

Rapid Rescue: Ambulance Booking and Emergency Response System

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Abstract—If an accident occurs in an unknown location, such as a forest or a highway, a person will be unable to share the specific position with the ambulance driver, and the ambulance driver would have numerous challenges in reaching the patient. The software allows patients to upload photographs and the location of accidents to ambulance drivers, who may then find the patient using Google Maps API and Google Positioning System (GPS). The system makes optimal judgments based on real-time hospital loading information, with a focus on reaction speed and door-to-needle time. Traffic congestion is a serious issue in cities, and ambulances are frequently trapped in traffic for extended periods of time, putting patients' lives in jeopardy.

Index Terms— GPS , Google Map API , Real-time Tracking.

I. INTRODUCTION

An application that tracks and monitors emergency ambulance vehicles is presented in this paper as a means of addressing various challenges associated with track and monitor applications. The system sends out warning messages whenever an emergency occurs. During an accident or when a driver is lost, there must be an alert system in place to provide information. In conventional methods, the ambulance driver couldn't get to the accident site on time due to heavy traffic, so many lives were lost. Using the technological advancements of smartphones and mobile apps, this paper proposes an application for tracking ambulances in real time. In this application, ambulance drivers are able to keep track of the location and availability of their vehicles. When the user triggers the emergency, the ambulance is dispatched and the user is logged in. Users will be able to locate their location in relation to nearby ambulances using Google Maps. Once the patient has boarded the ambulance, a traffic police officer stationed at the traffic signal will be notified of its location. The driver then uses the map to find a nearby hospital, allowing the patients to be treated on time. The navigator uses Web Services to track the location of the ambulance. This technology will assist in updating the ambulance location in the database. It is also possible to control the traffic signal based on the approaching ambulance vehicle, resulting in a less congested route.

II. OBJECTIVES

- i. **Rapid Emergency Response:** During medical emergencies, the primary goal is to shorten response times. The system should enable the fastest possible dispatch of ambulances to the incident location by leveraging real-time data and enhanced position monitoring.

- ii. *Identification*: Using GPS, cellular tower triangulation, or other advanced geolocation technologies, the system should be able to precisely determine the location of the caller or event. This information guarantees that ambulances arrive at the exact spot as soon as possible.
- iii. *Efficient Resource Allocation*: Based on parameters such as proximity, availability, and the severity of the medical condition, the system should optimize the allocation of ambulance resources. This helps to avoid unnecessary delays and ensures that key situations are prioritized.
- iv. *Privacy and Security*: It is crucial to give security and privacy first priority.

III. LITERATURE REVIEW

A research suggests a smart ambulance system that uses contemporary communication, processing, and sensing technologies to improve ambulance response time, journey time, and waiting time. Based on real-time road traffic conditions and hospital loading statistics, the system makes optimal judgments, with an emphasis on reaction time and door-to-needle time. Analyses of the suggested algorithm's performance confirmed its accuracy and superiority under various operating settings and situations..[4] This paper proposes a mobile tracking application for emergency ambulance services, along with various challenges.

In vehicle tracking and monitoring system . This study proposes a smartphone app for tracking ambulances in real time. The ambulance driver will be able to register its availability and position using the program., and will point out nearby ambulances on the Google map.[5]

The COVID pandemic has prompted researchers to consider upgrading the healthcare system. An edge computing-supported healthcare system is proposed, utilizing smart ambulances for primary diagnosis and sending patient information to medical centres. This system supports video calls for emergency communication, especially for patients from rural areas. Blockchain is used to protect patient data, and edge computing facilitates the process. A proof-of-concept simulation is presented, demonstrating minimal time and storage consumption for the E Health system.[6]

The UN predicts that cities will double in population in the next three decades, causing challenges in both traditional and smart cities. Smart health infrastructure, enabled by IoT technologies, is crucial for accessing patients. A smart ambulance management system is proposed in smart cities, directing ambulances to patients using Google Maps. The system addresses speed and accuracy of first treatment, keeping hospital density information and ambulance positions in a database. The system has three interfaces: admin, ambulances, and users. [7]

The Automatic Ambulance Recovery System in India aims to reduce delays in hospital arrivals due to accidents. The system uses shortest distance search algorithms to ensure efficient ambulance delivery. The primary unit provides the most scan route to the ambulance and its location, while the server determines the accident spot through the vehicle. Traffic congestion in urban areas is addressed by automatically controlling traffic lights and directing ambulances to the nearest hospital. The system aims to improve health sector efficiency and save lives in critical situations. [8]

The UK's emergency call and response systems are straining as a result of a 6.1% rise in calls in 2014-15, with over 9 million calls received. To remedy this, the Smart Hospital Emergency System (SHES) was created, which would employ innovative technology and algorithms to improve communication between patients and emergency personnel. SHES processes data rapidly and securely using health data from personal cellphones and internal monitoring data, with the goal of reducing non-emergency calls and improving usability through built-in two-way communication between patients and physicians.[9]

The abstract underscores the critical need for advancing patient care, especially during emergencies, by emphasizing the vital role of swift and accurate decision-making through a decision support system. This technology is a pivotal component of smart healthcare solutions within the broader Smart City context. The research's primary objective is to develop a Smart Health Care model using a Decision Support System approach, with the ultimate goal of effectively addressing healthcare challenges and delivering the highest level of service to patients. In essence, the research aims to establish a state-of-the-art healthcare system that harnesses advanced technology to enhance patient care and safety across routine and emergency scenarios. [10]

The pursuit of higher citizen survival rates, both in routine and emergency situations, underscores the importance of effective Emergency Medical Services (EMS) management, particularly within the framework of a smart city. This study introduces a novel hybrid model, LR-MEXCLP, which amalgamates. To optimize coverage inside MEXCLP, use local activity estimate using the TIMEXCLP model. This unique hybrid approach improves accuracy in resolving ambulance facility location issues, resulting in more dependable ambulance service. To

improve the dependability of EMS in a smart city environment, the model incorporates local activity estimates, maximum coverage, and lowest response times. [11]

The study focuses on the need for a smart EMS (SEMS) system that integrates pre-hospital care recording systems with personal lifelogs, electronic medical records, and patient monitoring in ambulances. The system makes use of IoT technology to improve context awareness, speed up first responder activities, and provide personalized care throughout the hospital stay. The system is designed and implemented using health information standards, with life log-connected EMS for stroke patients as an example service.. [12]

This work introduces a novel approach to ambulance vehicle routing using neural networks. The neural network takes eight input features, including time, accident and hospital locations, street count, injured persons, accident type, and patient age. These inputs help determine the optimal route for ambulances to reach the nearest hospital efficiently. The study assesses key metrics in emergency response, including temporary emergency units, ambulance availability, and the city's response and resources. [13]

Technology drives lives, but population growth and traffic congestion threaten ecological survival. India, with over 130 crore people, faces shortages in food, medical facilities, and homes. An app-based real-time interface is proposed to improve ambulance bookings and crowd management. The app uses secure servers and databases, integrating data about ambulances and ensuring data security. The system can also book high priority vehicles, reducing delays and preventing patient deaths. The goal is to improve medical infrastructure and reduce traffic congestion in dense countries. [14]

The growing population and high volume of vehicles on roads make ambulance service efficient, affecting response time and increasing road accident fatalities. This paper proposes an interactive survey to identify issues and propose an innovative design process to improve ambulance response time. The survey aims to provide faster and efficient solutions to address these concerns. [15]

IV. PROPOSED METHODOLOGY

A. Citizen App

It is a piece of software that will be installed on the server. In order to use the citizen app, the user must complete a registration form, providing all of their personal information as well as their medical history. In the event of a disaster or accident, a picture can be taken and uploaded to the server, and this picture is then transmitted instantly to the ambulance driver app, along with a live location report for the accident. An emergency medical assistance request can also be made by the user.

The emergency contacts of the user will be notified if the user opts for an emergency service, as well as provided with ride details. With the help of the IBM Watson computing platform, we have created a chatbot to help with catastrophe prevention, emergency situations, and first aid. IBM Watson is an IBM supercomputer that combines artificial intelligence (AI) with sophisticated analytical software to perform optimally as a "question answering" machine. Healthcare remains a major focus for IBM as it works to prove Watson technology. IBM's use of Watson to solve some of the most difficult problems in patient care and to recommend treatment options based on data-driven insights would demonstrate the value of Watson technologies. Following that, the citizen app provides information about nearby hospitals, fire stations, and police stations.

We obtain the location of nearby hospitals, fire stations, and police stations using the Google Maps API. Google APIs are a set of application programming interfaces (APIs) created by Google that allow communication with Google Services as well as integration with other services. Search, Gmail, Translate, and Google Maps are a few examples. We used Google Maps API in our project. To name a few examples, the Google Maps API can be used to create a custom map, a searchable map, check-in functions, display live data synching with location, plan routes, or create a mashup.

B. Ambulance Driver App

This program will be used by the ambulance driver. Ambulance drivers will receive a request list of accident images as well as the live location through this application. Because the citizen app sends images of accident sites as well as the live location to the ambulance driver app, ambulance drivers nearby can accept the request and respond as soon as possible. We used the Google Maps API for this feature. A chatbot similar to IBM Watson is integrated into ambulance driver applications. Along with the chatbot, the ambulance driver app includes a feature that displays nearby hospitals, fire stations, and police stations. It would be advantageous for drivers to arrive at nearby hospitals as soon as possible. Ambulance drivers can use the ambulance driver app to share images of accidents on social media platforms such as Whatsapp, Facebook, and Instagram in order to raise public awareness. The ambulance driver may also send alert messages to the citizen app.

Facilities required for proposed work:

- i. **Development of Mobile Applications:** You must develop mobile apps for both the Android and iOS operating systems. With regard to Android and iOS, React Native and Flutter will be used.
- ii. **Development of Backend Servers:** - **Programming Languages:** The backend server can be built in languages such as Java Script, Dart.
- iii. **Database Administration: Database System:** To store user data, location information, and emergency records, utilize a relational database management system (RDBMS) such as PostgreSQL, MySQL, or SQLite.
- iv. **Mapping and Geolocation: Mapping API:** To build real-time location tracking and mapping functionality, use mapping services such as Google Maps API or Map box.

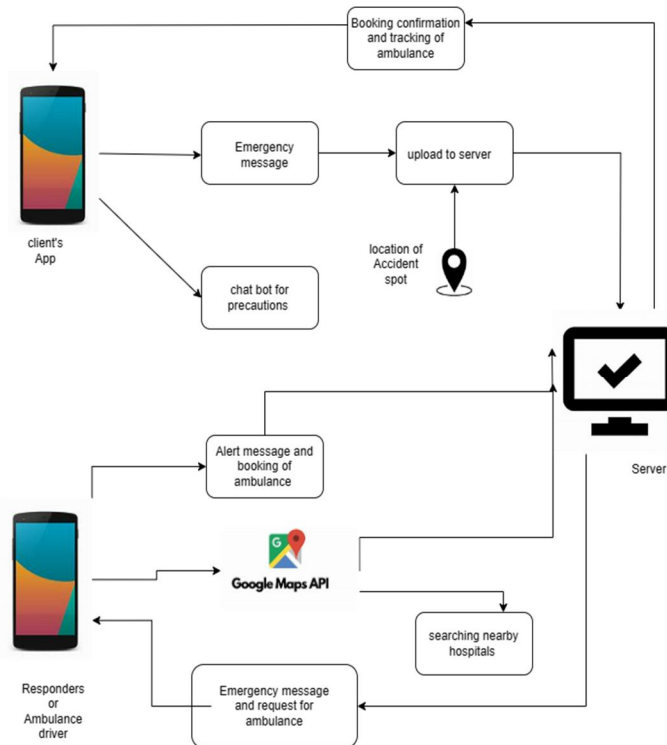


Figure 1: Overview of Proposed work

Figure-1 explains that the mobile application allows system users to schedule an ambulance. When a user schedules an ambulance, the application locates him on Google Maps and compares his location to the driver's. Similarly, the client can view the location of the ambulance that is nearest to the user. When the patient is aboard, the ambulance's location is identified, and a message is sent to the client indicating that the patient has been picked up. The nearest location of all the hospitals will be extracted using Google Maps, and the closest or most recent one will be chosen. Then a notification will be sent to the patient's guardian regarding the patient.

Figure-2 explains explain the sequence of activities done in proposed work 1. The User asks to sign in to the system.

1. The User asks to sign in to the system.
2. The user receives a login credential prompt from the system.
3. The User offers their login information.
4. The Database is used by the System to confirm the credentials.
5. The System logs the user in if the credentials are validated.
6. The user asks for their login credentials.
7. The User receives their details from the System after it has retrieved them from the Database.
8. The procedure to reserve an ambulance is started by the user.
9. The Ambulance Provider is consulted by the System to find available ambulances.
10. A list of available ambulances is sent to the system by the ambulance provider.
11. The ambulances that are available are shown to the user via the system.

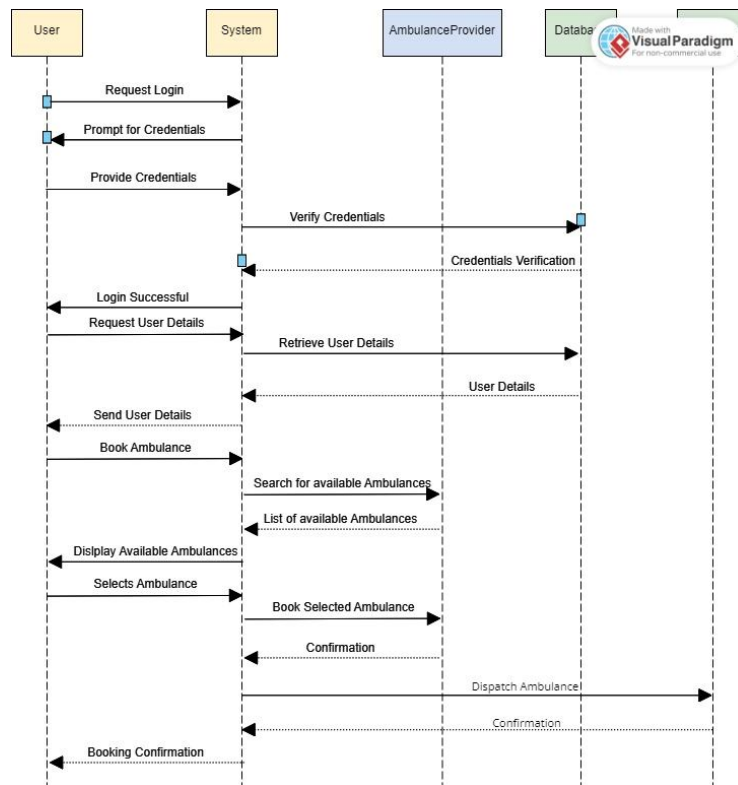


Figure-2: Sequence Diagram

12. User decides on an ambulance.
13. The Ambulance Provider is contacted by the System to schedule the chosen ambulance.
14. The booking is confirmed by the Ambulance Provider.
15. The ambulance is sent to the User by the System.
16. The dispatch is verified by the ambulance.
17. A booking confirmation is sent to the user by the system

V. CONCLUSIONS

The mobile tracking application for emergency ambulance services proposed in the above texts has the potential to significantly improve the efficiency and effectiveness of emergency response. The system can help to reduce response times, improve patient care, and make more efficient use of ambulance resources. The system also gives top priority to security and privacy.

The proposed methodology for developing the application is well-structured and comprehensive. It covers all the key aspects of the project, including the development of mobile applications, backend servers, database administration, and mapping and geolocation.

Overall, the proposed system and methodology have the potential to make a significant contribution to the field of emergency ambulance services.

Here are some additional benefits of the proposed system:

- Improved communication between patients and ambulance drivers: The system can provide real-time communication between patients and ambulance drivers, which can help to improve coordination and reduce confusion.
- Reduced stress for patients and their families: The system can provide peace of mind for patients and their families by knowing that the ambulance is on its way and that they are being tracked.
- Improved data collection and analysis: The system can collect data on ambulance response times, patient locations, and other factors. This data can be analyzed to identify areas for improvement and to develop more effective emergency response strategies.

The proposed system has the potential to save lives and improve the quality of care for patients in emergency situations.

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