C. IMPLEMENTATION*




The above output shows User, Hospital, Ambulance Registration screens used to register user, hospital and ambulance along with the login into the system. These screens allow hospitals, users and ambulance to create their own account so they can participate in emergency and disaster response activities. It is designed in a simple and user-friendly way so that hospital, user and Ambulance can easily enter the required details.

The user fields include Name, mobile number, password and language to select for the user registration and the dashboard will be displayed in the selected language. We provide three languages Hindi, Telugu and English as these are commonly spoken in South India. The user will login using mobile and his created password.

The Hospital fields include Name, email, password. The Hospital will login using email and their created password. The Ambulance fields include Driver name and his created password at the time of adding ambulance details provided in the hospital dashboard.

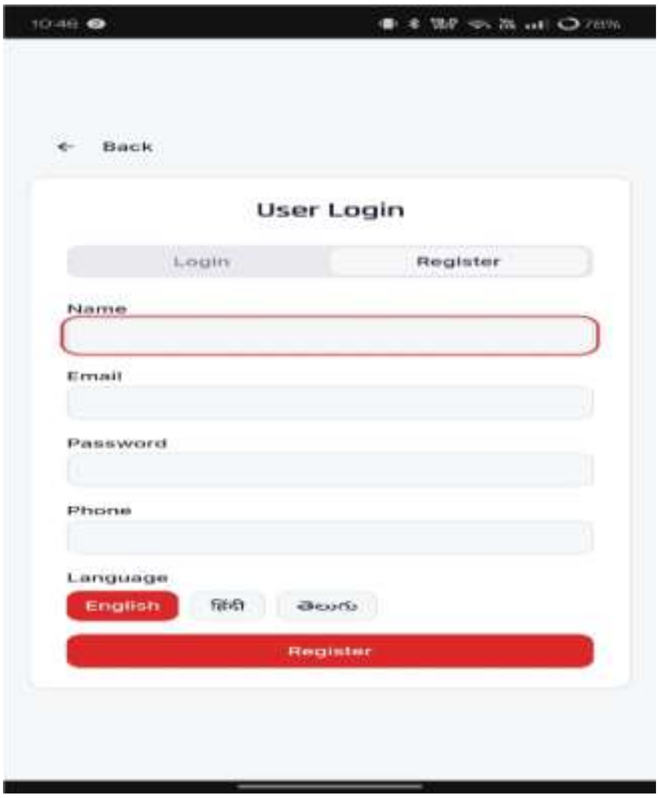
This registration is an important screen in connecting hospitals with the emergency management system and to ambulances and admins also. By registering, hospitals will become active participants who can receive alerts about accidents and disasters occurring nearby. This helps to reduce response time and ensures that patients are directed to the nearest and most suitable hospital. If One hospital rejects the alert or patient it will still display for other hospital.

This layout minimizes confusion between users and makes the registration easier and faster. Clear names next to each input idea guides the user on what information is required to enter while registration and as well as login. This is especially helpful in real-world scenarios and rural areas where hospital staff and people in rural areas doesn't need much complexion to fill these details and doesn't need any technical assistance.

Thus, the Hospital Registration output ensures secure and organized way of selecting hospitals into the system. By maintaining the hospital accounts, the system can co-ordinate between ambulances, users, and healthcare providers and volunteers ultimately improving emergency response and saving lives.

***D. RESULTS***

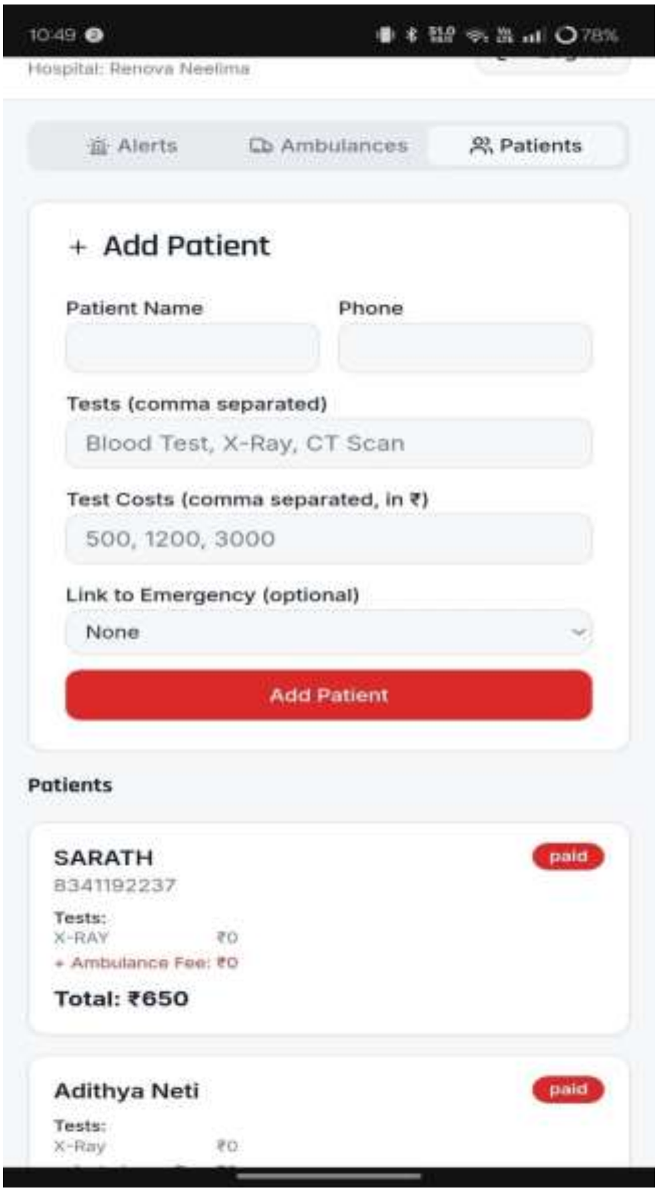
***I.USER FLOW***




The flow for the user includes **User Registration** at the initial stage, then login and once login they can use the dashboard which consists of two tabs one for giving disaster related information and one for giving medical emergencies such as road accident, fire accident etc. The SOS button for disaster application helps them to navigate through usage of google maps which help them find safest and shortest route.

The second tab is for hospital related task where in user is responsible for giving input such as emergency type and location so that we can track user location by using google maps. As this is a mobile application we don't need to use Maps API directly connect to open google maps which makes the application robust and user friendly application.

***II.HOSPITAL FLOW***




The hospital flow in SARADHI begins with **Hospital Registration**, after which the hospital authority logs into the system using the registered credentials. Once logged in, the hospital is directed to the Hospital Dashboard where it receives realtime emergency alerts raised by users. These alerts may include road accidents, fire accidents, medical emergencies, or disaster-related requests along with essential details such as the user's location and request time.

The hospital staff can review each request and decide whether to accept or reject it. There are two conditions: If the hospital accepts and the hospital rejects the emergency request. The hospital accepts then automatically the system opens Google Maps for navigation. The ambulance logins with the assigned details the user's location is considered as the pickup point while the hospital location becomes the destination at this stage and allows the ambulance to follow the fastest route and safest route to reach hospital and collects some amount. This enables faster response of emergency services and supports live tracking through google maps. If the hospital rejects the request, the alert is removed from one hospital dashboard and can be handled by another hospital which is near to user's location to avoid delay in treatment.

Finally, the dashboard allows the hospital to manage ambulances with patients and monitor recurring cases. Hospitals can assign available ambulances to accept emergencies and maintain details of patients. By directly allowing location access, we'll directly use Google Maps instead of using Maps API for easier understanding and access, which makes SARADHI a robust application and guarantees faster emergency handling and greater co-ordination between users, hospitals and external factors.

## *III.AMBULANCE FLOW*

The ambulance flow in SARADHI starts when a hospital accepts an emergency request from a user and assigning of ambulance to that user. Once accepted by the hospital and assigned to an ambulance and the request details are forwarded to the ambulance management section.

After assignment, the ambulance driver can see the details of the user and hospital and thus, the system opens navigation through Google Maps, setting the user's location as the pickup point and the hospital as the drop point. During this process, the ambulance status is considered as "Busy" until the patient is safely transported to the hospital. Once the case is completed or not assigned, the status changes back to "Available", and the emergency record is stored for future reference and tracking. Also, we make sure for ambulance we introduce a small amount such as Rs.100 per trip so that everybody can afford and pay for the trip and the driver gets some amount as a salary.

### *E. SOFTWARE REQUIREMENTS*

SARADHI is a mobile-based emergency response application developed to help users during accidents, fire incidents, and disasters such as earthquakes, floods, tsunamis etc. This application operates on Android cell phones with basic requirements such as GPS (Global Positioning Systems) and lower or less internet connectivity, and minimal storage and usage like normal applications. It is a cloud-based server infrastructure which supports real-time live alert processing, management of huge data, with offline maps functionality available during network disruptions or fluctuations.

The system is developed using MERN stack. Backend services such as Spring Boot or Node.js manages user requests and emergency alerts and assigning ambulance on the server, while mapping services such as Google Maps provide safe route navigation and location live tracking.

Functionally, SARADHI offers real-time disaster alerts and safety with GPS-based safe routing and nearby shelter identification through government volunteers. It ensures accuracy with fast performance, scalability during managing large no. of emergencies, multilingual feature, and strong security to protect user data.

## *IV. PERFORMANCE METRICS*

To evaluate the accuracy of the SARADHI mobile application, the following metrics are to be considered

**Response Time:**

It is used to measure the total time from emergency request generation to ambulance arrival. This is considered to be the most critical metric, as faster response impacts patient survival and system accuracy.

**Formula:**

**Response Time**=Dispatch Time + Travel Time

**2. Route Optimization Accuracy:**

This metric is used to evaluate how accurately the system computes the fastest path using algorithms such as Dijkstra or A* (A- Star). It is measured by comparing the estimated or predicted route with the optimal route or route we are following.

**Formula:**

**Route Accuracy** = Optimal Path Length/Predicted Path Length

3. **Ambulance Allocation Efficiency:** This measurement is to determine the nearest available ambulance is correctly assigned to the emergency request or not. High accuracy ensures better resource utilization.

**Formula:**

**Efficiency** = (Correct Nearest Ambulance Assignments/Total Emergency Requests) *100

**4. System Latency:**

This statistic is used to measure the delay between the user request submitted and dispatch confirmed. Lower latency or less latency depicts real-time coordination between users, hospitals, ambulance drivers and volunteers.

**Formula:**

**System Latency**=Dispatch Confirmation TimeRequest Submission Time

**5. Success Rate:**

This criteria is used to represent the percentage of emergency cases successfully completed with total requests collected that reflects overall system reliability and operational effectiveness.

**Formula:**

**Success Rate=** (Successfully Completed Cases/ Total Cases) * 100

## V. CONCLUSION

The SARADHI system is developed to improve disaster response management and hospital management by integrating and allocating ambulance with optimized route planning and live tracking into a single co-ordinated platform. This project concentrates on reducing response time, improving accuracy of the safe route, and ensuring effective usage of available ambulance resources. By implementing shortest path algorithms such as Dijkstra's Algorithm and automatic dispatch mechanisms helps the system improve speed and credibility of emergency services.

Throughout the development of the project, the system validated effective performance in minimizing delays and accurately assigning the nearest hospitals with their allocated ambulances, and maintaining stable communication between users, hospitals, and ambulance drivers. These techniques guarantees faster and safer navigation even in huge or terrible traffic conditions in cities such as Vishakhapatnam, Mumbai, Chennai, Thiruvananthapuram ,Hyderabad, Kolkata which actually are in coastal regions help in real-time live tracking improve in transparency and monitoring.

## VI. FUTURE SCOPE

The project SARADHI has a greater scope in future which enhances by integrating real-time traffic data to change routes based on congestion of roads with their conditions. This would help in diminishing response time even during peak hours of traffic and improves overall efficiency and accuracy of the ambulance movement. In addition to that, including AI-based prediction models can help identify emergency zones early, enabling better ambulance positioning and faster and safest service delivery.

This system can also be expanded using cloud infrastructure to support greater-scale deployment across cities or states. Integrating with IoT-based medical devices inside the ambulances would really help the patients to monitor their health and sharing the data with hospitals before arrival. Also , IoT based geographical location sensors can be used to detect various types of disasters such as Earthquakes, floods, fire accidents etc. These improvements in SARADHI can evolve and evaluate into a more powerful, useful, and comprehensive emergency management application.

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