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Introduction

An Ambulance Management System is one of the subsystems of an EMS, and serves to effectively and efficiently support dispatching and tracking of ambulance services. The situation of ambulances at the present time is problematic in many developing countries like Nepal, which shows the necessity of developing an effective manage their system. This system generally has elements like GPS navigation, automatic dispatch when close, syncing with databases of the hospitals, and other facilities for both the paramedics along with the dispatchers. Thus, the use of such a system can really decrease the response times and, therefore, increase the number of lives saved and effectiveness of resource usage.

In this paper the themes that manifest are the challenges related to ambulance services in Nepal. There are immense challenges facing the attainment of adequate healthcare services especially in the rural and remote regions including availability of timely ambulances. The preexisting system is disjointed, various entities that supply different services are not integrated with one another, which results in inefficiency and misunderstandings. In addition, there are further concerns which have to do with the servicing and accessibility of the ambulances more particularly where they are in the somewhat remote and rugged areas. But things are even worse in areas with heavy traffic as seen from cities like Kathmandu hence increasing the response time even further. From this argument, it is realized that for these services, there is no central area of coverage that provides for their management and monitoring thus resulting to inefficiencies and sometimes even life-threatening delays. These problems could arguably be solved by the adoption of a sound Ambulance Management System in Nepal that would give timely information and subsequently facilitate the enhancement of the flow of services, making it easier to deliver emergency medical services to clients.

Problem Statement

The situation with ambulance services in Nepal continues to be in a critical state as it is expounded by several problems that affect the delivery of timely and efficient emergency medical services. These hardships are more apparent where ambulances are hard to come by, mainly in the rural and remote areas where infrastructures are poorly developed. In urban areas traffic jam and poor traffic management only make the situation worst meaning that a delay situation can actually become fatal. Due to inadequate national standards of consolidating and organizing the ambulance services, such issues arise and lead to misuse of resources, poor interface between organizations and unequal service delivery. As all these problems persist, the outcomes of emergency circumstances in Nepal stay bleak, on top of threatening the lives of patients who require attentive care.

Challenges in Accessing Ambulance Services in Nepal

- Lack of Centralized Coordination
- Poor Communication Infrastructure
- Traffic Congestion in Urban Areas
- Absence of Real-Time Tracking
- Limited Public Awareness

Objectives

- To identify the ambulance locations on the road network in real-time using GPS coordinates.
- To find the ambulance which can immediately reach the accident site as compared to other ambulances is analyzed.
- To find the fastest routes from all the accidents to reach the hospital immediately.

Methodology

a. Requirement Identification

Thus, identifying the requirements for an Ambulance Management System (AMS) is an important stage to achieve expected goal and meet the needs of different stakeholders as well as to provide effective functioning of the system in emergency situations. These can be named as functional, non-functional requirements.

i. Functional Requirements

- Real-Time GPS Tracking
- Automated Dispatch System
- Patient Information Management
- Reporting and Analytics
- User Management

ii. Non-Functional Requirements

- Scalability
- Performance
- Security
- Reliability
- Interoperability

b. Feasibility Study

i. Technical Feasibility

Thanks to the current advances in the development of cloud computing, mobile networks and GPS, the technical support for Ambulance Management System (AMS) is therefore sound. Almost all the regions in Nepal have good internet connectivity that is requisite technological facilities for availing smart city services. In rural areas despite the challenges found there, with advancement in the mobile networks extension it will be easier to implement a internet-based AMS.

ii. Economic Feasibility

The improvement in efficiency and coordination in ambulance services can lead to cost savings in the long run, making the system economically sustainable.

iii. Operational Feasibility

The success of an AMS depends on the willingness of ambulance providers, healthcare institutions, and government bodies to adopt the system. With proper training and awareness programs, it is feasible to ensure high user adoption, particularly given the clear benefits in improving emergency response.

iv. Schedule

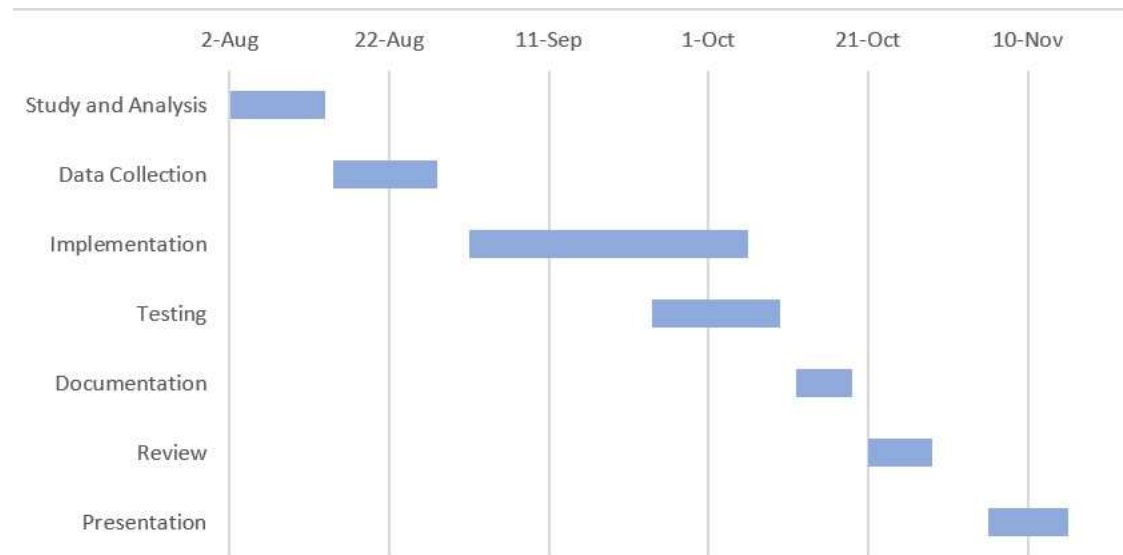


Figure i Gantt chart showing the project timeline

c. High Level Design of System

i. Methodology

It starts with data collection, involving both map data and real-time data. The collected data is stored in a GPS database, which includes information on roads, junctions, hospitals, GPS coordinates, and GSM data. The system then utilizes GPS/GSM technology, managed by an ambulance management system, to analyze and provide results. The results help identify the nearest ambulance, the accident site, and the nearest emergency hospital for efficient decision-making and response.

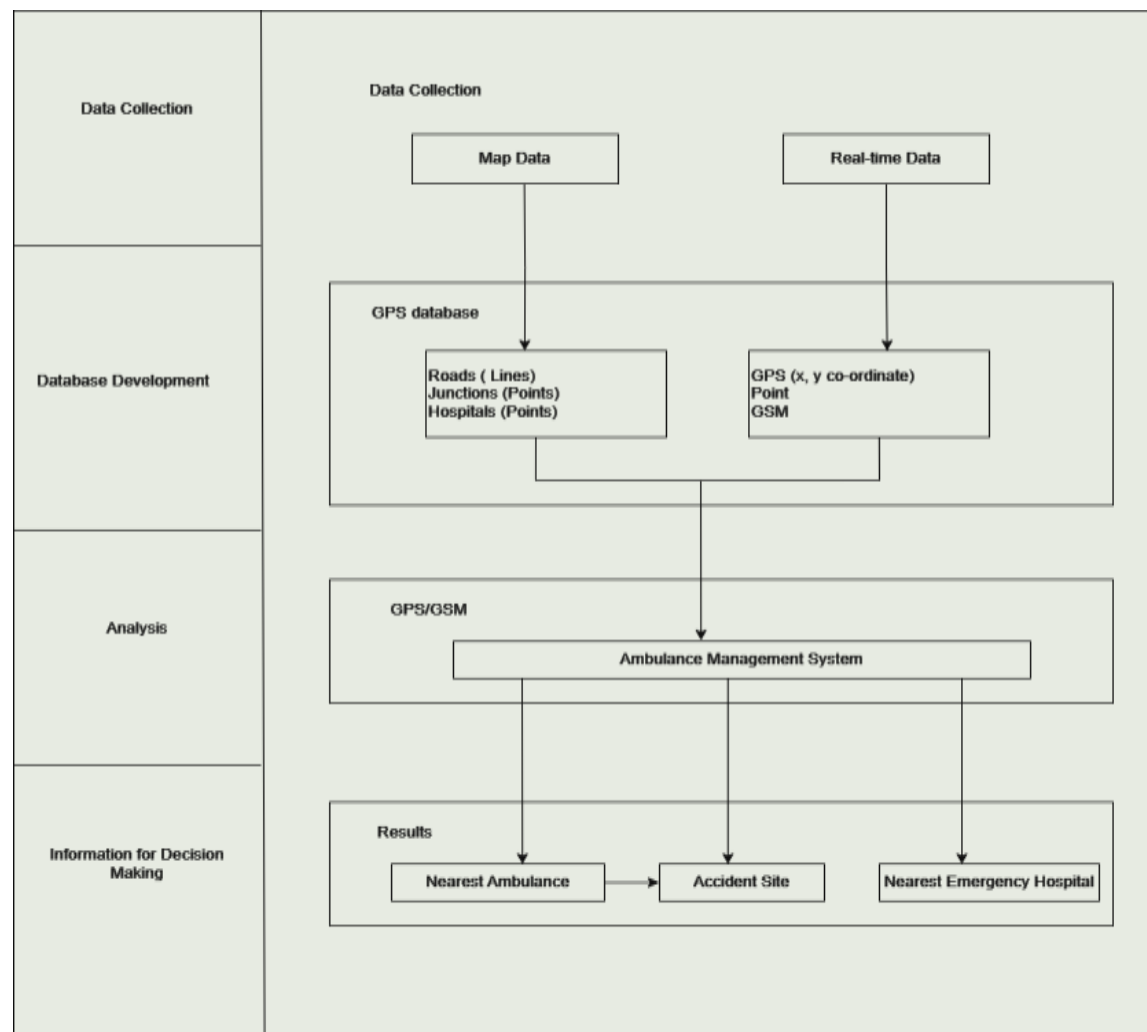


Figure ii Methodology of the proposed system

ii. Flow Chart

The flow of information using the AMS interface in finding the accident location, and fastest route from nearest ambulance to accident, and fastest route from accident to nearest Hospital.

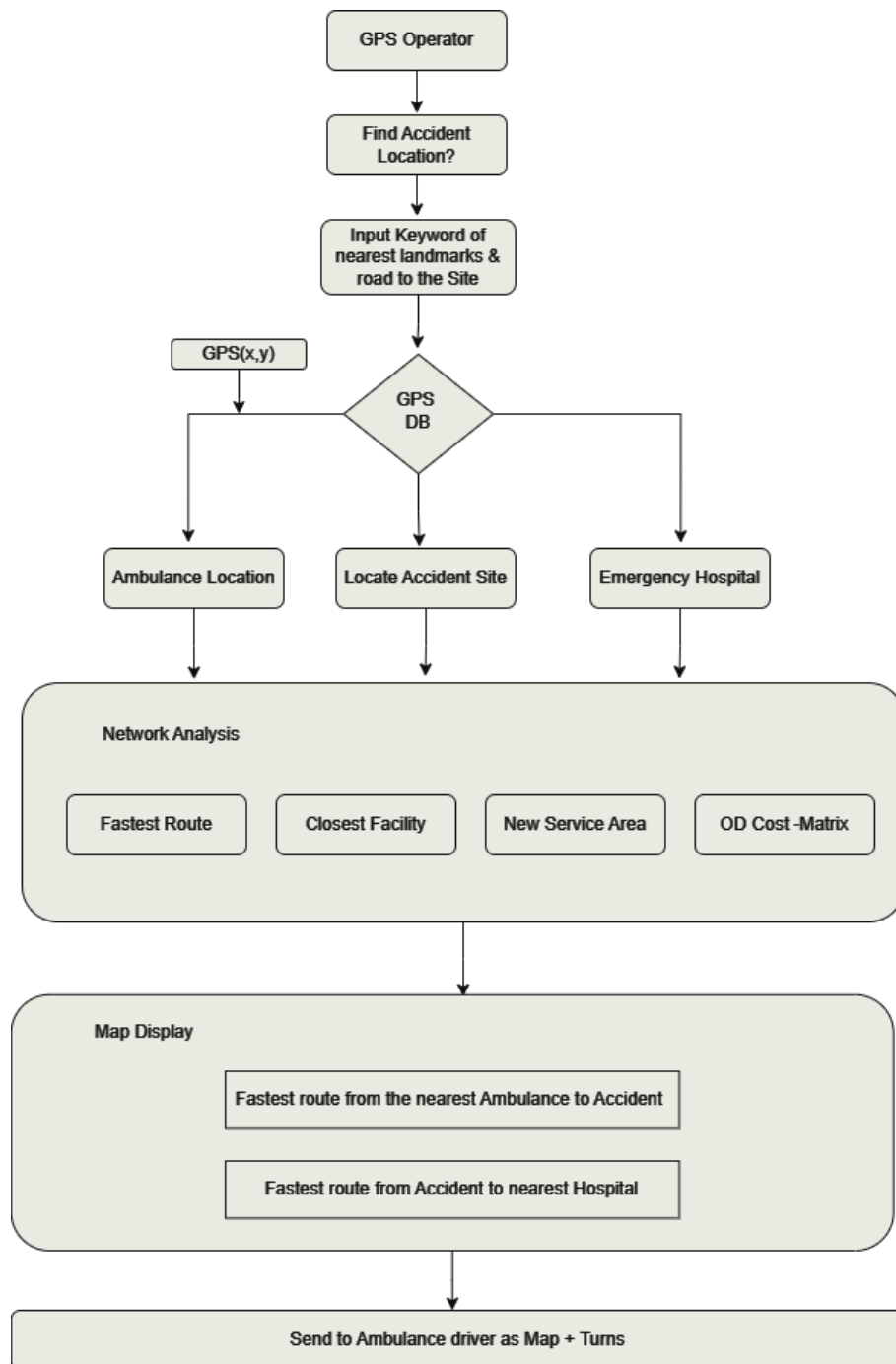


Figure iii Flow Chart of the proposed system

iii. Description of Algorithm

In this case, when the patient requests for an ambulance using his/her phone, the request is sent and stored in the cloud-based server. The ambulance administrator who operates just like the ambulance call center managers receives the request on a real-time basis and immediately checks the availability of an ambulance and allocates it accordingly. Immediately, a notification is sent to the paramedic available on duty to take charge of the emergency situation. In addition, the paramedic then uses the mobile interface to check the optimal route, distance and time and send notification to the ambulance administrator who then notifies the patient. The algorithmic flowchart for the process is shown in Fig

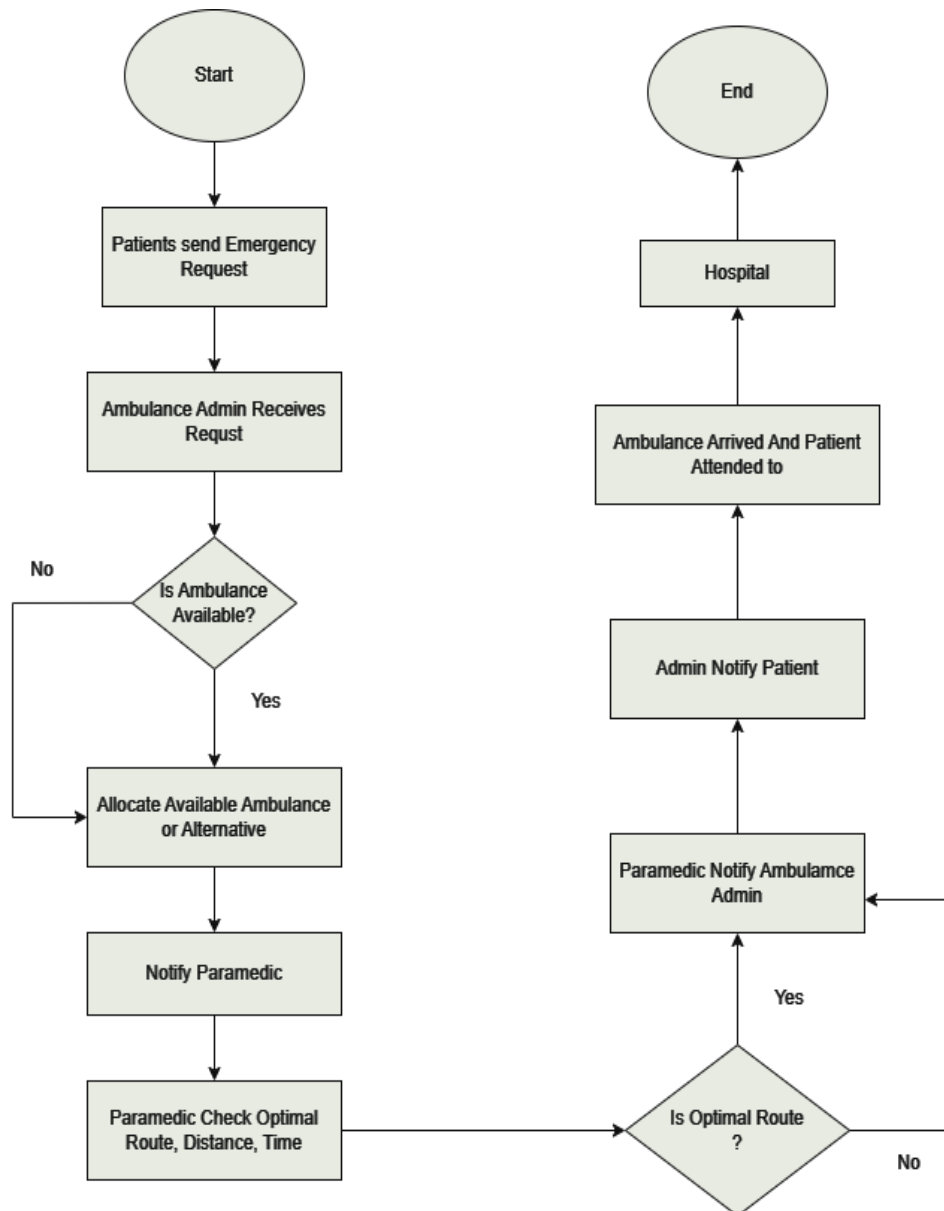


Figure iv Algorithms of the proposed system

Expected Outcomes:

1. The system can quickly identify and assign the nearest available ambulance to an emergency, reducing the time it takes to reach the scene.
2. Notifications and alerts can be sent to hospitals about incoming patients, helping them prepare in advance.
3. By optimizing routes, reducing response times, and efficiently managing resources, the system can help reduce operational costs.

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