Survey Paper on Ambulance Tracking Systems

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Abstract:- Ambulance is a medically equipped vehicle that transports patients to treatment facilities that have tested to be a lifesaver throughout several emergency cases. One of the issues during transportation of patients is traffic related problems. We studied various approaches available for vehicle tracking systems. After going through various research papers we found these techniques, i.e. GPS based tracking, RFID device, Google API, RESTful API which were proposed earlier and hence we deduce that existing ambulance routing technique is not effective as a result of there is lack of help provided to them during the transparent passage through the traffic congestion. This issue arises due to outdated dedicated GPS systems, no proper communication between police and ambulance and difficulty in providing accurate location of the ambulance. To tackle this issue, we propose a system which will help the traffic police easily track any upcoming ambulance with its priority using a mobile application. This system will help in fast, economical and efficient traffic control providing safe, easy and quick passage to the ambulance.

Keywords:- Ambulance Tracking, GPS Based Tracking, MapBox, Google Firebase, JavaScript.

I. INTRODUCTION

Ambulance has tested to be a lifesaver throughout most emergencies. Accidents / medical conditions happen nonlinearly due to speedy growth in population and increasing traffic congestion. Due to such reasons, the ambulance might get delayed and might impact the patient's health. In the current scenarios, transporting a patient to hospital in emergency conditions looks straightforward, however, in reality it is very troublesome throughout peak hours. Moreover, the state of affairs gets worse once emergency vehicles have to wait for other vehicles to offer methods at intersections with traffic signals. The current technique doesn't enable any traffic official regarding the ambulance's whereabouts that would possibly facilitate it to get through the traffic congestion. So the main objective behind the projected system is to undertake and supply an effective and quick transition to the motorcar from point 'a' to point 'b' without losing time and thereby overcoming the issues caused by traffic congestion.

- **Initiate**: When a person makes a call to the emergency toll free number the ambulance gets ready to reach the destination of the caller at its earliest.

- **Communicate**: The hospital authorities will immediately look for the ambulances available in the nearest location of the patient's place and contact the driver for the location of the patient.

- **Guide**: Via using Global Positioning System (GPS) tracking the exact location of the patient is grasped and rushed to the hospitals as soon as possible.

- **Monitored**: The live location of an ambulance will get updated in real time using Google Firebase via which GPS tracking is done and the precise location of the patient is grasped and rushed to the nearest hospitals as soon as possible and save the victim's life. [5].

The most popular and available service used so far is Emergency Medical Technician (EMT) as mentioned before, that provides pre-hospital care for the patient on the way. Now in order to rush to the hospital quickly, a Traffic Police officer will be helpful in traffic clearance. As the ambulance approaches the traffic police will help in clearing traffic upon the ambulance arrival at traffic light junction and would help the ambulance in rushing the patient to the hospital at critical time. In this paper we analysed the different techniques suggested for ambulance tracking and proposed the new tracking system.

II. LITERATURE SURVEY

A. Literature Survey

[1] The existing technology uses a GPS integrated in the mobile phones to extract the location (longitude and latitude) of the device. After extracting the location coordinates, Firebase is used to upload them into a real time database. In the system email and password authentication are provided just to avoid unauthorized access using firebase authentication. An open source JavaScript library called Geofire is used which allows the users to perform some set of queries based on geographical coordinates. Therefore, when the ambulance logs in to the system, geofire captures its location and uploads it to the firebase. Meanwhile traffic police can obtain the location of any active ambulance within a specified radius and further guide them through the hazel. [1], [5].

[2] This paper demonstrates a mobile tracking system where parents can track their child's current location. There are two ways provided to the parents to check their children's

location. First manually where parents have to open the app and click on the track button to get the current location of their child's location. And secondly automatic where parents have to set up a time interval for the app to automatically send their child's live location after the set time period. Using this system parents can track the latest location of mobile phones. To use this system, we need to install this application in mobile phones and have to register, once configured the parents can monitor the mobile phone's location from anywhere. This app helps such parents who are always concerned about their children and want to monitor their activities. [2].

[3] In this paper the author worked on implementing a smart traffic control system to help emergency vehicles like ambulance and fire brigade pass smoothly. Every emergency vehicle is fitted with a Radio Frequency Identification (RFID) transmitter tag. Also a RFID receiver tag is placed at traffic signals which are not visible to the public, making it hard to damage the RFID tag. In this paper they find the nearby ambulance and the nearby hospital based on their location. This process helps the user to book an ambulance in case of emergency which will allow the patient to reach the hospital as soon as possible. The user can use this system to track the ambulance based on its location. [3].

[4] In this paper the GPS is used for tracking the vehicle. This system allows the admin to trace the location of the driver using the installed GPS device. The admin will be knowing each driver's current location at that particular instance. This system can be used in cabs to track the location of the driver. This system will also help the admin to allocate cab to the client. User logs in using the credentials provided to access the system. The credentials consist of the user's username and password. With the help of GPS, the system will trace the user's location. And that location is further sent to the admin. Later the admin accesses the system using his credentials and will locate all the drivers driving currently. Depending on such details the admin performs certain operations. Using this system admin can easily locate various drivers and also keep record of their attendance which might help him in calculating driver's salary. This system helps admin to find out drivers cheating and further prevent it. Using this system, the admin can easily find out the drivers committing any kind of cheating. [4]

B. Different Ambulance Tracking Systems:

1) GPS based tracking:
GPS-based vehicle tracking framework is used for navigation that can confirm wherever the motorcar and wherever it's been. This framework uses geographic position and time information exploitation Satellites. It takes the latitudes and longitudes coordinates of the situation from the google map and shows them within the net connected devices that can instruct in that path it has to travel in order to achieve the victim's place earlier. Global systems for mobile communication (GSM) module is a design used by a mobile device or a modem that helps in communication. It

additionally uses SIM cards that work in its mere network and it can be paired with Bluetooth devices likewise.

2) Traffic clearance using RFID CLOUD:
RFID is a small electronic device that consists of a radio wire and a tiny chip. It is used for following and identification purposes. It sends radio waves passing data to the traffic signals, paving a method for the motorcar to not stop on its way to the hospital. The radio wire senses the respective vehicle and alters the per-user RFID to get the vehicle's identification variety. The Id is then stored in the information. The traffic signal is cleared for the motorcar once the confirmation is received from the server.

3) Routing based clustering:
In density-based clustering, given a collection of points which focus on grouping the closely packed points together (nearby neighbors) whereas the neighbor points (a touch so much away) square measure are thought of as outliers. The clusters square measure created on the premise of most accidental prone areas according to the user given radius. The cluster is created by checking the number of ambulances available. If there's less variety of ambulances, the user radius is redoubled.

4) Ambulance tracking using Restful API:
RestFul internet service could be a service that's being offered by one electronic gizmo to another electronic gizmo, to facilitate connecting with every alternative by means of the World Wide Web (WWW). The protocol request is used that is helpful in web communications. Using genus Api, the calls between applications square measure overseen through internet services. This application helps the consumer to follow the close-by rescue vehicle for emergency reasons, for instance, accidents or any emergency like pregnant cases with the aim that patients are often taken to the hospital as quickly as time permits and their life will be spared. The consumer checks the near motorcar books with the goal that the patient is often taken to the hospital.

5) RF module:
It provides wireless communication wherever 2 or more devices will connect by transmittal radio waves. The RF module helps in dominating the traffic lightweight signals in the path of the motorcar. By exploiting this it facilitates the motorcar to avoid unwanted delays as a result of any traffic congestion and help it to urge quick passage.

III. PROPOSED WORK

In today's world, the technology is evolved and has potential which can be used to help hospitals with the help of traffic police to monitor location of ambulance logs into the system, the live location of these ambulances will be informed to the traffic police before the ambulance approaches within a particular radius of the police, so that they can provide a hassle free passage to such ambulance from the traffic by waving off the vehicles blocking the path of the ambulance. To achieve these objectives, we propose a system to track ambulances using Mapbox which will be installed on the smartphones of police, hospital and

ambulance operators. This app would provide real-time location data of the ambulances to the traffic police directly which will help them to clear the signal junction and avoid unwanted traffic congestion. In addition to that, we are implementing an additional feature where the traffic police officer will get notified whenever the ambulance reaches the circular area of a 500m radius. [6].
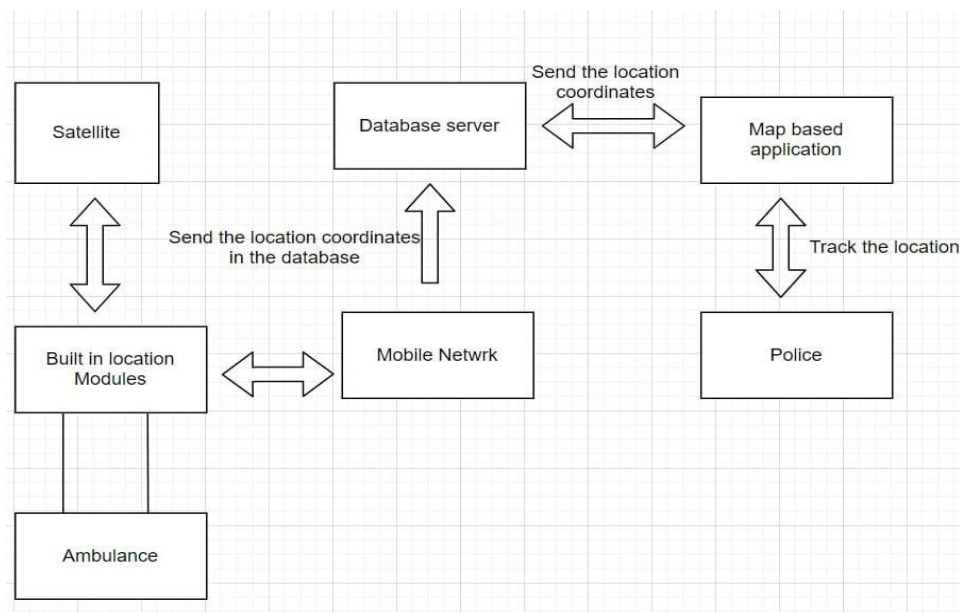
Figure 1: Block Diagram

To develop this system, we used Framework7 and JavaScript for frontend and backend. We also used Google Firebase for email authentication and validation. We are using Google Firestore as a database service for faster data retrieval. and finally we used a mapbox instance for Map UI. [5], [6], [7], [8], [9].

IV. CONCLUSION

The main aim of this paper is to study different approaches available for ambulance tracking systems. After a detailed literature survey we understand the limitations of the existing systems i.e. these systems were not helpful to save those few critical minutes of response times by monitoring the location of ambulances accurately. Moreover, some more limitations arise with the present existing tracking systems. Currently the tracking system uses a dedicated GPS and GSM module which is not pocket friendly, in the universe-need hardware maintenance in the GSM/GPRS module that is expensive also, use conventional MySQL database that updates data within a minute etc. Hence we conclude that there are various techniques to be implied to make the ambulance reach the patient's place and rush them to the hospital immediately but are not efficient and hence concerning these limitations, the developed system uses smartphone applications for transmitting and receiving information using Firebase, an online server with real-time database updating data within few milliseconds that makes the system faster than others. [5].

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