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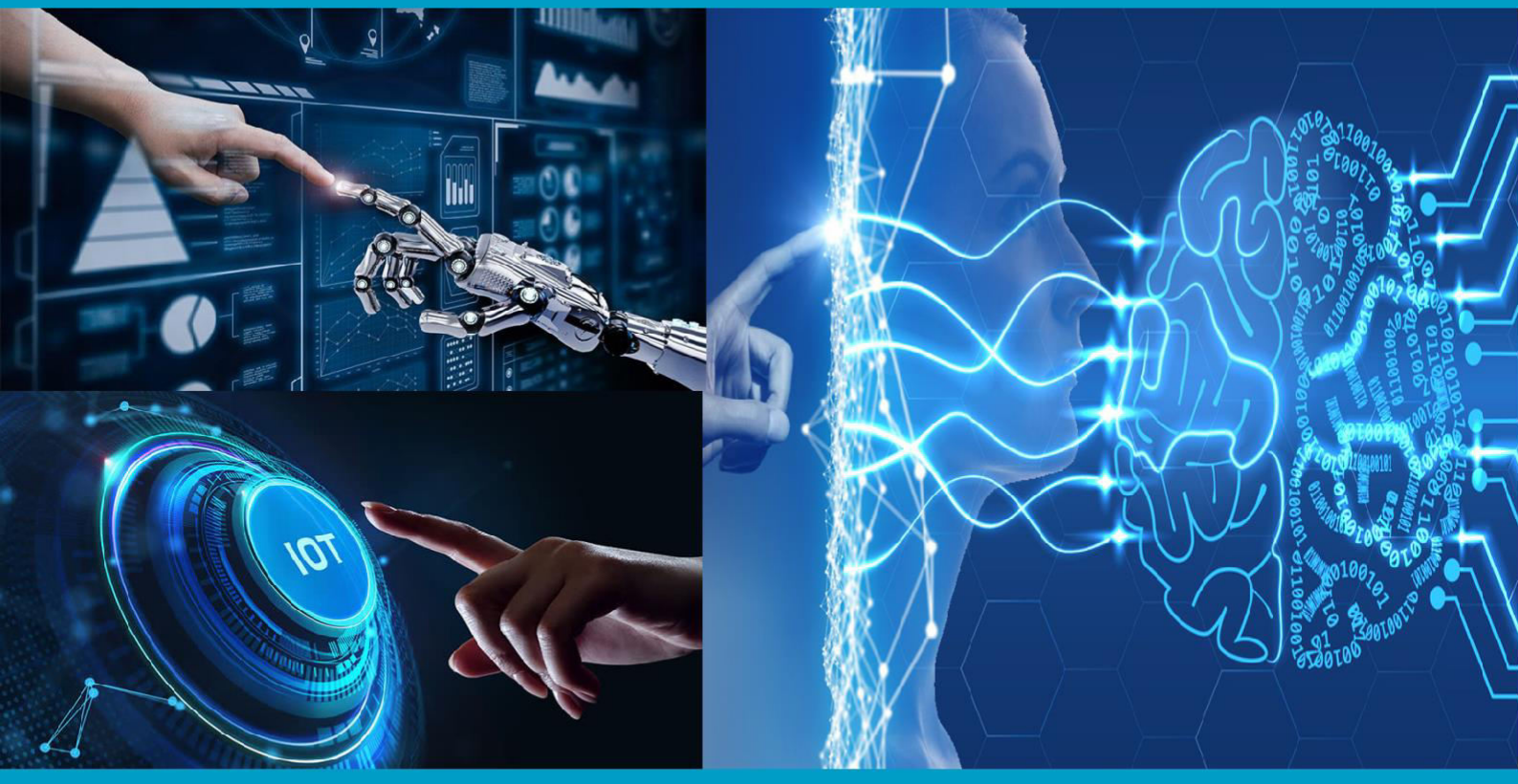

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Ambulance Booking System: Quick Aid

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ABSTRACT: Fast and effective emergency medical services are essential in today's healthcare to save lives and provide vital care during medical emergencies. An innovative solution known as "QuickAid" has been created to address the issues with traditional ambulance dispatch systems. With a primary focus on reducing response times and increasing the general effectiveness of emergency medical services, QuickAid is an advanced ambulance booking system that seeks to streamline the process of requesting and dispatching ambulances. QuickAid wants to transform the way emergency medical services are provided, ultimately saving more lives and improving patient outcomes, by leveraging technology and data-driven techniques.

I.INTRODUCTION

Life on Earth is now much better because of medicine. Patients in critical condition who have a slim prospect of recovery can now be treated. However, it's critical that people obtain quick medical care in an emergency. This can be challenging, especially in congested big cities. Traffic congestion is a significant issue in Bangalore, a city with a rapid worldwide expansion. This may make it challenging to quickly remove patients to hospitals. Sometimes, this has led to critical health problems or even fatalities.

Patients will be able to follow the whereabouts of their ambulances via the suggested technology. Patients and their relatives would feel more at ease, and it would also assist to make sure that ambulances are sent as promptly as possible to the proper area. People who have been in vehicle accidents, expectant mothers, people with serious medical illnesses, and others who require emergency medical care would all benefit from the proposed approach. Additionally, the system's development company would benefit financially from it.

II.LITERATURE REVIEW

Current Situation

One of the major contributing factors to traumatic deaths is delays in reaching medical facilities in India in a timely manner. The government has established an ambulance system based on state-run call centers (108), but there are no guidelines or regulations followed by more than 30% of ambulances[1]. When surveying emergency department (ED) patients who used emergency medical services (EMS) in the United States, 78% were willing to consider any alternative to an ambulance. 15% of patients have to wait for an ambulance for a long time [2].

An IoT-based application developed in [3] creates a system where an ambulance can be booked with one click and all traffic lights on the road turn green. Using Arduino and Google Maps API, a suitable model was developed to implement this idea. The HelpX system in [4] allows users to select emergency services after logging in/registering. A report with a unique ID is generated with the click of a button. The evolution of ambulance prices is mentioned on a daily basis.

E-Ambulance System

An ambulance reservation service is a great way to bridge the gap between patient and ambulance response times. [5] Ambuitec is an ambulance booking application for a patient in distress; where patients will choose their suitable routes by comparing the ratings and distances of each route in an area. Android Studio, Firebase and Google Maps API are used to make the system.

Bassey Isong and Nosipho Dladlu [6] created a system for communication between healthcare personnel and patients in their village. It uses cloud computing and mobile technology. The methodology involves using a combination of mobile app and GPS Service to enable patients to request an ambulance and book appointments

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In another attempt[7], there was a minor drawback where the hospitals were provided to the ambulance but the information about the patient was not relayed to the hospitals. The authors propose a system where the patient's information is shared to the hospital. Information such as body temperature and pulse rate is shared. This would allow the hospital to make the necessary arrangements to provide the patient with the best care available.

In a different approach, an application provides an implementation [8] to save lives in accidents and emergencies. This app notifies the ambulances nearby using their service number via SMS. The messages sent to EMS are formatted. Loved ones are contacted using integration with Facebook, Google, WhatsApp etc. Integrating various other ride sharing applications with the proposed app is currently not available.

Location-based Services

Location based services or LBS are any services that tell us the geographic location of any person or object. In a request for location based services, there are always at least two people involved, like in a telephonic conversation [9]. The LBS server must be capable of handling a huge number of concurrent queries. When a request is issued, the mobile client establishes a connection with the server and receives the necessary result from the server over the channel that is established[10].

The introduction of the taxi-hailing business was introduced by Ola in India. Customers can book a taxi on their phones using the app. GPS plotters are used in all cabs to monitor and track their activity[11]. The transportation industry in India has changed over the years in terms of infrastructure and consumer preferences. Ola and Uber use route optimization to find the shortest path to the final destination.[12]

III.METHODOLOGY

System Overview

The name of the system will be QuickAid. QuickAid is a mobile application for booking an ambulance for a patient in stressful, critical times where an ambulance is booked from the nearest location, thereby increasing the time for the patient to be treated and looked after. The fare of the ambulance is also calculated and can be seen at the time of the booking to ensure that the person booking the ambulance can be sure of the affordability of the service. The system will have users like patients, ambulance drivers, and hospitals. QuickAid will develop a robust rating and feedback system, enabling patients to offer insightful feedback on their encounters with the ambulance service and the driver, in order to ensure a high standard of service. Performance reviews for ambulance drivers will encourage them to give patients the best care and service possible. All the information-gathering algorithms, REST, responses, and request processes will be linked to Firebase. Analytical data will be held in the CRM, this analytical data includes the ratings of drivers, etc. This application will cater to coordinate tracking and response from Google Map API.

User Architecture

The primary parts of the application include the patient's application and the driver's application. A crucial tool for anyone looking to provide their driving services in the ambulance service industry is the driver's application. The drivers can build and edit their profiles, including information like their name, phone number, and personal rating, which is based on feedback from prior passengers. Depending on their availability and closeness to the pickup site, drivers can choose whether to accept or deny real-time travel requests. When GPS is included, drivers can navigate more effectively, guaranteeing that passengers will arrive on time. The patient's application was created for people who want dependable ambulance services. For easy ambulance booking, patients create and maintain their profiles and include their name, phone number, and address. By identifying the pickup and destination locations, the application streamlines transportation requests by automatically connecting patients with local drivers who are available. Patients can watch the driver's approach in real-time, assuring on-time arrivals.

Algorithmic Design

We consolidated the current scheduling algorithm of the system to ensure the system's successful functioning and to meet the needs of the users. Using the Dijkstra algorithm and first come, first served. Due to its effectiveness, precision, and compatibility for weighted graphs frequently used to describe road networks, Dijkstra's method is a well-justified choice for determining the shortest paths for an ambulance to take. Dijkstra's algorithm demonstrates to be a realistic and approachable solution for ambulance route planning, greatly affecting patient outcomes during emergencies by rapidly calculating the best time-efficient route, guaranteeing accuracy, and allowing real-time modifications.

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In order to deal with the long list of patients waiting, the LILO or FIFO concept can be used with the first come first serve strategy. The concept argues that the first person to book the ambulance is the first person that should be served. The coordinates, path, distance, and cost of the patient are not taken into account in this method. This approach's inclusion of long, varied, and hold times has further effects on the increased cost.

System Operation

The system proposed, develops data from the role assigned to the user. There are two application users in the system - patient and driver.

STEP 1: A user chooses whether they are a patient or a driver

Patient side

STEP 2: Users need to provide their phone numbers for registration. After this, there is no login necessary.

STEP 3: The module works like a cab booking facility. The device's GPS fetches the user's location.

STEP 4: The nearest hospital will be selected as the location or the user can manually drop the location - medical facility.

STEP 5: The user can click the Request an ambulance button.

Driver side

STEP 2: The driver can specify whether they are working or not by clicking the toggle button.

STEP 3: The driver will receive a pickup request from the patient.

STEP 4: Drivers can accept pickup requests and the route will be shown from the pickup location to the hospital.

STEP 5: The patient is taken to the hospital in the ambulance.

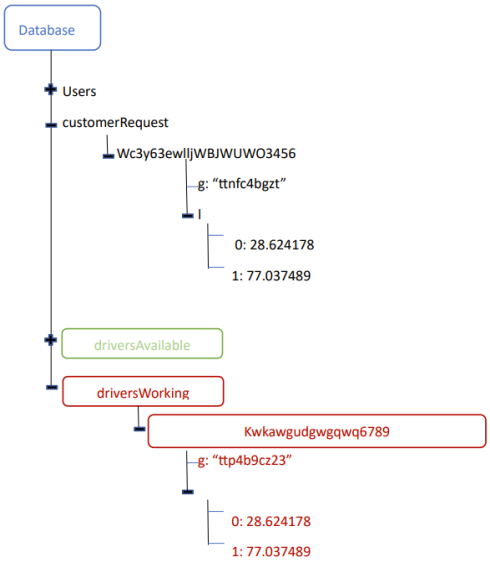

Figure 1. Database Structure

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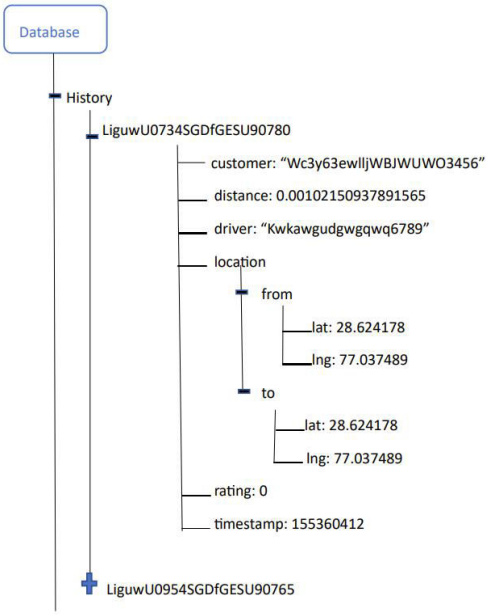

Figure 2. Database Structure(Saved History)

IV.RESULT

ambulance booking app was tested in real time to assess its operation and efficiency. Three ambulances were stationed 500 metres, one kilometre, and 2.2 km apart from the patient. During the booking procedure, the app used a proximity-based algorithm to automatically identify the nearest available ambulance for the patient.

The app enabled direct connection between patients and the selected ambulance, allowing patients to request help from their end. This simplified the dispatch procedure and increased overall efficiency. Furthermore, the programme used the Google Maps API to determine and recommend the quickest route for the selected ambulance, decreasing travel times and ensuring immediate medical treatment.

The ambulance booking application demonstrated its operating skills during intensive real-time testing. It handled instances with several ambulances available at varied distances with ease. The software improved its reliability in critical emergency circumstances by utilising the proximity-based algorithm and Google Maps API connection.

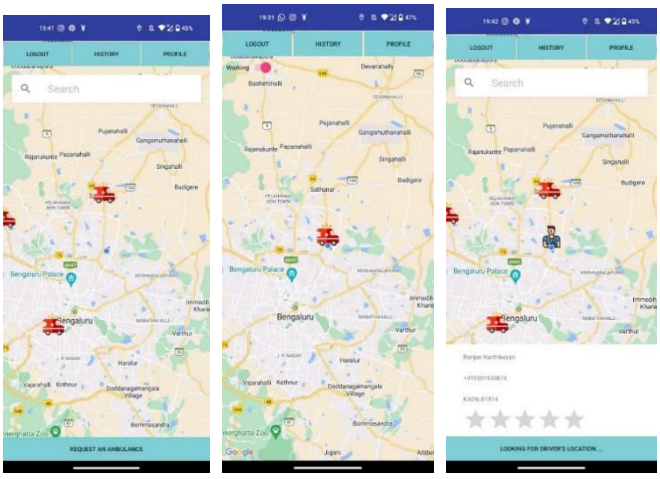

Figure 3. App Implementation

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V.CONCLUSION

The ambulance booking app's real-time testing has yielded promising results in swiftly locating the nearest ambulance for those in need. The app's algorithm successfully detected and dispatched the closest available ambulance to the patient's location by strategically positioning many ambulances at varied distances, potentially lowering response times and improving emergency medical services.

While the current implementation concentrates on calling, the app's functionality can be upgraded to include additional features such as chatting and audio messages. These future improvements could open up essential communication lines between patients and emergency medical staff, allowing for vital real-time information exchange and reassurance during critical periods.

As the software evolves and incorporates additional capabilities, it has the potential to transform the way emergency medical services are accessible and delivered. This ambulance booking software holds the promise of making a big beneficial influence on emergency response systems by utilising the power of technology and data-driven decision-making, ultimately leading to improved patient outcomes and potentially saving lives. However, while adopting these new features, it is critical to keep user input, usability, and security in mind to guarantee a seamless and trustworthy experience for both patients and medical responders. This unique app has the potential to become a vital tool in emergency healthcare, improving accessibility and responsiveness for patients in critical situations with continued development and refining.

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