Fast Instant Access to Emergency Ambulance Services

A.Sowmya[1], B.Pavan Teja[2], B.Praveen[3], Ch.Abhivardhan[4], K.Varnika[5], K.Ashritha[6]
Vardhaman College of Engineering, Narkhuda, Nagarguda - Shamshabad Rd, Kacharam, Telangana 50121

Abstract: **Advancements in health care centers are supported by emerging research in medical devices, wireless communications, sensors, and software applications. This paper presents various methodologies for realizing a web-based approach to ambulance service, providing efficiency and comfort. The ambulance service providers install the app and register their ambulance services with details. In case of emergency situations, users can avail of the ambulance facility either by registering the details in the application. The user is able to find out the places of the ambulance vehicle manually by entering the details of the location or automatically by selecting the needed option. By locating the nearest ambulance & directing through the shortest route to the patient's site & afterward to the hospital, the web application is the quickest service possible. A GPS (Global Positioning Service) facility is used to track the location of registered ambulance services. The easiest distance and quickest route are represented using Google Maps. Ambulance and application user details are stored using cloud storage or database. With the help of current and trending technologies, the most valuable service will be provided to the needy.**

I INTRODUCTION

Sometimes our life can take us by surprise, often at the most unexpected moments. In a crowded city, fast medical emergencies might feel like rare occurrences for any family, but they are happening around us all the time than we might realize. People of a city trust that their cries for help will be met with speed and efficiency, ensuring that in those critical situations, they are not alone, whether from poisonings, heart attacks, or other sudden illnesses.

In those critical moments, every second counts. Acting quickly to protect someone from that injury and shock can make all the difference. But it's not just the life-threatening situations that need our attention. There are also those sudden health issues that, while less severe, still bring a sense of urgency and anxiety. These might be treated with first-aid, a visit to the family doctor, or if those options aren't available, a trip to the emergency treatment facility.The number of these non-emergency cases are growing, placing a heavy burden on the entire emergency system. While these are not the life-or-death cases, they still need care and compassion. It's a delicate balance, making sure that everyone gets the help they need, when they need it. And in a large city, that's a promise we must strive to keep, ensuring every resident feels safe and cared for, no matter what.

The primary goal of this thesis is to develop a prototype for the Ambulance Service when road accidents takes place. This Fast Emergency Ambulance Service used to address routing and accident location challenges during both normal and peak hours. It includes GPS tracking technology to identifying accidents on the road network. Real-time identification of ambulance locations on the road network using GPS coordinates. Determining the shortest routes for all the ambulances to reach the accident location. Identifying how soon the ambulance on one of the roads can reach the accident location in relation to other ambulances. The next step after finding the shortest route from the nearest ambulance to the accident location is finding the shortest route from the accident site to the nearest hospital. If there are multiple accidents on the road network, then determining the shortest routes for ambulances to reach all accidents. Identify the shortest paths from all accidents to the hospital. Tackle the problem of congested roads during peak hours and determine the best routes for ambulances.

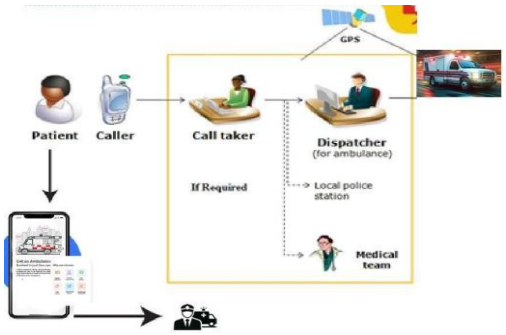

Fig.1.Block Diagram

Fig.1.(Block Diagram) explains about our website, if an emergency situation takes place then patient login to our website and then clicks on emergency button which is present in our application, the request will go to the nearby hospitals then the call taker will receive the call and dispatcher receives the request for ambulance (if required, call taker will give information to local police station and medical team). Using Global Positioning System(GPS) tracking system, patient can view the ambulance location and ambulance driver can view location where the accident takes place.

Basically, emergency ambulance services are then there in most communities to respond to calls for medical assistance. This is often the primary resource for dealing with a community's most critical, life-threatening medical emergency. Often requests are made for conditions that would not start life-threatening but would nevertheless evoke some concern or pain in those involved, to this end a speedy response is warranted. Hence, the emergency services would need to equip themselves to deal with a near-infinite variety of medical situations-from minor injuries through to crisis management in the severe health emergencies-thus ensuring that everybody, from the poor to the richest in the community, is afforded the right nature of care at the quickest possible time. The whole essence of the task in a city is to find out how great is demand in treating medical emergencies and works emergency-like. Ideally, it would have been best to ascertain the kind and rate of the occurrences in given areas. Such information could be used to ascertain the role of an emergency medical system and of its components each. In particular, the information could be used to better locate ambulances and emergency treatment facilities and to improve the training of ambulance attendants and the equipment carried in ambulances.

Including these challenges, we could successfully develop a model that explained almost all the differences in demand for publicly dispatched ambulances across different census tracts. Using only socio-economic data from a given area, we can predict exactly how many and what types of medical emergencies the public ambulance system will have to deal with throughout the year.

Surveys:

Preliminary findings spotlight that visitors congestion reasons delays of up to 15 minutes in city areas, considerably impacting emergency outcomes. Analysis also suggests that real-time statistics integration can lessen response times by as much as

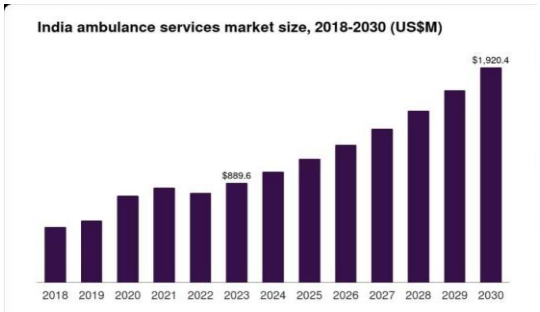

Fig.2. year-wise surveys of Indian Ambulance services

II LITERATURE SURVEY

"National Ambulance Services in India: A Narrative Review" - This article is a thorough review of the advancement and approach of the National Ambulance Services within the National Health Mission (NHM)[1]."Emergency and Injury Care at and Tertiary Level Centres in India" - This report evaluates the state of emergency and injury care provided at secondary and tertiary level centers in India and identifies gaps within ambulance services and health infrastructure[2]."Emergency Medical Services in India: The Present and Future" - This article discusses suggestions to streamline the Indian prehospital emergency care system, such as regionalization of EMS, better training, financial provisions, and enhancing community awareness[3]."Revitalizing Emergency Care Ecosystem in India through Technological Advancements" - This paper discusses the emergency care ecosystem within India, laying emphasis on first responders, clear communication, ambulance services, and trained healthcare workers[4]. "The Smart Ambulance Services" - This article is about the creation of smart ambulance services, such as the application of traffic control systems and health monitoring to increase emergency response effectiveness[5].This research is about different developments and technological advancements applied to ambulance emergency services in India[6]. "Systematic Literature Review of Emergency Medical Services" - This article provides a systematic overview of different researches on emergency medical services, with an emphasis on the necessity of technology incorporation for enhancing emergency response times and patient treatment[7]. "Technological Innovation in Emergency Medical Services" - This article discusses the application of predictive analytics, blockchain-based medical records, and drone technology to improve the effectiveness and reliability of ambulance services[8]. "Epidemiology of Emergency and Injury Care at Secondary and Tertiary Level Centers in India" - This study evaluates the existing situation of emergency and injury care at secondary and tertiary level centers in India and pinpoints the gaps in health infrastructure and ambulance services[9]. "Revitalizing Emergency Care Ecosystem in India through Technological Advancements" - This article discusses the emergency care ecosystem in India, with a focus on cloud technology, first responders,

efficient communication, ambulance services, and trained healthcare professionals[10]. "Cloud Computing and Accident Handling Systems" - This article examines the present challenges in cloud computing solutions for life-critical systems, i.e., car accident systems in the Gulf region. The Gulf area has a high mortality rate from car accidents, compounded by the lack of proper accident handling facilities[11]."Accident Detection in Vehicular Networks Through OBD-II Devices and Android-based Smartphones" - The authors are suggesting an Android-based application based on On-Board Diagnostics (OBD-II) interfaces to track vehicles and alert for accidents. Smartphones being integrated with vehicles are expected to expand user experiences and offer new features during driving[12]. "GPS-based Tracking and Health Parameter Detection" - The research emphasizes displaying the location of ambulances in real-time and health parameters of patients on an LCD screen, at the same time communicating this to the hospital[13]. "Intelligent Accident Detection and RF Communication" - The web-based software displays the user's nearest ambulances, clinics, and pharmacies. Automotive sensors are utilized in automatic detection of accidents and immediately alert the ambulance[14]. "Optimizing Ambulance Locations Using GIS-Based Simulations" - This article reports on applying GIS and statistical modeling to investigate ambulance response time variables like traffic and time of day. Published in the International Conference on Industrial Engineering and Operations Management[15]. "Dynamic Deployment Models for Emergency Medical Services" - Research on mathematical and simulation models to enhance response time while preserving system efficiency[16]."Integrating IoT for Smart Ambulance Routing" - Research on Internet of Things (IoT) technologies to boost emergency response by dynamically redirecting ambulances[17]. "Minimizing Response Time in Medical Emergency Services: A Literature Review" - Reviews ambulance location, allocation, and dispatch strategies employing analytical and simulation approaches. Key focus is on reducing response times while balancing resource use. Published by the IEOM Society International[18]. “Shortening Ambulance Response Time to Improve Survival” - Out-of-hospital cardiac arrest (OHCA) studies emphasize that every minute of delay reduces survival chances, identify response time thresholds critical for specific conditions, advocating for advanced resource allocation and enhanced communication systems to save lives[19]. " Dynamic Relocation Models for Emergency Services" - Employing simulation technologies such as GIS and mathematical optimization, research suggests dynamic ambulances relocation through predictive analytics. This reduces downtime and maximizes area coverage in peak demand periods. In a significant contribution, machine learning is used to predict emergency hotspots[20].

III METHODOLOGY

The method for growing and imposing a mobile or internet utility for instant immediately get admission to emergency ambulance offerings involves several key steps that ensure the creation of a strong and efficient device. Initially, it is vital to conduct a radical needs assessment and requirement analysis. This step involves identifying the specific desires of target customers and stakeholders, inclusive of patients, healthcare vendors, and ambulance offerings. Gathering and analyzing those necessities allows outline the software's features, functionality, and consumer interface.

Next, we come to layout and improvement. You broaden the person interface the usage of HTML, CSS, and JavaScript to make a consumer-pleasant and responsive design. This guarantees that customers could be able to use the utility without problems from numerous forms of gadgets.Through a SIMSPI admission framework, the impactful medical facts can be routed correctly with managed crunch of affected person coping with databases, even as APIs may be built to accommodate person requests, overseeing affected person statistics, and managing statistics bearers. This is an vital degree to make sure that patient statistics is kept stable and personal.

Once the fundamental framework is in location, the implementation of middle functions is the subsequent focus. This consists of developing a reserving system that permits users to e book ambulance services for each emergency and non- emergency situations. Integrating GPS and real-time monitoring capabilities is critical to display the place of ambulances and offer updates to users. Recording patient statistics, along with signs, scientific reports, and bio-records (heartbeat, pulse fee, and body temperature) all through the booking process is another vital function. This facts permits scientific specialists to put together for instant and appropriateSystematic testing and quality assurance are done to detect and fix any bugs

or defects. This phase guarantees the stability and functionality of the application. User acceptance testing (UAT) is conducted to validate that the application fulfills user expectations and requirements. Once the testing process is complete, the application is deployed to a production environment and made available on the market for users.After launch, ongoing monitoring of the application's performance is required to resolve any problems in a timely manner. Training is offered to health care professionals and ambulance staff to ensure they are able to use the application effectively. Customer support is also available to help users with any questions or problems they may have. Ongoing improvement is an important part of the methodology, which includes gathering feedback from users and stakeholders to determine areas for improvement. The application is continually updated and enhanced based on this feedback and new technologies.

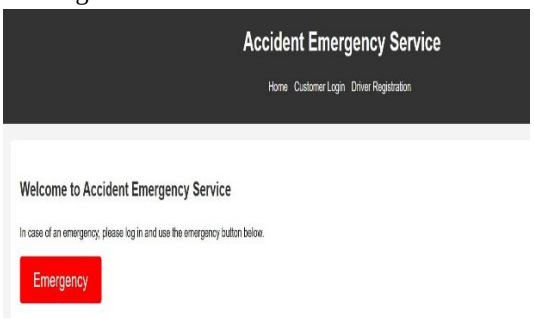

Fig.3.Frontend of Website

Fig.3.(Front-end of Website) explains about the picture is of a page named "Accident Emergency Service," which seems to be part of an emergency handling system. At the top, there is a black navigation menu with titles such as "Home," "Customer Login," and "Driver Registration." Below this, the page greets visitors and asks them to log in if they are in an emergency situation. There is also a red "Emergency" button, which is probably for urgent assistance. At the bottom, there is a caption named

To design front-end we used HTML, CSS and for internal implementation JavaScript, it can be programmed to build web pages, retain format and style, and combine interactive features such as buttons and real-time updates.

As for the back end, it is the portion that runs in the background of the system. It executes commands, it processes data and makes sure the process remains unaffected. The back end can be performed in any language, such as Node.Js, Python, Java, or PHP, that this can be applied.

The database will serve the system as a place where the emergency data will be stored, in this no case will it remain unnoticed without the help of patient data, also databases will store the patient information, which will be formally used to configure the ambulance to the patient, who has requested an emergency kit. Similarly, all of these will significantly improve patient treatment. Besides storing structured data in MySQL, PostgreSQL, or SQLite, you can also opt for the flexible mode in which NoSQL databases (like MongoDB, Firebase) are used.

For the front-end and also for the back-end to connect the application, the system will employ APIs (Application Programming Interfaces). These will make sure the user request, such as ordering an ambulance or tracking the nearest emergency medical service, will be handled in a blink of the eye. Security consideration of the process is essential, therefore, the methods of JWT (JSON Web Tokens) or OAuth can be employed for authentication and authorization, which will help to safeguard the user data and ensure thatonly the correct users are permitted access.

Lastly, this suggested design ensures the emergency ambulance service app is responsive, trustworthy, and secure. With real-time tracking, auto-dispatch of ambulances, cloud storage, and stringent security, the system will be in a position to ensure people receive their medical care on time, and more lives will be saved during emergencies.

Flow Diagrams & observations

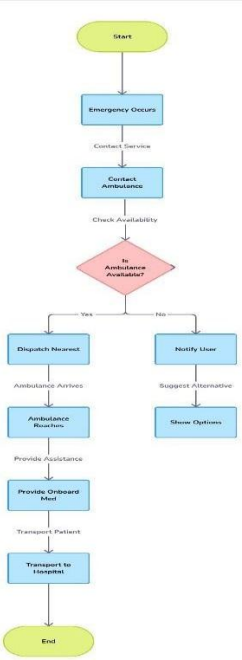

Fig.4.Flow Diagram

Fig.4.(Flow diagram) explains about the system's execution process, highlighting key interactions between users, dispatchers, and ambulance services. The flow diagram should depict the steps from the initiation of an emergency ambulance request to the completion of service. Here's how the process can be structured:

1. Emergency Occurs: An individual requires immediate medical assistance.
2. Request for Assistance
   - Modes: Call, SMS, mobile app, or website submission.
   - Information Collected: Location, type of emergency, contact details.
3. Verification and Dispatch
   - Validation: Operator verifies the request (optional depending on urgency).
   - Dispatch: Nearest available ambulance is identified and deployed.
4. Real-Time Updates
   - Communication: Updates provided to the requester via text, call, or app.
5. Arrival and Service
   - Ambulance reaches the location, provides first aid, and transports the patient to the nearest healthcare facility.
6. Post-Service Feedback
   - Feedback: User is prompted to rate the service for quality assurance.

IV RESULTS AND DISCUSSIONS

Results:

Efficiency and Response Time: The system has greatly cut down response time for ambulances to book, resulting in quicker responses. Integration of real-time GPS tracking enables ambulances to travel through traffic congestion effectively, without getting held up and reaching the site of the incident on time.

User Satisfaction: The user feedback has been extremely positive, with most users thanking us for the convenience and simplicity of the application. The simplicity of the user interface, built with HTML, CSS, and JavaScript, allows users to book an ambulance at a very high speed with ease, even in an emergency.

Discussion:

The system employs HTML, CSS, and JavaScript for improved emergency medical response with real-time tracking and processing. Future developments involve remote medicine consultation for real-time advice and predictive analytics for improved resource planning. Security measures will protect patient information. Extension to rural and disadvantaged regions will ensure timely emergency care through collaborations with local hospitals and government agencies, bridging the gap in emergency medical services.

V CONCLUSION

In summary, the use of web and mobile applications greatly improves the availability and effectiveness of ambulance services, both in emergency and non-emergency cases. The applications allow users to easily and quickly make bookings for ambulance services at any time, thus ensuring timely medical care. Through capture of essential details like symptoms, medical reports, and bio statistics at the time of booking, these applications enable instant and efficient treatment as soon as the patient reaches the hospital. The successful adaptation of the prototype into a fully operable software application, developed with HTML, CSS, and Java, is proof of the feasibility and usefulness of this method. The Fast Instant Access to Emergency Ambulance Services exemplifies the potential of technological advancements to revolutionize emergency medical services, ultimately improving patient outcomes and saving lives.

REFERENCES

[1] Andrews, R. B.: "Criteria Selection in Emergency Medical System Analysis." EMS Working Paper No. 1, 1969 (EMS-69-1-W). Paper presented at Annual Meeting, Western Section Operations Research Society of America, February 1969.

[2] Jacobs, A. R. and McLaughlin, C. P. "Analyzing the Role of the Helicopter in Emergency Medical Care for a Community." Medical Care 5:343, 1967.

[3] King, B. G.: "Estimating Community Requirements for the Emergency Care of Highway Accident Victims." A.J.P.H. 58: 1422, 1968.

[4] King, B. G. and Sox, E. D.: "An Emergency Medical Service System-Analysis of Workload." Publ. Mth. Rep. 82:995, 1967.

[5] Lavenhar, M. A., Ratner, R. S., and Weinerman, E. R.: "Social Class and Medical Care: Indices of Nonurgency in Use of Hospital Emergency Services." Medical Care 6:368, 1968.

[6] Weinerman, E. R., Ratner, R. S., Robbins, A., and Lavenhar, M. A.: "Yale Studies in Ambulatory Medical Care: V. Determinants of use of Hospital Emergency Services." A.J.P.H. 56:1037, 1966.
[7] Sarthak Khanna. "Ambulance Response Optimization." International Journal of Computer Sciences and Engineering (JCSE), EISSN: 2347-2693, Vol. 7(6), pp. 281-286, Jun 2019.
[8] Kotze J. M. "The role of the ambulance service as part of the health profession." S Afr Med J., Vol. 78, Issue 6, p.320-322, 1990.
[9] P. Iyappan, B. Nanthini Devi, P. Nivedha, and V. Sayoojya. "Lisa-life saver." 2019 IEEE International Conference on System, Computation, Automation, and Networking (ICSCAN), Pondicherry, India, pp. 1-6, 2019.
[10] TV Sethuraman, Kartik Singh Rathore, Amritha G, Kanimozhi G. "IoT based system for Heart Rate Monitoring and Heart Attack Detection." International Journal of Engineering and Advanced Technology (IJEAT), ISSN: 2249-8958, Volume-8 Issue-5, June 2019.
[11] Rashmi A. Nimbalkar, R.A. Fadnavis. "Domain Specific Search Of Nearest Hospital and Healthcare Management System." IEEE, 978-4799-2291- 8, 2014.
[12] R. Vithiya, S. Karthika, and G. Sharmila. "Detection, Monitoring and Tracking Of Survivors under Critical Condition Using Raspberry-Pi." 2019 IEEE International Conference on System, Computation, Automation and Networking (ICSCAN), Pondicherry, India, doi: 10.1109/ICSCAN.2019.8878711, pp. 1-5, 2019.
[13] Yuanyuan Du, Yu Chen, Dan Wang, Jinzhao Liu, and Yongqiang Lu. "An android-based emergency alarm and healthcare management system."2011 IEEE International Symposium on IT in Medicine and Education, Cuangzhou, doi: 10.1109/ITiME.2011.6130855, pp. 375-379, 2011.
[14] Justin J. Boutilier and Timothy C. Y. Chan (2018). "Ambulance Emergency Response Optimization in Developing Countries" .
[15] Marcus Poulton et al. (2018) "Modelling Metropolitan-area Ambulance Mobility under Blue Light Conditions".
[16] Haoran Su and Joseph Y. J. Chow (2024) "Intersection-Aware Assessment of EMS Accessibility in NYC: A Data- Driven Approach".
[17] Joshua Ong et al. (2022) "OpenEMS: An Open-Source Package for Two-Stage Stochastic and Robust Optimization for Ambulance Location and Routing"
[18] "Improving Access to Emergency Medical Services Using Advanced Air Mobility" in (2023).
[19] "The Role of Feedback in Emergency Ambulance Services" in (2022).
[20] "Supporting Fair and Efficient Emergency Medical Services in a Smart City Contex