Secure Vantage Point Application

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***Abstract* –In last few decades, urban and rural people are using mobile devices intensively. In particular, population in urban areas depends on many phone applications and gadgets. The applications which are built on these devices may sometimes depend on the current or preferred locations of the user, to provide the services as they wish.**

When a group of users who wants to meet on their preferred locations in case of emergency, one user among them collects all the preferred locations and finds a point which provides optimal meeting distance to all the user. This location is found to be a vantage point from all user's perspective. Additionally one user can be able to track the location of all the users by sharing their current location's latitude and longitude through SMS or text message.

Keyword – Preferred locations, optimal meeting distance, vantage point and SMS.

I. INTRODUCTION

According to a recent study, location sharing has become more popular by proposing innovative services for mobile subscribers. One outstanding example of such a service is the ALERT application, where user shares their current location as text message. This text message provides current location's latitude and longitude which can be viewed in Google map. The rise of mobile phone technology in societies has made mobile phone users to make use of context aware services on these devices. Service providers takes profit of this vibrant and ever-growing technology by proposing innovative context-based services for mobile subscribers.

The first scenario includes to meet in case of emergency by a group of people who have planned to go out for research purpose in an unknown place.

Under these circumstances, one user among the group of people can collect all the user preferred or current location and can calculate the entire distance between all the people and find an optimal meeting distances. The second scenario includes in tracking the user location. One user among the crew can track the locations on time basis via a text message, which is similar to that of an alert application in Motorola android application. For example: every 10 minutes remaining user's current location is sent as SMS to the initiators phone.

Taking these two scenarios into account, this paper differs from all by providing third location to all the users and tracking all the user's current location via SMS by one particular person called initiator.

A. OBJECTIVES

1. To provide one location which will be the optimal meeting distances to all the users among the crew.
2. To create a database which gets the latitude and longitude of all the users preferred location.
3. To calculate Euclidean distance among all the location and apply centroid point formula to compute a single vantage point.
4. To track the user's location via SMS or a text message to an initiator. Security is achieved where one user cannot view other user's current location except the initiator.

II. EXISTING SYSTEM

Location-based Services (LBS) are used by loads of mobile subscribers almost every time to get location-specific information. There are two famous features of location-based services - location check-ins and location sharing[1]. By location check-ins, users can share their current location with any of the family and friends or obtain location-specific services from service providers [1]. The other types of location-based services rely on location sharing.

Therefore location sharing gains popularity among mobile phone users. All the users share their current location via SMS or link in Google map. For example: In "wats app" android application the user shares the current location. All the group members give their preferred location. Finally vantage point (location) is obtained which provides optimal meeting distance to all the users.

A. DISADVANTAGES

Suppose a fraudulent user is present among the group, it is essential to track that user's current location. Therefore, in the existing system no user wishes to reveal their current location all the time.

III . PROPOSED SYSTEM

In this paper PPFRVP protocol[2] is used which is used to address the privacy issue in the existing system. The location's latitude and longitude are encrypted and stored in the database. For encryption, MD5 Algorithm is used.

In detective cases the spy or the leader among the group requires location tracking of multiple user. This leader or head will become the initiator of the process. Each time the initiators gets the location of all other users through a SMS.

The system architecture shows how the proposed system works on the above mentioned two scenarios. To estimate the shortest travelling distance for the users the Euclidean distance among the location and centroid point calculation is used. After obtaining the meeting point location, each user starts to travel to that particular point. One user is required to monitor whether all the members in the group travel exactly to that point. Therefore an automatic SMS is sent to that user. This SMS would contain users name long with their current location's latitude and longitude Google map link[3]. On clicking that link, Google map application points the location.

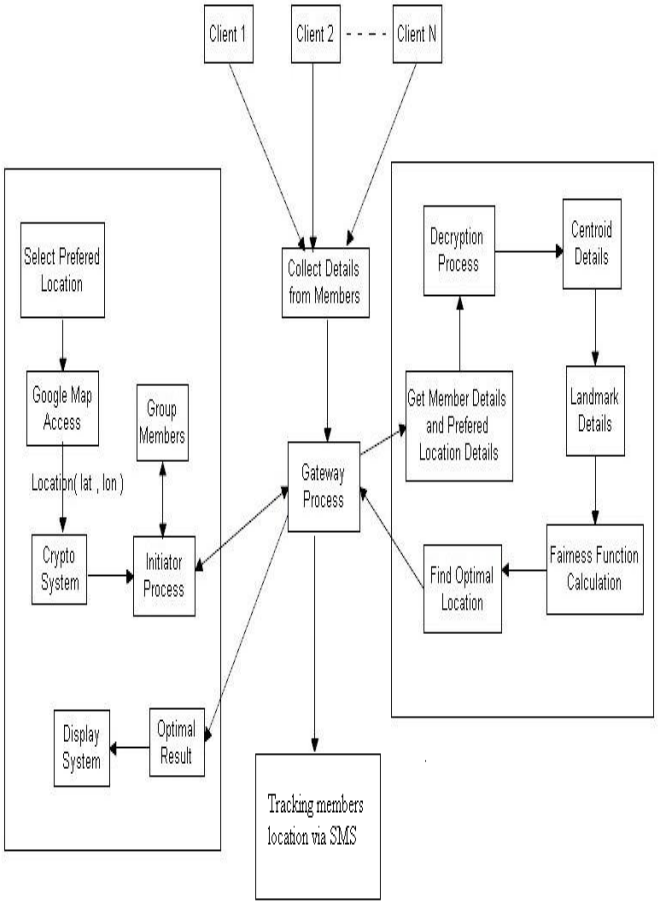

Figure 1 System architecture

A. ADVANTAGES

1. Tracking location of multiple users simultaneously through SMS.
2. One user's location in a crew cannot be viewed by the other user except the initiator.

IV. ALGORITHMS USED

A. PPFRVP (Privacy Preserving Fair Rendez Vous Protocol):

This protocol overcomes the defects in FRVP (Fair Rendez Vous Protocol) [2], [5]. It is used for distance calculation between the locations and calculating the centroid point. After this steps, it helps in bringing privacy to the location of the user. It includes modules like

1. Euclidean distance.
2. Centroid point calculation.
3. Preserving privacy.

A. EUCLIDEAN DISTANCE

In general Euclidean distance can be defined as the distance between two points. According to this system, the two points will be the location where X and Y coordinates shall be the latitude and longitude of the location.

Distance between

two points= $\sqrt{(X_2 - X_1)^2 + Y_2 - Y_1)^2}$

B. CENTROID POINT

Centroid point refers to mean position all other point in space. Therefore centroid point calculation is required to find the centroid location. Based on the distance and the shape obtained by connecting the location coordinates, centroid formula differs. The centroid point of n number of coordinates can also be calculated.

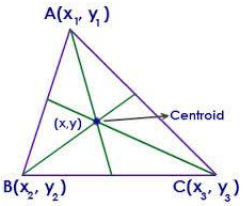

Figure 2 Centroid of a triangle

$$\text{Centroid point of an triangle} = \left(\frac{X1+X2+X3}{3}, \frac{Y1+Y2+Y3}{3} \right)$$

C. PRESERVING PRIVACY(Using MD5)

Message Digest 5 is the most widely used algorithm for encryption. It makes uses of cryptographic hash function. In this system, latitude and longitude of the location is encrypted and stored in the database. Therefore, no user can track other user's location.

V. WORKING OF THE SYSTEM

A group of users registers themselves into the application. The first registered member take up the initiators role and the rest of the user plays "member" role. After these steps, initiator selects the member and to them the initiators location will be requested.

Figure 3 Role selection

After getting the requested location from the initiator, the user give their preferred location. On collecting all the member's location, the initiators finds a location that is optimal to all the members. Each user can view that location on their mobile devices respectively.

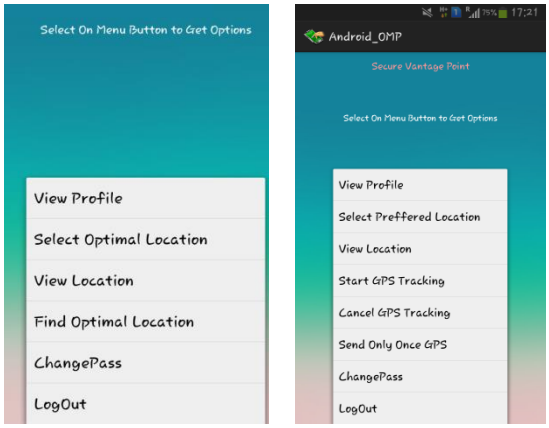

Figure 4 Menu selection page of initiator

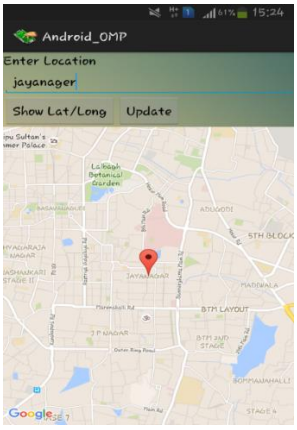

Figure 5 Preferred location on Google Map

Initiator eventually starts to track the location of all the members. Location is sent as GPS URL[5], which contains Google map link along with location (latitude, longitude)[4] and member's name.

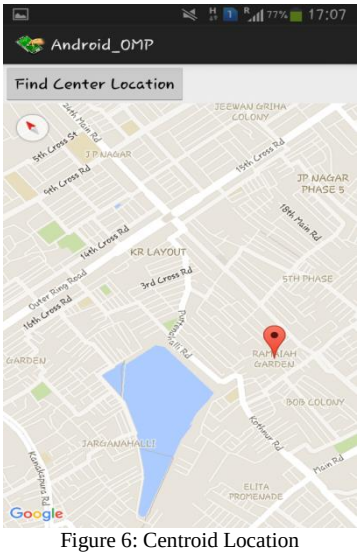

Figure 6: Centroid Location

1. LOCATION TRACKING via SMS

Location tracking is found to be important in this system because once all the user have started to travel towards to that vantage point (meeting location), one among the group needs to be aware of where all the users are there. Hence location tracking system is used. For this purpose, GPS technology is used. Location's latitude and longitude is sent as link to the initiator along with their name.

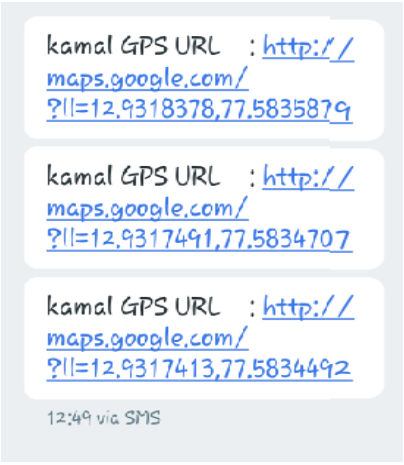

Figure 7: User's Location sent as SMS

V CONCLUSION

On summing up the most significant points of the proposed system which overcomes several issues, we come to the conclusion that optimal meeting distances can be provided to all the users and one spy alone among the group can track all the user's location at any point of time.

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