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TRACKING LOCATION OF FAMILY MEMBERS AND FRIENDS USING GPS.

PROF. ASHWINI JADHAV [1], MISS. KALPITA ZADE [2], MISS. SONAL OSWAL [3] & MISS. ASHWINI GHARAT [4]

[1234] **Department of Computer Engineering, Pune University, Pune India.**

ABSTRACT

In today's life most of the people uses Android hand-held devices, which provides users with great opportunity to innovate and get things done in a mobile device. Now a days android stared as phone operating system as every system started using android operating system, the need of portability risen. So applications related to every single need are available in market. GPS is another very important feature in the system. So, GPS is used to track location every possible object. To save time as well as money, we need more advance location tracking services. GPS is a system that is present from long time to track exact co-ordinate position of objects, it is an open network, anyone can access easily without any restriction.

The goal of the project is to present the design and implementation of a tracking system using on Android phones GPS location on maps, able to find persons in case of emergency and give a set of necessary information for rescue. After using GPS the information collected from GPD, we needed a cellular device to calculate the information gain. So to track location android device is best choice. In this application, the provides the security for family safety issues, tracking android devices and android users for finding the location of users by using GPS, Internet and Mobile sensors.

Keywords: ***(Networking, Communication system)***

1. INTRODUCTION

Accounting for more than half of the presently used hand-held devices, Android, as an operating system, has provided users with great opportunity to innovate and get things done in a mobile device. Starting as a phone OS,

the array of devices compatible with Android is even driving the market in the direction of PC experience with rumors that Intel and some of the partners are working on laptop prototypes with Atom processors. And so, the need for portability has risen by leaps and bounds. People have started developing apps for every other need.

With recent technological advancement of modern science people are now expecting the information about the location of any object for tracking purposes. Presently, we want more location based services for being advanced and to save time and money also. GPS is a system which is already implemented and everyone can access it without any restriction. Having the facility of GPS to develop this system we need a cellular GPS device to calculate the location from the information taken from GPS. Hence, we have chosen Android device to perform this calculations because Android mobile phone is cost effective and offers multidimensional purposes having some special built-in features like GPS service. Thus, this system is developed for location tracking of a group of people with a notification, massage alert system using various latest demanding tools and technology like Java, android, JSP, java script, html, CSS, Google places APIs, Google's material design, firebase notification.

The first part of the project involves Android Application Development of a GPS based Location Tracker in which with the help of any mobile device (app installed); any other GPS enabled handset (app installed) could be located. Though target user may be located anywhere in the world, he must have network connectivity and/or be GPS enabled.

There are many situations which request a tracking and localization system. Some examples are car/persons tracking and localization in case of accidents or disasters. Due to the hardware and software characteristics of the smartphones, these devices are suitable to work as terminals for such a system. The goal of the project is to present the design and implementation of a tracking and localization system using on Android phones GPS location, able to find persons in case of accident or any other emergency and give a set of necessary information for rescue. The system sends the GPS coordinates of the person, display the coordinates on a map and computes the shortest route to the accident site.

In this application, the system provides the security for family safety issues, tracking android devices and android users for finding the location of user by using GPS.

2. RELATED WORK

The application makes use of an android mobile phone which is provided with GPS receptor and GSM network. This application enables the user (a) to track a particular friend or a family member. When both users with have internet connection then check their current tracking details. When they are offline then it can be achieved by using SMS (short messaging service). This application also maintains a record of the positions which are already monitored. This allows the users to check when and where the mobile device of a family member or a friend was located using Google maps. The application works in open space areas only since it relies on GPS by calculating the longitude and latitude values of the mobile. Future extensions may look at other options such as getting the location from the service provider. In this case the location accuracy will be reduced and will depend on the size of the cells where the user is located.

The main purpose of this paper is to boost the accuracy of positioning system in GPS signal receivers or other location provider. The Mobile station is connected to satellites that retrieve the information about coordinates using GPS or network base station tracks the location from server base station of location database.

HOW TO OBTAIN AND MAINTAIN USER LOCATION:

The strategies will apply to the platform location API in {android. location} package. The Google Location Services API, part of Google Play Services, provides a more powerful, high-level framework that automatically handles location providers, user movement, and location accuracy. It also handles location update scheduling based on power consumption parameters we provide. In most cases, we'll get better battery performance, as well as more appropriate accuracy, by using the Location Services API.

Knowing where the user is allows our application to be smarter and deliver better information to the user. When developing a location-aware application for Android, we can utilize GPS and Android's Network Location Provider to acquire the user location. Although GPS is most accurate, it only works outdoors; it quickly consumes battery power, and doesn't return the location as quickly as users want. Android's Network Location Provider determines user location using cell tower and Wi-Fi signals, providing location information in a way that works indoors and outdoors, responds faster, and uses less battery power. To obtain the user location in our application, we will be using both GPS and the Network Location Provider, or just one.

CHALLENGES IN DETERMINING USER LOCATION WHICH WILL BE CONSIDERED IN DEVELOPMENT:

Obtaining user location from a mobile device can be complicated. There are several reasons why a location reading (regardless of the source) can contain errors and be inaccurate. Some sources of error in the user location include:

1. Multitude of location sources:

GPS, Cell-ID, and Wi-Fi can each provide a clue to users location. Determining which to use and trust is a matter of trade-offs in accuracy, speed, and battery-efficiency.

2. User movement:

Because the user location changes, we must account for movement by re-estimating user location every so often.

3. Varying accuracy:

Location estimates coming from each location source are not consistent in their accuracy. A location obtained 10 seconds ago from one source might be more accurate than the newest location from another or same source.

These problems can make it difficult to obtain a reliable user location reading. In order to use location manager in android development strategy helps provides ideas that we can use in our application to provide the user with an accurate and responsive geo-location experience.

DEFINING A MODEL FOR THE BEST PERFORMANCE:

Location-based applications are now commonplace, but due to the less than optimal accuracy, user movement, the multitude of methods to obtain the location, and the desire to conserve battery, getting user location is complicated. To overcome the obstacles of obtaining a good user location while preserving battery power, we must define a consistent model that specifies how our application obtains the user location. This model includes when we start and stop listening for updates and when to use cached location data.

*** Flow For Obtaining User Location:**

Here's the typical flow of procedures for obtaining the user location:

1. Start application.
2. Sometime later, start listening for updates from desired location providers.
3. Maintain a "current best estimate" of location by filtering out new, but less accurate fixes.
4. Stop listening for location updates.
5. Take advantage of the last best location estimate.

Figure1 demonstrates this model in a timeline that visualizes the period in which an application is listening for location updates and the events that occur during that time.

Figure 1

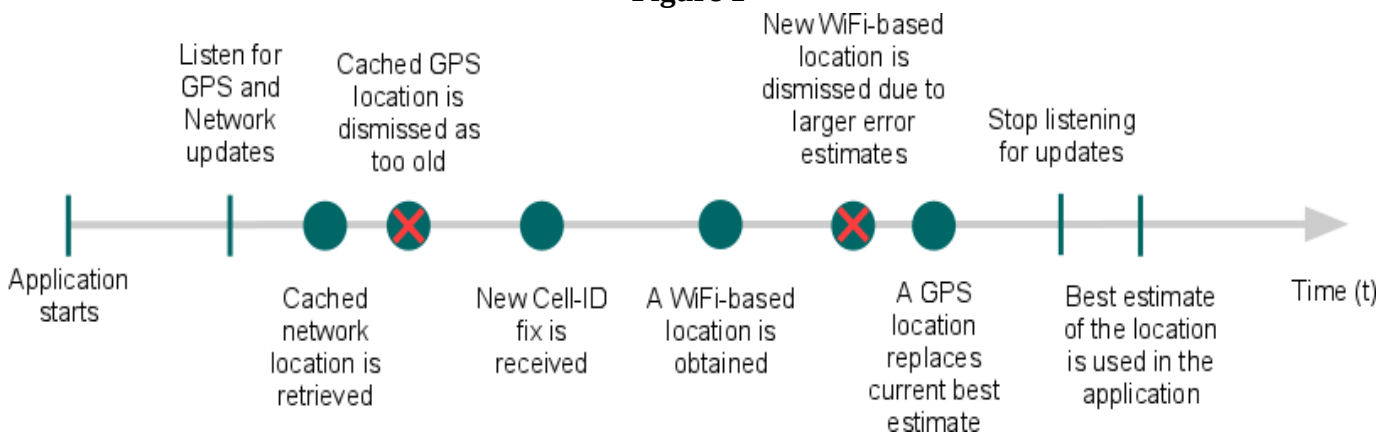


Figure1. A timeline representing the window in which an application listens for location updates

This model of a window during which location updates are received frames many of the decisions we need to make when adding location-based services to our application.

DECIDING WHEN TO START LISTENING FOR UPDATES:

We might want to start listening for location updates as soon as our application starts, or only after users activate a certain feature. Be aware that long windows of listening for location fixes can consume a lot of battery power, but short periods might not allow for sufficient accuracy.

DECIDING WHEN TO STOP LISTENING FOR UPDATES:

The logic of deciding when new fixes are no longer necessary might range from very simple to very complex depending on our application. A short gap between when the location is acquired and when the location is used, improves the accuracy of the estimate. Always beware that listening for a long time consumes a lot of battery power. So it is mandatory to stop listening for location updates where it is not required.

MAINTAINING A CURRENT BEST ESTIMATE:

We might expect that the most recent location fix is the most accurate. However, because the accuracy of a location fix varies, the most recent fix is not always the best. We should include logic for choosing location fixes based on several criteria. The criteria also varies depending on the use-cases of the application and field testing.

Here are a few steps we can take to validate the accuracy of a location fix:

1. Check if the location retrieved is significantly newer than the previous estimate.
2. Check if the accuracy claimed by the location is better or worse than the previous estimate.
3. Check which provider the new location is from and determine if we trust it more.

ADJUSTING THE MODEL TO SAVE BATTERY AND DATA EXCHANGE:

As we test our application, we might find that our model for providing good location and good performance needs some adjustment. Here are some things we might change to find a good balance between the two.

*** Reduce the size of the window:**

A smaller window in which we listen for location updates means less interaction with GPS and network location services, thus, preserving battery life. But it also allows for fewer locations from which to choose a best estimate.

*** Set the location providers to return updates less frequently:**

Reducing the rate at which new updates appear during the window can also improve battery efficiency, but at the cost of accuracy. The value of the trade-off depends on how our application is used. We can reduce the rate

of updates by increasing the parameters in request Location Updates() that specify the interval time and minimum distance change.

*** Restrict a set of providers:**

Depending on the environment where our application is used or the desired level of accuracy, we might choose to use only the Network Location Provider or only GPS, instead of both. Interacting with only one of the services reduces battery usage at a potential cost of accuracy.

COMMON APPLICATION CASES:

There are many reasons we might want to obtain the user location in our application. Below are a couple scenarios in which we can use the user location to enrich our application. Each scenario also describes good practices for when we should start and stop listening for the location, in order to get a good reading and help preserve battery life.

*** Tagging user-created content with a location:**

We might be creating an application where user-created content is tagged with a location. Think of users sharing their local experiences or recording some content that can be augmented with their current location. A model of how this interaction might happen, with respect to the location services, is visualized in figure 2.

Figure 2

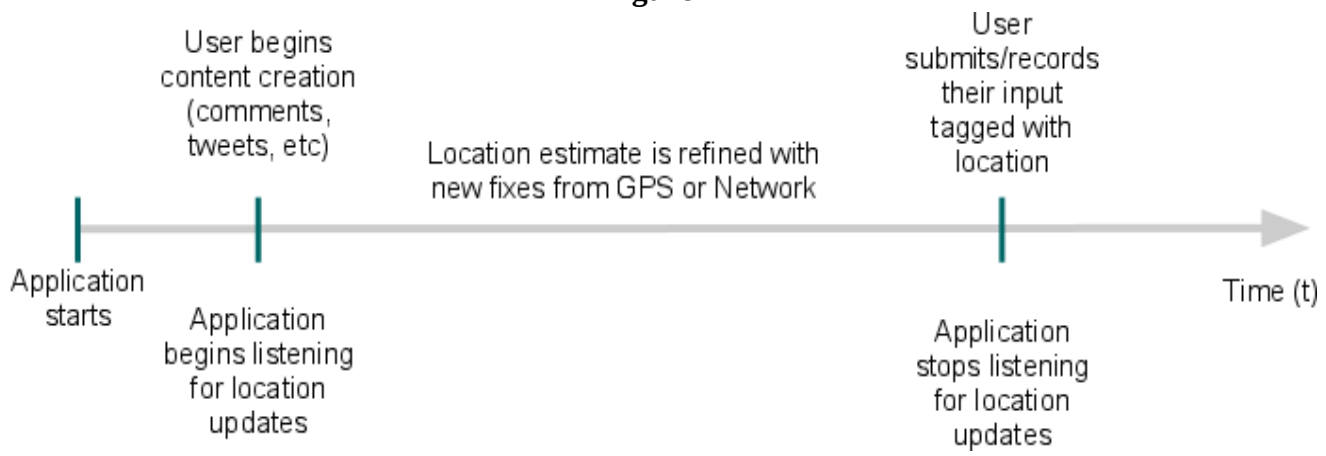


Figure2. A timeline representing the window in which the user location is obtained and listening stops when the user consumes the current location.

This lines up with the previous model of how user location is obtained in code (figure 1). For best location accuracy, we might choose to start listening for location updates when users begin creating the content or even when the application starts, then stop listening for updates when content is ready to be posted or recorded. we might need to consider how long a typical task of creating the content takes and judge if this duration allows for efficient collection of a location estimate.

 # Helping the user decide on where to go:

We might be creating an application that attempts to provide users with a set of options about where to go. For example, we're looking to provide a list of nearby friends / people and the order of recommendations changes depending on the user location.

To accommodate such a flow, we might choose to:

* Rearrange recommendations when a new best estimate is obtained.
* Stop listening for updates if the order of recommendations has stabilized.

This kind of model is visualized in figure 3.

Figure 3

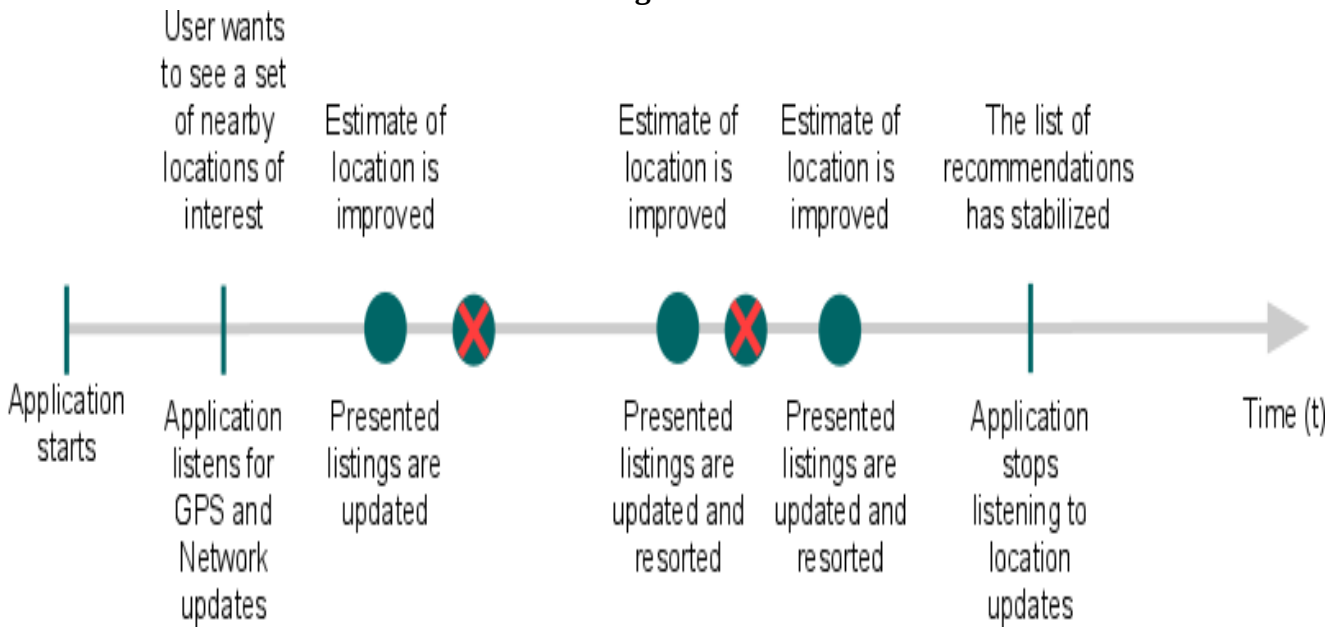
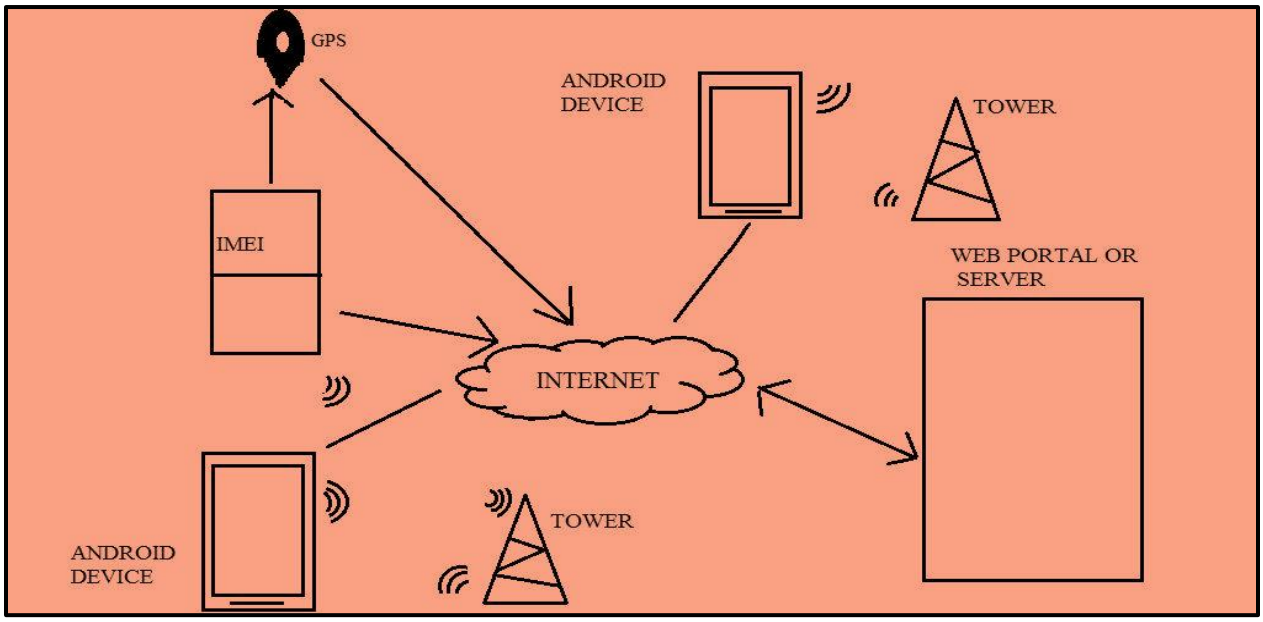


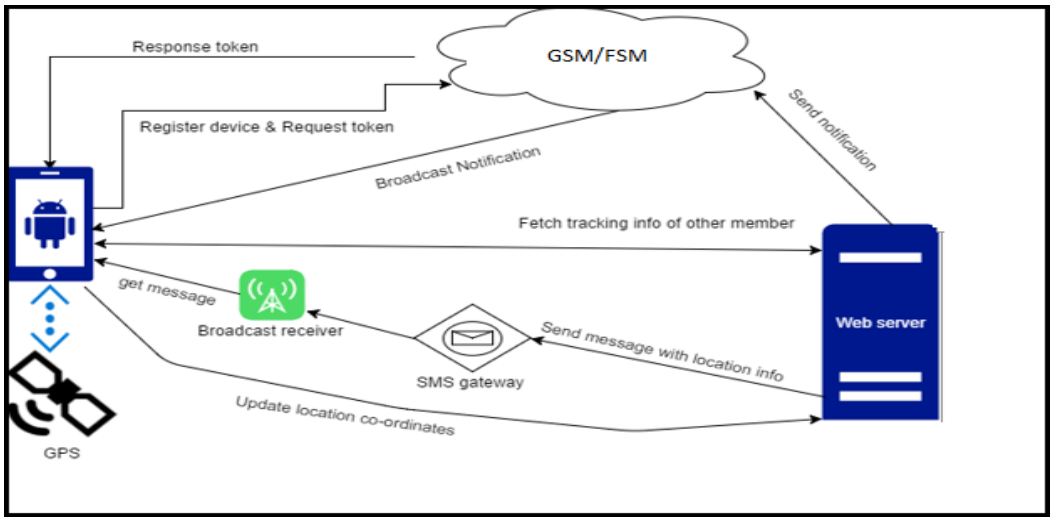
Figure3. A timeline representing the window in which a dynamic set of data is updated each time the user location updates.

3. SYSTEM ARCHITECTURE:

1. Initial overview of the system architecture:



2. Main architecture of the tracking system:



4. PURPOSE AND SCOPE:

PURPOSE:

The purpose of system design is to create a technical solution that serves the user. The system should be designed in such a way that is very flexible to use for the user. The preparation of the environment needed to build the system, the testing of the system and the migration and the preparation of the data that will ultimately be used by the system are equally important. In addition to designing the technical solution, system design is the time to initiate focused planning efforts for both the testing and data preparation activates. This application is a real life problem solving application. The user sections are designed in such a way that all users/family members enjoy the facilities of the application.

SCOPE:

1. All users' locations would be retrieved from an online database so as to centrally control the permissions for viewing.
2. For restricting user access, user authentication would be supported.
3. Periodic refreshing has to be present so that each time the geo–location changes or after a fixed interval of time the values in database should be updated.(offline location record keeping and sync with server when network connectivity on)
4. All devices would be having a unique ID (UID) and this would be used for searching for the user.
5. SOS feature for support using notifications and massage.
6. Track user (family member) when member fails to receive 3 consecutive phone calls.

5. APPLICATIONS:

1. Set up your own social personal safety network of friends, family and co-workers
2. Share locations to find each other more easily.
3. Track your friends with live GPS trace. Check friend's geo-location using Google map.
4. Use I'm here to tell selected people where you are right now.
5. And in case you are ever in trouble, the Guardian Alert button will immediately notify your friends and family members that you need help, and let them know where you are (GPS). It will even set off a siren.
6. Quick to find nearby Hospitals or Police Stations and easy navigates there.

6. CONCLUSION

This paper have proposed the enhanced design and overcome limitations and drawbacks of existing location tracking systems and designed an improved real time, flexible, scalable, cost effective, and enhanced version of location tracking system. We are working for future enhancements.

7. ACKNOWLEDGEMENT

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