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Sarathi: A Smart Emergency Location Sharing And Navigation System

Official Website :- https://sarathi-emergency.vercel.app/

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Abstract: *Emergency situations such as road accidents, medical emergencies, and public safety incidents require fast communication of location information. In many cases, victims are unable to clearly explain their exact location due to stress, injuries, or unfamiliar surroundings, which can delay the response of emergency services and increase risk. These communication challenges can significantly affect the ability of authorities to provide timely assistance.*

This paper presents Sarathi, a web-based emergency location sharing and navigation system designed to improve the efficiency of emergency response. The system allows users to trigger an emergency alert through a simple interface, after which the application automatically retrieves the user's geographic location using GPS technology. The platform is designed to be simple and accessible so that users can quickly request help during critical situations.

Based on this information, the system identifies nearby hospitals and police stations and displays them on a digital map interface. Navigation routes are also generated to help responders reach the user's location quickly and efficiently. In addition, the system supports better coordination between individuals in distress and nearby emergency services. By integrating location tracking, mapping services, and automated service discovery, Sarathi aims to reduce response delays and improve the overall effectiveness of emergency assistance systems.

Keywords: Emergency Response System, GPS Tracking, Location Sharing, Smart Navigation, Public Safety, Web-Based Emergency Application

I. INTRODUCTION

Emergency situations such as traffic accidents, sudden medical conditions, and public safety threats require immediate action from nearby authorities. One of the major challenges during such situations is communicating the exact location of the victim. In many cases, individuals may not be able to clearly describe their location due to stress, injuries, or unfamiliar surroundings. As a result, emergency responders may face delays in locating the person who requires assistance.

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With the rapid development of location-based technologies, it has become possible to design systems that automatically detect and share a user's geographic location. Modern web and mobile technologies provide tools that can retrieve GPS coordinates and display them on digital maps in real time. These technologies can significantly improve the speed and efficiency of emergency communication systems.

The Sarathi system was developed to address these challenges by providing a simple platform that allows users to quickly send an emergency alert and share their location with nearby emergency services. The system identifies nearby hospitals and police stations and provides navigation support that assists responders in reaching the user's location. By combining location tracking and mapping technologies, Sarathi aims to improve emergency response efficiency and reduce delays in critical situations.

II. PROPOSED SYSTEM

The Sarathi system is designed as a web-based emergency assistance platform that uses location services to identify and display nearby emergency facilities.

The system primarily focuses on three core capabilities:

1. Quick emergency activation 2. Automatic location detection

3. Navigation support to the nearest emergency services

The architecture of the system consists of the following components:

User Interface :-

The application provides a simple web interface that allows users to access the system through a browser. The interface is designed to minimize complexity and allow users to quickly trigger emergency assistance.

Figure-1:- Sarathi Application User Interface

Emergency SOS Interface

The Emergency SOS interface acts as the main entry point of the Sarathi system. This interface allows users to quickly trigger an emergency alert whenever assistance is required. The design focuses on simplicity so that users can activate the SOS feature with minimal interaction. Once the SOS is triggered, the system begins the emergency response process and prepares the information needed to guide responders to the user's location.

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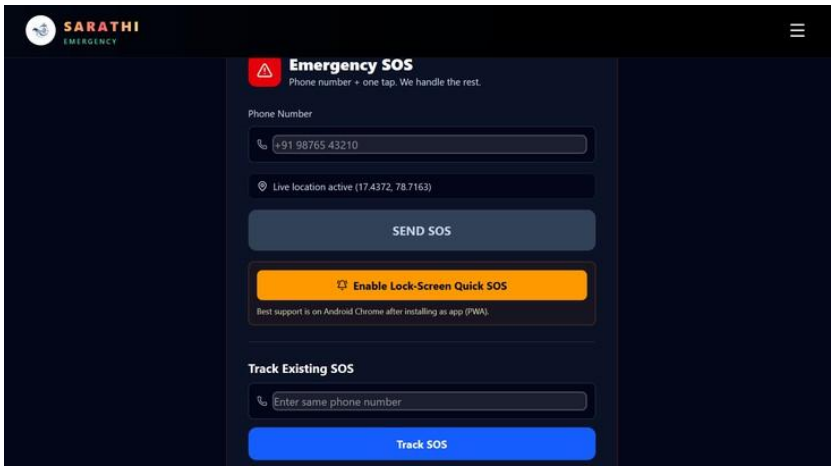

Figure-2:- Emergency SOS Interface

Driver Module :-

The Driver module is designed for responders who are responsible for reaching the emergency location. Through this interface, drivers can log into the system and view active emergency requests. Once a request is accepted, the system provides route guidance that helps the driver travel toward the user's location in an efficient manner.

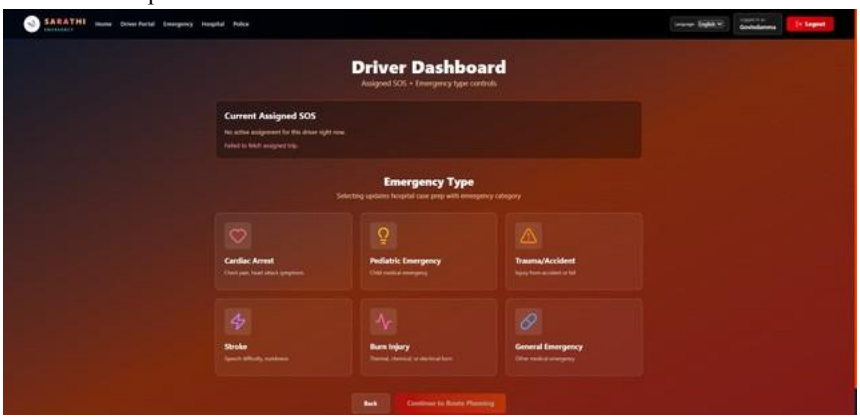

Figure-3:- Driver Module Interface

Hospital Module :-

The Hospital module allows medical facilities to receive and view emergency alerts generated by the system. When an SOS request is triggered, hospitals can access the information through their interface and prepare for possible medical assistance. This module helps improve coordination between emergency requests and healthcare providers.

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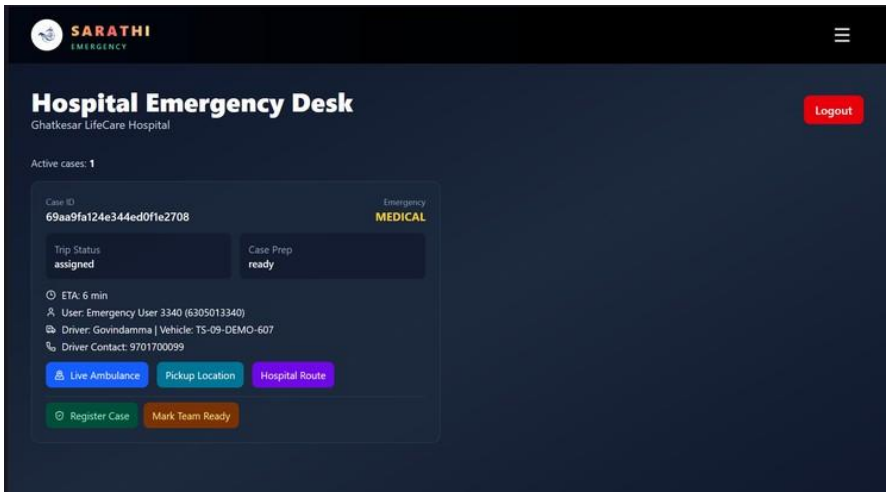

Figure-4:- Hospital Module Interface

Police Module :-

The Police module provides law enforcement authorities with access to emergency alerts generated by the system. Through this interface, police personnel can view the location details of the incident and respond accordingly. This module supports faster communication between individuals in distress and nearby law enforcement services.

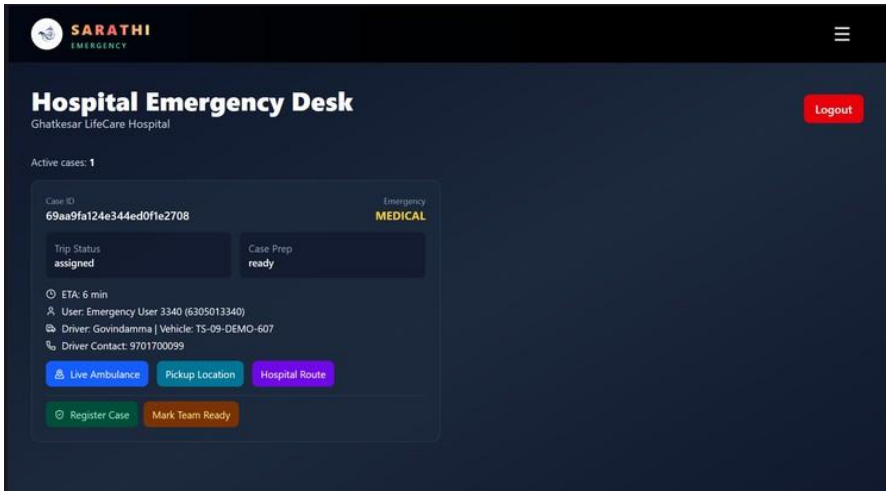

Figure-5:- Police Module Interface

III. SYSTEM WORKFLOW

The Sarathi application follows a simple workflow to provide emergency assistance. The process starts when the user opens the web application in a browser. The interface is designed to be easy so that the user can quickly activate the emergency feature during a critical situation.

When the SOS feature is activated, the system collects the user's location and processes it. The application then finds nearby hospitals and police stations. The user's location and nearby services are shown on a digital map. Navigation routes are also generated to help responders reach the user quickly.

Step 1: Application Access

The user opens the Sarathi web application through a web browser.

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Step 2: Emergency Activation
In an emergency, the user presses the SOS button in the application.
Step 3: Location Retrieval
The application asks permission to access the device location. After permission is given, the GPS coordinates are collected.
Step 4: Location Processing
The system processes the location data to identify the user's exact position.
Step 5: Service Discovery
The system searches for nearby hospitals and police stations.
Step 6: Map and Navigation Display
The user's location and nearby services are displayed on a digital map. Navigation routes are also generated.
This workflow allows emergency information to be shared quickly with very little user interaction.

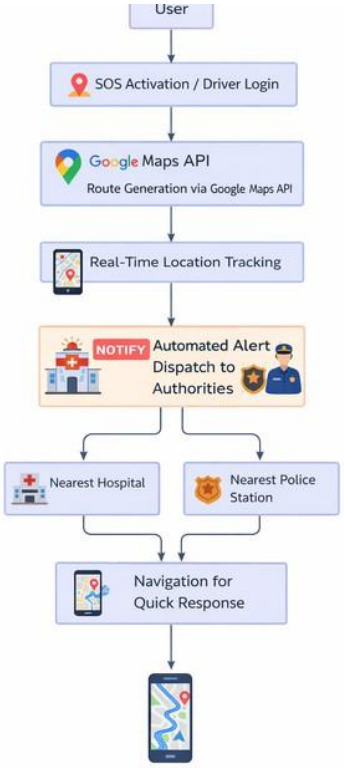

Figure-6:- System Architecture / Workflow

IV. MATHEMATICAL MODEL

The Sarathi system identifies the nearest emergency service by calculating the distance between the user's location and available service locations. Since the Earth is spherical, the Haversine formula is used to compute the geographic distance between two coordinates.
Let the user's location be represented as:
$L = (lat_1, lon_1)$
Each emergency service location is represented as:
$Si = (lat_2, lon_2)$
The differences in latitude and longitude are calculated as:

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$$\Delta lat = lat_2 - lat_1$$
$$\Delta lon = lon_2 - lon_1$$

The Haversine formula is then applied:

$$a = \sin^2(\Delta lat/2) + \cos(lat_1) \times \cos(lat_2) \times \sin^2(\Delta lon/2)\ c = 2 \times \text{atan2}(\sqrt{a}, \sqrt{(1-a)})$$

The distance between the two locations is calculated as:

$$D = R \times c$$

where R represents the radius of the Earth (approximately 6371 km).

The system calculates this distance for all nearby hospitals and police stations. The service with the minimum distance is selected as the nearest emergency facility.

V. IMPLEMENTATION

The Sarathi application was implemented using modern web development technologies to ensure accessibility, reliability, and smooth performance. The system was designed as a web-based platform so that users can easily access it through a browser without installing additional software. The frontend interface was developed with a simple and clear layout that allows users to quickly interact with the system during emergency situations. Important features such as triggering the SOS alert and viewing nearby emergency services are presented in a straightforward manner to reduce confusion and ensure that the user can take action quickly when assistance is required.

To obtain the user's real-time location, the system uses browser-based geolocation services that retrieve geographic coordinates directly from the device with the user's permission. Once the location data is captured, the application processes it to identify nearby emergency facilities such as hospitals and police stations. The map interface then displays the user's location along with these services and provides navigation support that helps responders determine the most efficient route to reach the user. The application was deployed using a cloud-based hosting platform, allowing it to be accessed through a live web interface and ensuring that the system remains available whenever emergency assistance is needed.

VI. RESULTS AND DISCUSSION

The testing of the Sarathi system was carried out to evaluate how effectively the application performs during emergency situations. The system was able to successfully retrieve the user's real-time location using GPS services and display it accurately on the map interface. During testing, the application consistently identified nearby emergency facilities such as hospitals and police stations and displayed them clearly on the map. This allows users to quickly understand the available emergency services around them without manually searching for locations.

Another important feature tested was the navigation functionality provided to responders. Once an emergency alert was triggered, the system generated route guidance to help responders reach the user's location efficiently. The navigation feature simplifies the process of locating the user, especially in unfamiliar areas. Overall, the testing results indicate that the Sarathi system can effectively support emergency assistance by reducing the time required to identify and reach individuals who need help.

VII. CONCLUSION

This paper introduced Sarathi, a smart emergency location-sharing and navigation system designed to assist individuals during critical situations. The system enables users to quickly trigger an emergency alert and automatically share their real-time location with nearby emergency services. By integrating GPS-based location detection with digital mapping services, the application helps identify nearby hospitals and police stations and provides useful navigation guidance to responders.

The proposed system demonstrates how modern web technologies can be used to improve communication and coordination during emergencies. With further development, Sarathi can be expanded with features such as mobile application support, real-time traffic- based route optimization, and integration with official emergency response

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networks. These improvements can make the system more efficient and contribute to faster emergency response and improved public safety.

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