Geo-Notifier: Location-Based Android Application

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Abstract—Geo-Notifier is revolving around the concept of geo-fencing and it is based on smart mobility. It focuses on both, service to the end users and business partners. Location based Services offer many advantages to the mobile users to retrieve the information about their current location and process that data to get more useful information near to their location with the help of GPS in phones and through Web Services using GPRS. This is an android based application which has 5 modules; the first module of this application will provide location based offers in the current location. The second module is about location tracking. The third module provides the user with notification whenever a friend enters the default limit, this requires dual-permission. Fourth module will provide SMS service. The Fifth module is the emergency module, which provides you and your family with a one-click automated emergency communication system.

Key words: Android Mobile Operating System, Location Based Services, Web Services, GPS, GPRS

I. INTRODUCTION

Information exchanges hands very swiftly nowadays. We say the mobility and agility of information has increased over the years. With the advent of smart devices the need of the hour is to introduce Smart Mobility, which means “To enhance people’s lives through real time contextual information”. We have put a foot forward by developing geo-notifier that is integrated with geo-fencing, which help us to tap information vicinity wise. For taping location based information we are making use of GPS Service which is available with the mobile set. For showing position of the users we are using Google map as well. Internet connection is also required either GPRS, Wi-Fi or others. Location based services or LBS [1] refer to “a set of applications that exploit the knowledge of the geographical position of a mobile device in order to provide services based on that information.” Location-based services (LBS) provide the mobile clients personalized services according to their current location. They also open a new area for developers, cellular service network operators, and service providers to develop and provide value-added services. Location-based services offer many merits to the mobile clients.

For the mobile user, the examples of location based services [2] are:

Receiving alerts, such as notification of Sale in Shopping Mall provide value-added services & to track the current location of friends.

“Friend finders” are popular services that allow a user to discover, through her mobile device, people that are in the vicinity.

A. Geo-fencing

Geo-fence programs allow an administrator to set up triggers so when a device crosses a geo-fence and enters (or exits) the boundaries defined by the administrator, a alert is sent.

Many geo-fencing applications incorporate Google Earth, allowing administrators to define boundaries on top of a satellite view of a specific geographical area. Other applications define boundaries by longitude and latitude or through user-created and web-based map.

A publisher or operator can allow an advertiser to select a geographic point using latitude and longitude coordinates to create a virtual “fence” around that point of a given radius. An advertiser can create multiple such geo circles and target campaigns to those circles. Once a customer enters the geo-fence, relevant ads can be delivered to the customer based on their preferences and other targeting attributes.

Geo-fencing allows publishers to deliver ads that are more relevant to the location based context of their users as well as yield higher conversions and better ROI for their advertisers.

II. TECHNOLOGY INCORPORATED

Various technologies have been used. These technologies are listed as follows:

A. Google Map in Android:

Android provides a number of objects to handle maps in LBS system like MapView which displays the map. To handle this MapActivity class is there. To annotate map it provides the overlays class. Even it provides canvas by which one can easily create and display multiple layers over the map. Moreover, sufficient provisions are there to zoom the map, localize the map by means of MapController.

B. Global Positioning System(GPS):

GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location. Essentially, the GPS receiver compares the time a signal was transmitted by a satellite with the time it was received. The time difference tells the GPS receiver how far away the satellite is. Now, with distance measurements from a few more satellites, the receiver can determine the user's position and display it on the unit's electronic map.[3]

A GPS receiver must be locked on to the signal of at least three satellites to calculate a 2D position (latitude and longitude) and track movement. With four or more satellites in view, the receiver can determine the user's 3D position (latitude, longitude and altitude). Once the user's position has been determined, the GPS unit can calculate other information, such as speed, bearing, track, trip distance, distance to destination, sunrise and sunset time and more.
C. General Packet Radio Service (GPRS):
General Packet Radio Services (GPRS) is a packet-based wireless communication service that promises data rates from 56 up to 114 Kbps and continuous connection to the Internet for mobile phone and computer users. The higher data rates allow users to take part in video conferences and interact with multimedia Web sites and similar applications using mobile handheld devices as well as notebook computers. GPRS is based on Global System for Mobile (GSM) communication and complements existing services such switched cellular phone connections and the Short Message Service (SMS).

III. EXISTING SYSTEM
A. Location tracker:
Mobility information of cell phone users is very important for wide range of applications, including context-based search and advertising, early warning systems, city-wide sensing applications such as air pollution exposure estimation and traffic planning. With the inclusion of new technologies in the cell phone hardware such as built-in GPS and 802.11 supports, mobility information are easily captured, managed and forwarded to a remote system via opportunistic connections over Internet. [4]

B. Whatsapp:
Whatsapp Messenger is a cross-platform mobile messaging app which allows you to exchange messages without having to pay for SMS. In addition to basic messaging Whatsapp users can create groups, send each other unlimited images, video and audio media messages.

C. Life360 Family Messenger:
Communication is very important during emergencies. We always want to make sure that all the members of the family are safe or it could be the other way around. Life360 Family Messenger can help you in these kinds of scenarios. It allows you to communicate with your Family members through a private Family Channel where you can send messages.

IV. PROPOSED SYSTEM
Geo-Notifier is revolving around the concept of geo-fencing and it is based on smart mobility. The first module of this application will provide Location based Services can be implemented on Android based Services can be implemented on Android based services through Google Web Services and Geo fencing on Android Phones to give multiple services to the user based on their Location. It is related to receiving location based discount alerts which is provided by business partners from their account. The second module is location tracking, android app continuously updating their location on a web application. The third module is a list of new individuals in the application user list. The fourth module is SMS with the friends or family from the application user list.

Fifth module is Emergency alert sms, which provides you and your family with a one-click automated emergency communication system that contacts up to 3 family or friends in emergency case like natural disaster, kidnapping etc.

V. ARCHITECTURE DESIGN
A. Map Viewing Module:
Map viewing module controls all the activity related to map. It identifies the location using location identifier then provides view to that entity on map using map viewer. In this application view on map option can be used to view online users only.[7]

B. Notification Module:
It uses background service of android device to provide notification whenever any friend enters into default limit, most commonly known as geo-fencing. This module will provide notification only when the users are online and present in friend list.

C. Profile Viewing Module:
This module is uses to display and update the current profile of a user, which includes user location, status and profile picture etc. Profile picture can be taken either from gallery or can be snapped instantly.

D. Messaging Module:
This module uses bundle creator for creating message, listener listen to the incoming messages and downloader downloads and displays the messages.
E. Android Device:
Android device connects with system using various modules like GPS, GPRS/WIFI, camera and gallery etc. GPS takes the current position of the user and submits it to database on timely basis. GPRS/WIFI can be used for all the activities to be performed with application.

F. Computer Device:
This device is used to provide account for business partners to provide notifications regarding daily discount details to the users.

G. Geo-Notifier Server:
This server is use as a back end, which includes database server, PHP server. Android device communicates with PHP server, which authenticates the user and transfers request to the database server, which then process the request and gives results back to the user.

VI. WORKFLOW IMPLEMENTATION

The user with approximately same latitude and longitude coordinates are retrieved as location users but that person must be online i.e. status=1.

The aforesaid code snippet would create a geofence in the shape of a square as shown in Fig.

![Geo_Fencing](image)

1) Database Structure for same vicinity users: Table 2 shows all the users that are present in a particular location [6].

<table>
<thead>
<tr>
<th>Id</th>
<th>username</th>
<th>Password</th>
<th>Email</th>
<th>L</th>
<th>F</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ajit</td>
<td>e12cert</td>
<td>ajit@</td>
<td>35°</td>
<td>32°</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>43°</td>
<td>78°</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>45°</td>
<td>67°</td>
<td>E</td>
</tr>
<tr>
<td>2</td>
<td>Vikas</td>
<td>r45tg5ty</td>
<td>vik@</td>
<td>35°</td>
<td>32°</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>43°</td>
<td>78°</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>45°</td>
<td>67°</td>
<td>E</td>
</tr>
<tr>
<td>3</td>
<td>shannoy</td>
<td>r45tg5ty</td>
<td>shn@</td>
<td>35°</td>
<td>32°</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>43°</td>
<td>78°</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>45°</td>
<td>67°</td>
<td>E</td>
</tr>
</tbody>
</table>

Table 2: Database Structure for Same Vicinity Users

Friend requests can be sent to other users within the vicinity. If the friend request is accepted by the other user, then it is updated into the friends list of both the users.

2) Database Structure for adding users into friends list:
Table 3 shows the sender i.e. source and receiver i.e. wish and status would be update to ‘1’ if the friend request is accepted else it would remain ‘0’.

<table>
<thead>
<tr>
<th>Source</th>
<th>Wish</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ajit</td>
<td>Vikas</td>
<td>1</td>
</tr>
<tr>
<td>Shahinawaz</td>
<td>Shannoy</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 3: Database Structure for Adding Users Into Friends List

Another important module of this application is notifying users whenever any users from their own friends list enter their vicinity.

Notification module can be implemented by comparing Table 2 and Table 3. Users must be notified if and only if the following conditions match:
Users are in Table 2 and with status ‘1’.
- Users are in Table 3 and in the same row with status ‘1’.

3) Comparison of Table 2 and Table 3 for notification: Table 4 shows the user that would be notified which was compiled by comparing Table 2 and Table 3.

<table>
<thead>
<tr>
<th>User in Table 2 and status ‘1’</th>
<th>User in Table 3 and status ‘1’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ajit</td>
<td>Ajit</td>
</tr>
<tr>
<td>Vikas</td>
<td>Vikas</td>
</tr>
<tr>
<td>Shannoy</td>
<td>Null</td>
</tr>
</tbody>
</table>

Table 4: Comparison Of Table 2 And Table 3

From Table 4 we can deduce that only two users ‘Ajit’ and ‘Vikas’ would be sent notification because both conditions are satisfied i.e. status of ‘Ajit’ and Vikas in Table 2 is ‘1’ hence both are online. Since status of the row ‘Ajit’ and ‘Vikas’ is ‘1’, therefore request is accepted by the ‘Vikas’.

Notification module can be further extended for daily commercial updates to users. These updates would be sent by businesses to the users. This feature of this application would be solely meant for entrepreneurs and theirs would be a paid registration. This extension would help this application in generating revenue.

The discount related information is provided by the authorized business partners. Different accounts are provided for these business partners. They are submitting daily discount details with title and description into the database. These details are then converted into xml format which are often called as RSS feeds. A link of this RSS feed is provided in our application which provides list view of daily discount details in user’s application.

4) Database Structure for submitted discount details: Table 4 shows the user that would be notified which was compiled by comparing Table 2 and Table 3.

<table>
<thead>
<tr>
<th>Id</th>
<th>Title</th>
<th>description</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Puma- Discount flat 30%</td>
<td>Discount on apparels.</td>
<td>------</td>
</tr>
<tr>
<td>2</td>
<td>Nike- Discount up to 50%</td>
<td>Discount on footwear.</td>
<td>------</td>
</tr>
<tr>
<td>3</td>
<td>Fila- Discount Flat 25%</td>
<td>Discount on footwear.</td>
<td>------</td>
</tr>
</tbody>
</table>

Table 5: Database Structure For Submitted Discount Details

VIII. CONCLUSION

Geo-Notifier can become a strong link between all the ecosystems specified for effective and innovative social commerce and smart mobility. Geo-Notifier begins with connecting strangers, bringing the latest local information on fingertips, and helping the consumers and retailers personalize their transactions based on preferences and location. So this application is a complete package to socialize, to be well informed and to smart shop. The emerging cloud device is proved to be useful for fighting crimes when there is increase in crimes.

REFERENCES

[3] GPS Signal Acquisition and Tracking – An Approach towards Development of Software based GPS Receiver By Dinesh Manandhar, Yongcheol Suh, Ryosuke Shibasaki