Blood Locator System

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Abstract:- Since it is difficult to arrange the blood immediately whenever needed in case of an accident or for any particular treatment. So we have proposed a way to overcome these problems by the use of Global Positioning System (GPS) for tracking of nearest blood banks and donors. It needs an android phone which supports GPS and the application needs to be installed in phone. Also the blood banks can be given another web based application through which they can manage stock details. This proves beneficial for the users as when the user tracks the blood banks nearby him it will also show the stock details. The users have to register. Donor will be asked to enter an individual's details, like name, phone number, and blood type. Our application provides location of nearest blood banks and donors in your city/area by GPS tracking. As a large number of people carry an android smart phone, so we are using android platform to reach out the maximum people with this application as it concerns with the requirement of blood and also provides application which is low in cost, requires less time to find out blood banks and donors.

Keywords: Android, Blood bank, Donor, GPS, Google map.

I. INTRODUCTION

As the traditional practices which we have adapted are time consuming because it has to go through a long process. It consists of manual work like to actually search for blood banks and communicate with them and sometimes the information given may be irrelevant and inappropriate.

Despite being a country with a population of 1.2 billion, India faces a blood shortage of 3 million units. The problem can be addressed if an additional 2 percent of Indians donated blood, Statistics confirms that there are 234 million major operations in India, 63 million trauma-induced surgeries, 31 million cancer-related procedures and 10 million pregnancy related complications which require blood transfusions. Apart from these there are many disorders like sickle cell anemia, thalassemia and hemophilia that require repeated blood transfusions.

Lot of time is required to make the blood available and it is inconvenient during emergency situation, some very rare blood groups are difficult to arrange which O-, AB- etc. are. Since almost everyone carries an android mobile phone with him, it ensures instant location tracking and communication. Using With the use of GPS we can find donors and blood banks nearer to the location from where the request is

generated. So we present an android application to make easy to find blood donors and blood bank and with this a web application is created to maintain blood banks stock details which is connected to server, so users can check the blood stock of a particular blood bank through our application. During the emergency of blood, you can quickly check for donors and blood banks matching a particular or related blood group and reach out to them via Phone Call/SMS through the app. And also we can post request for blood on this app so that all users can notify other users and blood banks for blood requirements. The blood banks and donor will be plotted on the Google Map with location.

II. PROBLEM DEFINITION

To create smart phone (android) based and web based blood bank tracking system (application) for users who are willing to donate blood or who requires the blood. Enable users with an automated, intelligent application to find and donate blood with quick and easy taps on android phone and provide the users with its necessity in less time. And also it enables blood bank with web based application so that they can maintain stock details and satisfy the request posted by the users.

III. LITERATURE REVIEW

The system can be used to track the location and speed of the vehicle that is equipped with GPS and GSM devices. The owner of vehicle will get the current location of the vehicle at any time when required. The system provides Lock/unlock the current GPS coordinates of the vehicle to detect unauthorized movement and lock/unlock the maximum speed of the vehicle to get an alert if the vehicle goes above that speed.[1]

The GPS provides locations but in indoor infrastructures, the receiver may not receive the signal because the signal strength is low or limited because of building's impact at this time GPS is unusable. By using RFID devices with signal strength with Cascade correlation network for an indoor position location system, system can provide location service for user. [2]

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The ATM booths locations and fast tracks are tracked and shown on map. It requires inbuilt GPS supported android device with application installed on it for the user to use. Textual information are provided of nearest ATM booths or fast tracks from user's current location. Dijkstra's algorithm used to show the possible shortest path between user and an ATM booth. Haversine formula is also used to calculate perpendicular distance. [3]

When developing a location-aware application for Android, one can use GPS and Android's Network Location Provider to get the required location and user location. Android's Network Location Provider identifies user location using cell tower and Wi-Fi signals, providing location information at indoors and outdoors. To get user location in application, we can use both GPS and the Network Location Provider, or just one. Here one could track the positions of the Android Device constantly for 2/4hrs and save them on a well secured webpage. [4]

Optimal Facility for Location Tracking of Blood Bank and Donor system uses GPS for location tracking and dijiktra's algorithm and haversine formula is used to calculate nearest blood banks and donor. But it's not usable for more than one destination. [5]

BLOOD LOCATOR SYSTEM

An android application can be developed as now days almost everyone behind developing this application is to reduce time, cost required for finding blood in critical situation and donating blood.

The system provides facilities for finding and donating blood in less time as compare to traditional system. We have developed android application for end users which provides facilities such as registration, find blood (by registered, current, provided location), donate blood, post request, view stock details etc. Blood locator system also provides functionality for calling user by just one click on contact number which is displayed on screen. System gives alerts and notifications to user for requirement of particular blood group and alert after three month of blood donation completion to donate blood again. In blood locator system, web application is for blood banks for maintaining stock details like quantity of blood, blood type etc. Blood banks register to web application admin gives unique ID and password for login of blood banks. Then blood bank can use web application to update stock.

We used Haversine formula to find nearest blood bank and donor. Haversine formula calculates the distance on spherical earth using latitude, longitude and radius of earth.

A.HAVERSINE FORMULA [9]

Following is Haversine formula:

$$\Delta \text{lat} = \text{lat2} - \text{lat1} \quad \ldots\ldots\ldots\ldots(1)$$

$$\Delta \text{long} = \text{long2} - \text{long1} \quad \ldots\ldots\ldots\ldots(2)$$

$$d = 2R.\arcsin \sqrt{(\sin(\Delta \text{lat}/2) + \cos(\text{lat1}).\cos(\text{lat2}).\sin^2(\Delta \text{long}/2)} \quad \ldots\ldots\ldots\ldots(3)$$

d = distance between the user and blood bank or

donor. R= radius of earth.

The above is the haversine formula with the help of which we can calculate the straight line distance, where longitude and latitude are spherical co-ordinates. These spherical co-ordinate points are retrieved from Google API. In step 1, the difference between the latitude of any two blood banks or blood bank and user is calculated. The 2nd step is to calculate the difference between the longitude of any two blood banks or blood bank and user. The 3rd step is where the straight line distance is calculated.

Now once the blood bank are plotted using latitude and longitude, our application provides the user with the ranks; in the order in which all the blood banks need to be visited. For this, distance is calculated between each blood to other blood bank and from user to each blood bank by haversine formula, which stored in a matrix. Now to help the user to know which blood bank should be visited 1st and if the 1st blood bank visited is not able to fulfil your needs then which blood bank is next near to you is suggested by our application. Instead of all the time going on the location and searching for blood banks all the time may not be possible as it requires GPS, internet. Therefore, we have proposed an idea to minimize this work i.e. we have provided the blood banks with ranking.

This can be done by storing all distances calculated by haversine formula in the matrix. For example, consider the following fig.1 Plotting of blood bank:

The user is the location from where the user wants to search for blood banks near by the radius. The marker in red is the blood banks viz. BB1, BB2, BB3, BB4, BB4, and BB5.

Now the distance between each blood bank to every other blood bank and distance between each user to every blood bank is calculated by haversine formula.
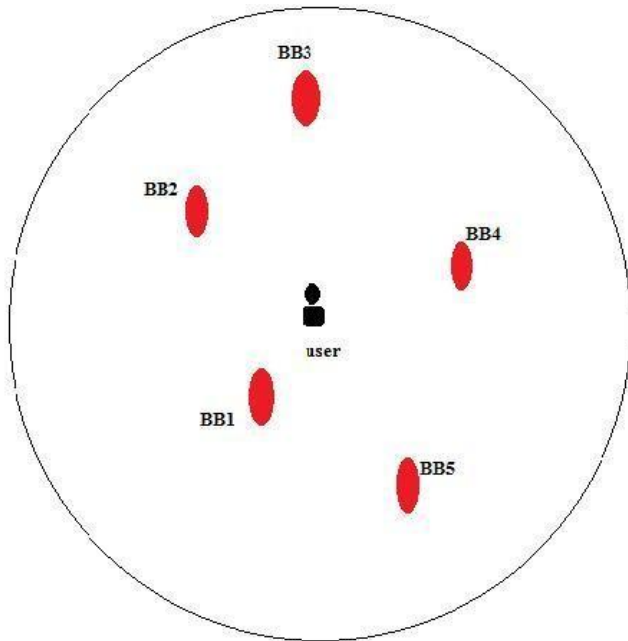
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Fig.1: plotting of blood bank

Example: consider the following matrix (fig.2);

Fig. 2: matrix for storing distances calculated by Haversine formula.

STEPS FOR RANKING:

Step 1: Now the current location is the user location, from that location the nearest is the BB1 (0.5km, as we can see the matrix). Go to BB1

Step 2: In BB1, the next nearest is BB2 (user is already visited so it cannot be visited, self-destination is always zero so it cannot be visited). Go to BB2.

Step 3: In BB2, the next nearest is BB3. Go to BB3.

Step 4: In BB3, the next nearest is BB4. Go to BB4.

Step 5: Since all the banks in the radius are ranked, therefore, stop.
Ranking of blood bank will be in the order:
BB1: rank 1, BB2: rank 2, BB3: rank 3, BB4: rank 4, BB5: rank 5.

This will suggest the user that he should visit the BB1 1st and if BB1 fails to provide the necessity then he should visit BB2 and again if BB2 fails to provide with the necessity user wants then visit BB3 and BB4, BB5 likewise.

B.SYSTEM ARCHITECTURE

Major functions of system is divided into following functions:

1. User Registration
2. Find nearest blood bank and donors
3. Donate blood
4. Blood bank registration
5. Stock updation

Architecture diagram fig.1 explains the system overview, as to how system works in real.There are four main components which are central database, users(Android phone
& desktop applications for blood bank), server,Google Map
Services. Web application is for blood banks who are registered in our system. Admin add blood banks to our system and provide unique id and password to blood bank for login and use web application. Web application which is connected to our server provide facility for blood bank to update the blood stock. Blood bank stock shows details of blood stock available in blood bank i.e., blood group and available quantity of that blood group. Server that is central database of our system it contains user registration information, blood donation records of donors, blood bank details, stock details etc. To use our application it's necessary to install our application on his android phone having minimum API level 13.

User can register themselves by providing their details like name, address, contact, DOB, blood group, email address etc. After registration user get username and password by using it they can login to our system. Once the user logins, our proposed android application provides facility to **find blood, donate blood, check stock details, post request to users, view other's posted request and post request to blood bank, view donation history.**

User can find blood banks or donors by current location and registered location. Now when the user selects **find donors** then select the blood group you need and click on locate. Now the user has to select search from **donor's current location or donor's registered location** (it means the address which was provided during registration).

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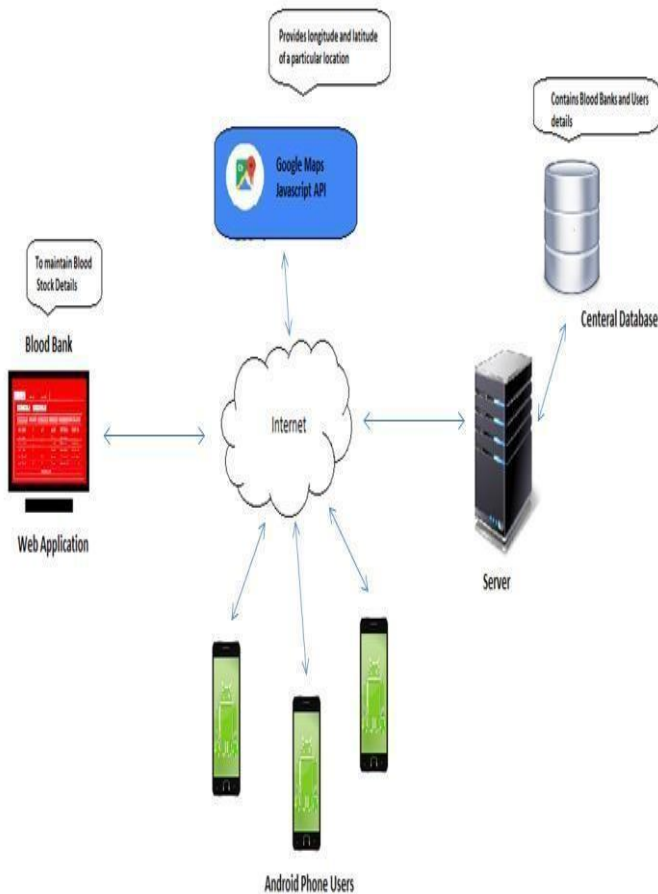NCETEIT - 2017 Conference Proceedings

Fig.3 System Architecture

Now if user selects search through current location then donors whose current location is nearby the user's current location will be plotted. (For this you have to on your GPS location).The donor's last logged in location will be the current location. After selecting search through donor's register location then the donors whose registered location is nearby your current location will be plotted .System provides facility for user **post request to user**, it allows to post a request to all users with a particular blood group and specifying the condition like high, low and emergency. Also you can view your on request here and can satisfy or cancel it (both the options; satisfy and cancel will remove the request from **view other's request option**). All request can be viewed from **view other's request**. When user selects **check blood stock** then the blood stock of all blood banks are available.

When user want to donate blood then he can search blood banks nearby his location. After three months completion of his blood donation user will get notification that he is now able to donate blood again. Blood banks and donors which are nearest from user's location are plotted on map with ranks which helps user to identify nearest blood banks. On map blood banks and donors are plotted by using location markers with some details like name, address, contact, rank, blood group of donor and check blood stock (check blood stock will show available blood

stock in blood bank).User can contact donor or blood bank by just tapping on that contact no. it is for user convenience to direct communication with donor or blood bank.

The next option is **view your posted request to blood bank** which facilitates user to view his posted request to blood banks and also if the user wants to cancel the posted request to blood bank then he can cancel. Notifications will be given to only those users whose blood group matches with the user's required.

Blood group who has posted request to all users. This is a special notification because sometimes, all the users do not always check view others request option; therefore, at least each individual person should know that our own blood group is needed.

RESULT ANALYSIS

Problems in traditional system:
1. Lack of information about blood bank and donor
2. Less accuracy of information
3. Time consuming process

In existing system man to man communication is required and it is a time consuming process so in emergency situation where there is urgent need of blood existing system is not convenient.

So to overcome this problems we have proposed a system which provides accurate information within less time. Following table shows difference between traditional system and blood locator system.

Main objectives of proposed system are as follows:

1. Users can find blood banks and donors when they required blood.
2. User can locate blood banks easily if they want to donate blood.
3. Notifies users to donate blood after 3 months completion of blood donation.
4. Shows blood bank stock details.

Table 1 difference between traditional system and proposed system

Parameters	Existing system	Blood Locator
Automated & Intelligent	NO	Yes
Time	Time consuming	Fast
Accuracy	Less	High
Cost	High	Less
Availability	Time Dependent	Time independent
Results	Slow	Fast
Efficiency	Average	High

Our system is intelligent & automated because, it find blood bank and donors when user provide location. It

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notifies user after three months completion of blood donation. Keeps record Of user and blood bank, blood bank stock. It also provides an intelligent and automated functionality to call the blood bank and donors automatically just by click on that contact number which is displayed on screen. Whereas, the existing system allows the people to find blood banks through verbal communication, paper pamphlet.

Existing system requires man to man communication so it is time consuming process and our system provides results in less time with assurance of information and no man to man communication is required user just provide some details then system provides results.

We measure accuracy in terms of correctness or surety of information. Our system provide high accuracy by providing accurate information because at the time of registration donor and blood bank submitted their details which are accurate. In existing system user not get proper and trustworthy information.

It is low cost because user just visit to those blood banks which are near to his location and he can check blood bank stock using our app so less traveling cost. User can select the particular blood bank or donor who fulfills requirement so it will reduce the traveling, communication (phone call) cost.

User can use our application any time it is not time bound its time independent. Whereas, in existing system we required man to man communication with friends and blood banks which is time bound.

Blood locator produces faster results by providing required information in less time. For better understanding consider an example; a person will take an hour (minimum) to find the blood banks or donor who can provide required blood group e.g.-. But with the use of the blood locator android application this will just take few minutes (maximum) depending on internet speed. This concludes that the Blood Locator provides faster result than the existing system.

The blood locator provide higher efficiency because it is low cost, produces faster results, time independent and more accurate information which is good for user convenience.

Advantages of proposed system:

1. Accuracy of all information-
System provides correct blood bank and donor location, distance from user location, priority of blood banks and donor for visiting user, blood bank and donor details.

2. Lower costs-
As most of the people carries android phone so it is low cost and free source.

3. Produces quicker results-
It provides location and information about donor and blood bank on just few taps.

4. Processing time is less- Time required processing is less.

5. Surety of information-
Accurate information is provided. Information is available

6. Helps in raising awareness for blood donation-
System provides facility donate blood so that user can find nearest blood bank from his location and system alerts user after three month completion of blood donation.

7. Simple GUI design for user and blood bank.

8. Optimal suggestions for the people to find donors and blood banks.

CONCLUSION

We have developing android based location tracking application. The Blood Locator System which is developed evaluates the possibility to combine the facility of donating as well as requesting blood to the blood bank in just few tap which also helps in critical situation by reducing time required for arranging blood, reduces time and cost and ensures correct location tracking of blood banks and donor nearby. Now-a- days most people uses android phone so application is low cost and provides accuracy with less time of proceeding. Helps in raising awareness of blood donation by providing facilities to track nearest blood bank to donate blood. Using this system finding blood is convenient for user in critical situation to save someone's life.

FUTURE SCOPE

In the future we are planning to integrate blood locator app with all the real time database for our city. Blood Locator focuses on tracking of donor's and blood banks, later you can even focus on delivering the blood bottles to the required destination by providing the address and also track the delivery of blood bottles that are required. You can also add a facility to post message with a photo which may encourage other people to donate blood. Later you can also provide a facility for blood banks to notify users if the stock of particular blood group is decreasing.

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