

Emergency Medical Dispatcher

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Abstract - Casualties which are caused by the late arrivals of the ambulance and searching for them has been a hustling factor.

In this paper, we are presenting an application which will help the user in need to call the ambulance in short span of time and get a live track of the ambulance.

The application will provide quick emergency service to the patient in a case of emergency and will also provide health-related information to the hospitals. The application will provide the functionalities such as live location tracking of the ambulance so that the nearest hospital will be ready for the prior treatment. The shortest path feature will find the optimal route to the nearest hospital. Additional feature such as pill reminder will help the user to take the medicine on time without fail. The health record module will store all the health record of the user and when the user wants to view the past history of the health record the data will be displayed on single click. Using this application the time that is required for the ambulance to reach the patients can be reduced and prior treatment can be given to them

Key Words: EMS(Emergency Medical Dispatcher), GPS, location tracking, route optimization, reminder terface)

1. INTRODUCTION

According to the government data, more than 50% of the heart attack cases reach late[1]. Every second patient, having a heart attack takes more than 400 minutes to reach a hospital which is almost 13 times the ideal time window. Indian Council of Medical Research surveyed that in some cases it takes 900 minutes more late because of transportation. According to National Crime Records Bureau, Ministry of Road Transport and Highways, Indian Law Commission, 2013 Global Report on Road Safety, every minute road accidents happen and on an average 16 people die every hour[2]. 1214 road rashes take place everyday out of which 20 children at the age of 14 die due to rash driving. This kind of causality can be reduced by implementing a system that provides help within a short span of time. In addition to this, patients are mostly having issues on searching for an ambulance, handling the locations and availability of the limited service in the time of emergency. With current technology era where mostly, everything runs on smartphones and applications, the need for quick and efficient services is almost important in every aspect especially when it comes to medical services.

The main aim of this application is to reduce the time of calling the operator and to request an ambulance and to allow the ambulance driver to locate the victim easily by using the GPS signal. An effective Emergency Medical Dispatcher (EMD) can make the difference between life and death. Therefore, ambulance service providers must meet strict requirements in terms of response times, i.e. the time between an incoming emergency call and the moment of arrival of an ambulance.

2. LITERATURE REVIEW

Previous research work on ambulance tracking system proposes a real-time ambulance/vehicle tracking system using a global positioning system (GPS) technology module to receive the location of the vehicle, to forward into the microcontroller and to connect internet by a general packet radio service

(GPRS) technology for displaying a real time on the website map developed by Google Map which allows inspection of vehicles at all times[3]. There are three modules of their project. The first part is a program developed in C language for controlling the hardware. Employing PHP and AJAX language will be developed for the Google Map API to help a map construction on the website. The second part is the hardware, there are the GPS and GPRS modules, the GPS module will locate the vehicles via the satellite, and the GPRS module will assemble all data and send it to the website by the microcontroller. The final part is the interface using RS232 for connecting between the GPS and GPRS modules. With the Google Map on a real-time website, vehicles can be monitored and located very effectively.

This includes paths and/or vehicles directions. However, the small error is at approximately 5 meters in the wrong location due to the limitation of hardware and the ratio of map reference.

Another system provided intel to provide primary treatment even when a patient is in an ambulance. By following the advice of the hospital, ambulance crew can deliver primary care or even re-route the ambulance vehicle to the nearest healthcare center with the available specialists. By having access to all necessary patient data, the experts at the hospital can deliver proper treatment as the ambulance brings in the patient. This proposed system attempts to make it easier for the emergency response

personnel to monitor accurately the location of the emergency vehicles, thereby allowing them to save time during an emergency by routing the vehicle closest to the incident[4].

A system named Patient Health Care and Monitoring System states that there is a need for communication between the staff of the ambulance and the monitoring station. This requirement is achieved by using such a system in ambulance which uniquely transmits location information and status of patient through parameters that is heart bit rate and temperature etc. Their system includes biomedical sensors to transmit status of patient. All systems are connected to each other through wireless communication which transmits information and data. Use of GPS and GSM modems for higher communication links makes system more effective and fast response[5]. Even with this there is also need of traffic control during transportation of emergency patient so valuable time of response can be saved. System will be interfaced with wireless RF module to transmit low signal. Including all these requirements system will found to be very useful for emergency treatment of patient during transportation. Proposed project achieves all requirements by including four units called as Ambulance unit, Monitoring Unit, Vehicle unit and Signal Unit. Ambulance became intelligent due to interfacing biomedical sensors. The proposed system is built around ARM microcontroller. It is placed at ambulance. Their system consists of LM35 temperature sensor, heartbeat sensor, GPS module and GSM modem. The health statuses of patient obtain using a body temp Micro sensor as well as heart rate sensor. These sensors capture RF Max data of patient that is the body temperature and the heart Module Controller 232 rate of patient and stored in microcontroller memory. The heart bit and temperature data can be sent through GSM modem. Signal transmitted by Ambulance unit after reading tag by RFID reader received at Signal Unit through RF module. [5]-[6]Microcontroller 89C51 is used to process received signal. Message displayed on mobile includes Heart Beat Rate in Beats per minute and temperature of patient in Degree Celsius.

3. METHODOLOGY

This includes the different design elements, proposed features and implementation methods of our project. Our project has various features which include tracking features, search feature, route optimization feature, a pill reminder feature, and notification feature.

3.1 Location Tracking

Usually, the ambulance needs to reach unknown locations to pick a patient. Finding the exact location of patients is a difficult task especially with time constraints. The ambulance may get diverted to some other location. The

location tracking feature solves this problem. The location of the patient is marked on the map[4][7]. The location of the ambulance is also marked and the route to be taken is also displayed. Due to this a lot of time will be saved by helping the ambulance finding the quickest way to the patient.

3.2 Notification Enabling

In critical condition, one is confused about what to do and who to call. The notification feature sends an alert to the ambulance, hospital and the emergency contacts in times of a crisis. This alert contains the location of the user and a distress message. In order to achieve this feature the proposed system uses SMSManager object which is the built in class in android the alert will be sent when the panic button is pressed in the form of an SMS. But in future the proposed system will notify the user in the form of call. Android provides a built-in phone app, and in some cases the user may need to make a call through the application. This can be done easily by using implicit intents and appropriate actions. In addition to this, PhoneStateListener and TelephonyManager classes helps to achieve this functionality.

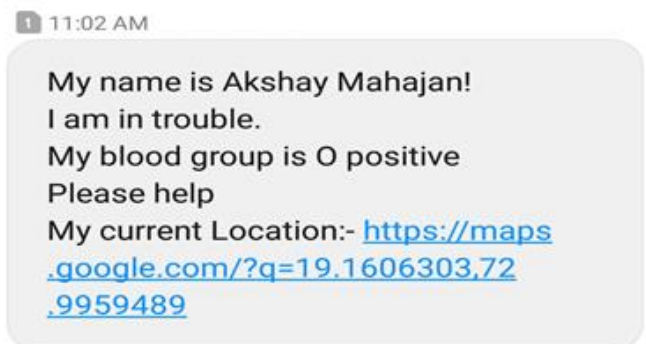


fig-1: Notification Enabling

3.3 Locate Nearby Clinics

The nearby clinic feature locates all the nearby medical clinics. This is necessary for a person suffering from a minor ailment and just needs a doctor rather than a hospital. It is a useful feature for who fall sick in an unfamiliar location. In order to implement this feature all the nearby hospital and medical clinic will be displayed with hospital information, number of bed available. Since the location of the hospital and clinic needs to be shown on the map, the proposed system uses the Google Maps API. The Google Maps API is a web map service that provides a variety of features in addition to the digital view of the map. It provides location information, search addresses and directions.

This API proves to be very useful for adding the most important features of our application (location

tracking)[11]-[13]. When the user selects a hospital, the physical location of the hospital is sent to the API. The API then points to the location on the map. Once the device's GPS is enabled, the user's location can be used. Once the two locations are obtained, the path between the user and the hospital is displayed.

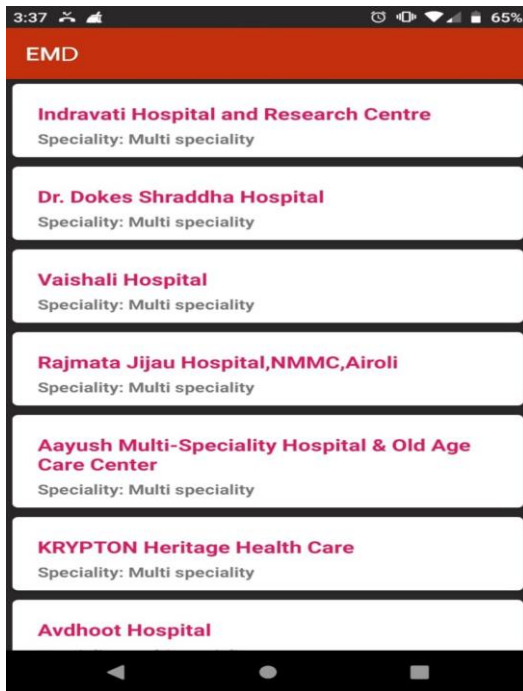


fig-2: Nearby clinics

3.4 Route Optimization

There may be various possibilities to reach the hospital, but which route to choose. The least time spent must be calculated to save valuable time. The system uses Google Maps API, which will determine which route is the least time consuming. The time will inform the ambulance driver to follow the road and arrive at the hospital.

When the user selects a hospital, the start and end positions are already available. Identify the various paths that can be used to reach your destination. Calculate the distance covered by each path[8]. The paths and their respective distance values are stored in a matrix. Select the path with the shortest distance.

Request and Response generation in the system is as follows.

1. The system access the Directions API through an HTTP interface.
2. With requests constructed as a URL string, using text strings or latitude/longitude coordinates to identify the locations, along with the API key.

3.5 Pill Reminder

It is evident for a person to take the wrong medicines or even skip the recommended doses. Pill reminder feature prevents this from happening. This feature alerts the user to take the pills whenever the reminder turns on and also helps to track the history of whether the pills are taken or ignored.



fig -3: Pill Reminder

3.6 Health Record

Losing old documents is a very common problem. It is also possible that a document gets damaged or a person does not have it with him when he needs it. At such a time, having a soft copy of said documents can be very helpful, especially in case of a patient's documents that include his test reports, insurance details and prescriptions. The proposed system implements this feature where the user will be prompted to enter his details such as current body mass index, blood pressure prescription provided by the doctor. This will help the user to keep track his previous health record.

4. CONCLUSION AND FUTURE SCOPE

Thus "Emergency Medical Dispatcher" is an important application, which is used to provide the facility of quick and easy communication between the user, ambulance and hospital in the time of an emergency and will also reduce the time taken to contact the help and receive medical treatment. Besides this, it provides GPS tracking feature to ensure that the user gets required facilities from the nearest source. It also provides an additional feature of nearby specialty clinics. The proposed system contacts the ambulance in a short time span and locates the correct and nearest available hospital. The optimal route to the specific hospital is shown and it will also give details about hospital such as a number of beds available, number of Doctors available. Location tracking will make it easier to find the nearest ambulance and hospitals and track the route. It also finds the shortest path to reach the patient

and hospitals. Thus saving some time which is a crucial aspect in cases of emergency. The application sends a notification to the ambulance, hospital and their emergency contacts after picking up the patient and his application will also remind the user to set the reminder i.e the timing of the pills.

This application can be further improved by adding certain functionalities. If the user has an appointment with a doctor, then he can send his previous reports directly to the doctor using the health record feature. As new technologies are launched, the scope of improvement also increases for our application.

REFERENCES

- [1]<https://www.hindustantimes.com/india-news/more-than-50-of-heart-attack-cases-reach-hospital-late-govt-data-shows/story-penFdsewgGwpIwiQnRDOLJ.html>
- [2]<https://sites.ndtv.com/roadsafety/important-feature-to-you-in-your-car-5/>
- [3] Supaporn Kiattisin , "A real time GPS ambulance/ vehicle tracking system displayed on a google- map-based website", The 3rd Biomedical Engineering International Conference 2010
- [4] Fabio Magagna, Basil Hess, Juliana Sutanto, "Building Location-Aware Web with SALT and Webnear.me ", 2012
- [5] Prof Deepak B Kadam, Prof Vinay S Suryawanshi, "Patient Health Care & Ambulance Monitoring System using Controller & Wireless Technology", 9 September 2016.
- [6] Divya D. Nanwani, Puja R. Kshirsagar, Bhavana P. Kawalkar, Pritish Deshmukh, "Ambulance Tracking and Patient Health Monitoring Using GPS and GSM", March 2017.
- [7] GSM and GPS Projects With Arduino
- [8]<https://developers.google.com/maps/documentation/distance-matrix/>
- [9] Zeimpekis, V., Giaglis, G., and Lekakos, G. A taxonomy of indoor and outdoor positioning techniques for mobile location services. SIGecom Exch. 3, 4 (2003), 19_27.
- [10] Supaporn Kiattisin "A Real-Time Ambulance Tracking System Displayed On Google-Map-Based Website", 2010.
- [11]. GUI Design for Android Apps
- [12]. Introduction to GPS: The Global Positioning System (Artech House Mobile Communication Series)
- [13] S. Pradeep Kumar D. Akash K. Murali R. Shriram, "Call Ambulance Smart Elderly Monitoring System With Nearest Ambulance Detection Using Android And Bluetooth" March 2016.
- [14]. D'Roza, T., and Bilchev, G. An overview of location-based services. BT technology. Journal 21,1(2003). 20_27
- [15] Schwinger, W., Grin, C., Prll1, B., and Retschitzegger, W. A light-weight framework for location-based services. In Lecture Notes in Computer Science (Berlin, 2005), Springer, pp. 206_210
- [16] Neha Firdaus Raun, Maitrayee Saha, "Monitoring Patient's Health with Smart Ambulance System using the Internet Of Things (IOTs)", August 2017.
- [17] Yi-Li, Shih-Han Chen, Fanf-Yie Leu Secured Traffic Control system with Emergency handling for Ambulance, pp 1-5, Jan 2016
- [18]. www.tracking-system.com/for-businesses/vehicle-tracking-system
- [19] www.vehicletrackingsystem.in/ambulance-monitoring