Comprehensive Automated Solution for Detecting Ambulances in Real-Time

Kavya AM
kavya.am07@gmail.com

Yojana K S
yojanakirankumar@gmail.com

ChinmayaK
swiftchinmaya@gmail.com

Neha Mohandas Kharvi
nehakharvi2002@gmail.com

Naveen T
nehakharvi2002@gmail.com

M Anirudh Kamath
Computer Science and Engineering Department
Canara Engineering College Bantwal, Mangalore
anirudhkamath2002@gmail.com

Abstract

Emergency medical services (EMS) play a vital role in saving lives during critical situations. However, delays in response times caused by inefficiencies in ambulance dispatching systems can have a profound effect on patient outcomes. To address this issue, we present a comprehensive automated system for real-time ambulance detection. This system consists of two applications: a User Application and a Driver Application. The User Application allows users to request ambulance services by providing their location. Simultaneously, the Driver Application enables ambulance drivers to indicate their availability and respond to incoming requests. To efficiently locate nearby ambulances and prioritize their allocation, the system utilizes Haversine's algorithm, considering factors such as proximity and availability. Furthermore, the system facilitates direct communication between users and drivers to ensure prompt assistance during

emergencies. By harnessing real-time data and advanced algorithms, our system aims to enhance the effectiveness of ambulance dispatching, ultimately leading to improved patient outcomes in emergency situations. The focus of this study is on the development, implementation, and evaluation of our automated system, highlighting its potential to revolutionize emergency medical services through technology-driven solutions.

Keywords :Ambulance app, Haversine's algorithm, mobile application, Healthcare

Introduction

In today's era, numerous local governments are implementing projects to update their city landscapes. To be recognized as a leader in progress, a city must integrate state- of-the-art innovations in various fields. Improving efficiency in healthcare presents significant obstacles. This involves ensuring swift ambulance responses and delivering effective care to enhance survival rates in critical situations. Traffic congestion continues to be a major problem in urban areas, complicating matters for emergency services.

However, ambulances are often seen stuck in traffic for extended periods due to heavy congestion, posing a risk to patients' lives. Moreover, there has been a surge in road accidents in the city, underscoring the importance of preventing fatalities resulting from such incidents. In cases where accidents occur in unfamiliar locations like forests or highways, individuals may struggle to provide accurate details of the incident's whereabouts to ambulance drivers. Therefore, ambulance drivers face numerous obstacles in reaching the injured party due to the lack of precise information. These situations result in wasted time, ultimately leading to the loss of the patient's life. It is clear that lives are lost every minute and hour due to delays in reaching hospitals promptly.

Recognizing these challenges, we are developing an application called "Comprehensive Automated Solution for Real-Time Ambulance Detection." An Ambulance Tracking System utilizes the Haversine algorithm to offer users detailed, real-time information on the precise locations of the nearest available or unoccupied private ambulances within their respective areas.

Moreover, this application goes a step further by facilitating direct connections between users and ambulance drivers. By eliminating the traditional process of dialing emergency services, it bypasses resistance and streamlines communication, ensuring faster and more coordinated responses during critical situations. To validate a user prior to requesting a service, the user is required to send a geo- tagged image to the driver. This measure ensures the authenticity and location verification of the user before initiating the request process.

![sdmimd logo]

Shri Dharmasthala Manjunatheshwara Institute for Management Development, Mysuru, India
6th International Marketing Conference on
Marketing in the AI Era - Marketing 5.0 - Reshaping Global Marketing

----

Related Work

This document presents a summary of the system development and specifications for the Ambulance Response Application. The main goal of this application. is to enhance emergency response and rescue operations in Region VIII hospitals and agencies through the utilization of Information and Communications Technology(ICT), specifically mobile applications. The system architecture follows a client-server model, where the server-side scripts handle the dynamic and interactive elements of the web pages. The input-process- output model is employed to describe the system's functionality, which includes user registration, validation, and login processes. Users are able to send emergency notifications, search for nearby hospitals and agencies, and track the real-time location of responding ambulances. In essence, the Ambulance Response Application strives to expedite emergency response, foster collaboration among hospitals and agencies, and provide improved assistance to patients in need.

The paper commences by examining the emerging studies in medical devices, wireless communications, sensors, and software applications that contribute to the progress of healthcare facilities. The application is installed by ambulance service providers who then register the pertinent details of the available ambulance services. In case of emergency situations, individuals can either register their details in the application or directly access the ambulance facility. The authors elucidate that the application employs various techniques to verify ambulance availability, deter fraudulent calls that exploit the emergency service, utilize cloud computing for data storage, incorporate a panic button for immediate response, determine the shortest route, and identify the user's location. Cloud computing is utilized to store the vast amount of data, facilitating the prompt delivery of ambulance services. Additionally, the application utilizes modules that utilize GPS and Google Maps to provide guidance on the shortest path for the ambulance to reach its destination.

The discussion in the paper commences by addressing the issue of heavy traffic in densely populated regions globally, with a specific emphasis on countries such as India. The rise in annual mortality rates of patients who could be saved with timely treatments is linked to rush-hour traffic, which obstructs patients from reaching hospitals within the required timeframe. To tackle this problem, the researchers suggest the deployment of an ambulance tracking system that is based on IoT (Internet of Things) technology.

This system makesuseofGPSandGSMmodulestopromptlyrespondto emergency calls and determines the quickest route to the hospital. It heavily depends on traffic monitoring and route optimization techniques to direct paramedics and ambulances through the most efficient route possible. An Arduino circuit is employed to transmit GPS coordinates and vehicle information to the server. In summary, the paper presents a thorough overview of an innovative solution to a crucial issue in emergency services. The IoT-based ambulance tracking system has the potential to save numerous lives by reducing response times and ensuring patients receive timely medical care.

The report analyzes the execution of a mobile-based ambulance service in India to tackle the scarcity of timely healthcare services and enhance the overall healthcare system. Various challenges are encountered by the current system, including delays in ambulance arrival, difficulties in locating ambulances, and fraudulent calls. To surmount these hurdles, a mobile application is presently in the development phase, which will enable users to request an ambulance with a single tap. Upon making a request, the application will dispatch a notification to local ambulance drivers, furnishing them with the user's details and location. Through the utilization of the Google Maps API, the application will have the capability to track the exact location of the ambulance, and this feature can be extended to encompass other healthcare facilities as well. The primary goal of this endeavor is to reduce ambulance delays and guarantee the swift delivery of healthcare services. The driver component of the application will empower ambulance drivers to accept emergency requests,

sdmimd

Shri Dharmasthala Manjunatheshwara Institute for Management Development, Mysuru, India
6th International Marketing Conference on
Marketing in the AI Era - Marketing 5.0 - Reshaping Global Marketing

navigate to the user's location, and pinpoint the nearest hospital. Conversely, the administrative component will be tasked with collecting user information, generating usage reports, and overseeing the application's data. The proposed solution aims to transform the utilization of emergency services and enhance the effectiveness of ambulance services in India.

The healthcare industry is in need of enhanced efficiency as the number of urgent medical cases continues to rise. To tackle this issue, the system focuses on dispatching ambulances promptly and delivering precise treatment to improve patient survival rates. It is built to be dependable, effective, and can seamlessly integrate with other devices to further enhance reliability. This groundbreaking solution simplifies the process of booking ambulances, potentially saving lives and boosting the overall efficiency of the healthcare sector.

The document details a mobile tracking application designed for emergency ambulance services, consisting of two primary applications: an accident alert system and an ambulance tracking system. The accident alert system is responsible for notifying family members, police departments, and ambulance services in case of an accident, providing the exact location for a swift ambulance response. Furthermore, the system includes features for user registration, traffic police registration, and ambulance driver registration. The ambulance's location is tracked via GPS and stored in a database. Additionally, the system allows for traffic signal control to ensure a clear path for the ambulance. In conclusion, the proposed system aims to improve the efficiency and effectiveness of emergency ambulance services by leveraging mobile technology and real-time tracking.

This document emphasizes the necessity for enhanced ambulance services and emergency response systems in the healthcare sector. It underscores the significance of prompt medical assistance and identifies existing infrastructure challenges. By leveraging technological advancements, applications have the potential to streamline ambulance booking and emergency response. Through the app, users can swiftly request an ambulance for on-site care. Sensors can monitor the patient's condition and transmit data to a database accessible to hospital staff, thereby improving service scheduling. The document also explores platforms that support patients, ambulances, and hospitals, providing doorstep ambulance services akin to mobile cab booking services for expedited aid during emergencies. Ultimately, the objective is to augment the efficiency and effectiveness of ambulance services, ultimately preserving lives through mobile apps and intelligent technology.

The system allows users to easily access emergency healthcare services by calling for an ambulance with their mobile phone. It uses GPS to locate the nearest ambulance driver and provides a route to the user. The system also utilizes GIS to give drivers information about nearby hospitals and doctors. Users can log into search for hospitals and send pictures of patients to assess injuries. The system captures user behavior through weblogs to improve its v value. Overall, the ambulance tracking system aims to improve emergency healthcare services and save lives.

The research is centered on assessing a city's resources and response capabilities in accidents, along with the effectiveness of current emergency teams and ambulance availability. The aim is to enhance emergency response systems and decrease ambulance arrival time at accident sites. A central hub is suggested for managing ambulance dispatch and monitoring, ensuring optimal ambulance distribution and facilitating patient data analysis en route. In summary, the study underscores the significance of efficient ambulance management and systems in enhancing the quality of emergency medical services (EMS). It ends by underscoring the necessity for advancing software with enhanced features to boost emergency response capabilities.

The app helps people find the nearest ambulance driver in emergencies. It's cheaper and more effective than regular ambulance services. It uses AI and real-time tracking for quick and reliable service. The app has been extensively tested and improved with input from users and participation in events. EMS BD is a major advancement in emergency ambulance services, offering a faster, more efficient, and affordable option.

Shri Dharmasthala Manjunatheshwara Institute for Management Development, Mysuru, India

6th International Marketing Conference on
Marketing in the AI Era - Marketing 5.0 - Reshaping Global Marketing

----

Design and Implementation

The project encompasses three fundamental modules: an admin application, a user application, and a driver application.

User Application

Initially, users must complete the registration process by providing necessary information, which will grant them access to login to the application. Once logged in, users have the ability to modify or update their personal details within the profile section. After logging in, users can view and access all nearby available ambulances. They will also receive important information such as the distance between the ambulance and the user, the ambulance's current location, the driver's contact number, and a request button. With a simple tap, users can access the driver's details, including their contact information, and send an alert to request ambulance assistance along with a geo-tagged image. Users can notify the ambulance of an accident and then leave the scene. Additionally, to prevent false incident reports, the user application includes a camera feature along with geo-tagging. Users are required to take a photo of the incident along with its location and upload it to the app. If this step is not completed, the application will not proceed further. This feature has been implemented to reduce fraudulent reports..

Driver Application:

Initially, drivers register via the application .Once registered, drivers can access their profiles post-login to modify or update details within the profile section. Drivers have the choice to indicate their availability for service. Opting out of service visibility restricts user access to the driver's location. Upon user ambulance requests, drivers can view the user's location and utilize the map component to navigate the route towards the user's location. Drivers possess the ability to report users providing false notifications, enabling the admin to take subsequent action, including user blocking.

Admin Application:

The admin application includes a feature enabling the blocking of specific users based on ambulance driver reports.
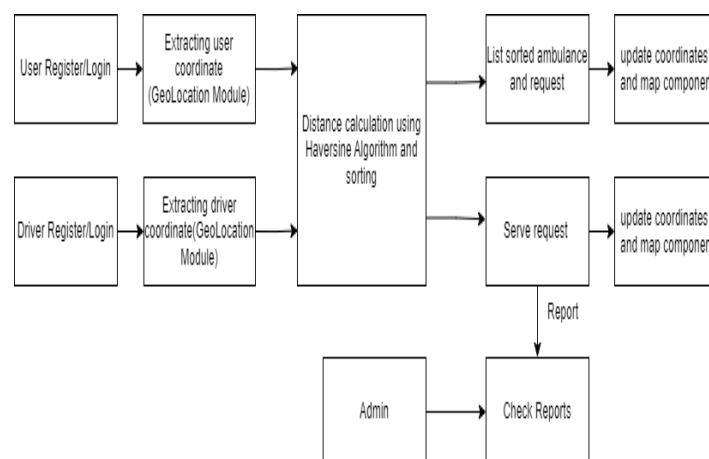
I. **ARCHITECTUREOFTHESYSTEM**

Figure 1 : Architectureofthesystem

The User and Driver must complete the Login/Register process and provide all the necessary information in their respective applications. This allows both parties to access each other's

information. After the registration is completed, the Haversine algorithm is used to calculate the distance between the user and each available driver. This algorithm accurately determines the distance between two points on the Earth's surface using latitude and longitude coordinates. Subsequently, the Quick sort algorithm is utilized to efficiently sort the available ambulances based on their proximity to the user. This sorting mechanism enables the user to easily find the nearest ambulance for their needs. The User can view all the nearest ambulances within a range of 40km. Once the sorted list of available ambulances is received, the user can proceed to request an ambulance. During the request process, the user is required to send a geo-tagged image to the selected driver. This image serves as a validation measure to verify the user's identity and location. Upon receiving the request and geo-tagged image, the driver validates the image to ensure a secure and reliable interaction between the user and the driver, prioritizing safety and trust in the service. When the driver accepts the user's request, the toggle button automatically turns off, indicating that the ambulance is either unavailable or serving another location. Additionally, upon accepting the request, the driver gains access to the embedded map component within the application. At the same time, the user can also access this map component once the driver accepts the request, allowing real-time tracking and navigation for both parties. Furthermore, if there is any fraudulent activity or false information, the ambulance driver can report the user. Admins have the authority to deactivate users based on driver reports. This ensures the integrity of the platform, enforces policies, and prioritizes the safety of both users and drivers, creating a secure and trustworthy environment for all.
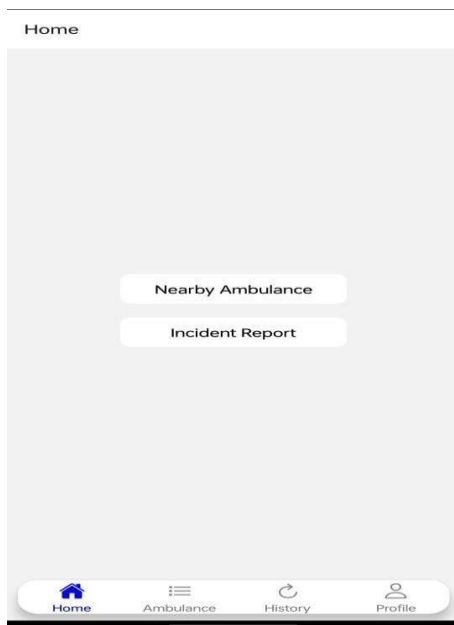
Application Screens

Fig1.UserHome page

![sdmimd logo]

Shri Dharmasthala Manjunatheshwara Institute for Management Development, Mysuru, India

6th International Marketing Conference on
Marketing in the AI Era - Marketing 5.0 - Reshaping Global Marketing

----
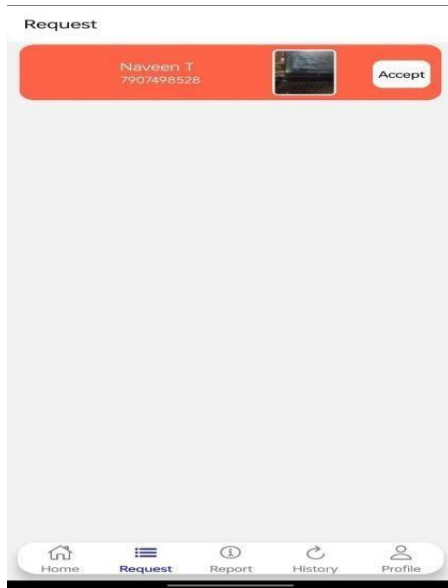
Fig2.DriverRequestPage

Conclusion and Future Work

To summarize, the Comprehensive Automated Solution for Detecting Ambulances in Real-Time is an indispensable tool that saves lives by enhancing communication between users and ambulance drivers, thereby streamlining the emergency response process. Moreover, extensive research has demonstrated the vital role of this application in aiding hospitals and emergency services in rescuing patients.

Consequently, this mobile app serves as a valuable asset not only in there alms of social media and gaming but also in the realm of life-saving. Moving forward, it is advisable for future updates of the Comprehensive Automated Solution for Detecting Ambulances in Real-Time to prioritize bolstering privacy measures, refining communication channels, predicting real-time traffic, and devising more efficient methods to combat fraudulent incident reports and calls.

References

[1] Devigayathri, P., et al. "Mobile ambulance management application for critical needs." 2020 Fourth International Conference on Computing Methodologies and Communication (ICCMC). IEEE, 2020. "Internet of Things (IOT) Based Ambulance Tracking System Using GPS and GSM Modules" Aritra Baksi1, Mayookh Bhattacharjee2, Siddhanta Ghosh2, Soham Kanti Bishnu1, Arindam Chakraborty1.

[2] Arunachalam, P. L., et al. "Ambulance booking application." 2021 6th international conference on signal processing, computing and control (ISPCC). IEEE, 2021. "GPS-based On-Demand Ambulance Booking System Using Google Cloud" Daksh Nauni, Preetam Singh, Shubham Verma, Keshav Gupta DOI: 10.1109/OTCON56053.2023.10113918.

[3] Sasipriya, S., R. Ajaai, and S. Harini. "Accident Alert and Ambulance Tracking System." 2021 6th International Conference on Communication and Electronics Systems (ICCES). IEEE, 2021. "A Survey on existing system design used for managing ambulance booking through mobile App" Dr. L. Srinivasan, Ms.Mounika BR, Ms.Shaik Anju Minayar ,Ms. Sanjeevani Sharma, Ms. Navya Sood DOI: 10.1109/ICCCI56745.2023.1012834.

[4] Gunavathie, M. A., et al. "Life-Saving Opulent Ambulance Tracking System." 2023 International Conference on Computer Communication and Informatics (ICCCI). IEEE, 2023. Web Application for Resume Screening – Sujit Amin,Nikita Jaykar,Sonia Sunny,Pheba Babu 2019

[5] Nuevas, Lyra K., et al. "AMBUAPP: Ambulance Response Application." 2021 IEEE 13th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM). IEEE, 2021.

[6] Ghani, Tasfiqul, et al. "Design and feasibility analysis of an artificial intelligence based mobile app for emergency ambulance." 2021 IEEE 11th Annual Computing and Communication Workshop and Conference (CCWC). IEEE, 2021.

[7] Nauni, Daksh, et al. "GPS-based On-Demand Ambulance Booking System Using Google Cloud." 2022 OPJU International Technology Conference on Emerging Technologies for Sustainable Development (OTCON). IEEE, 2023.

[8] Srinivasan, L., et al. "A Survey on existing system design used for managing ambulance booking through mobile App." 2023 International Conference on Computer Communication and Informatics (ICCCI). IEEE, 2023.

[9] Balaji, Chaitanya, and L. Sujihelen. "Finding an Optimal Route Path for Ambulance." 2023 8th International Conference on Communication and Electronics Systems (ICCES). IEEE, 2023.

[10] Baksi, Aritra, et al. "Internet of Things (IOT) based ambulance tracking system using GPS and GSM modules." 2020 4th International Conference on Electronics, Materials Engineering & Nano-Technology (IEMENTech). IEEE, 2020.