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# Mobile Tracking Based on Phone Theft Detection

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**Abstract:** Lots of Applications are developed to track a Smart phone but still it is a major concern. User has to manually report to the customer care to block the IMEI Number of the lost Phone. So that, Android Application is deployed with initial registration of Alternative Mobile numbers. An Application which is deployed in the mobile devices can be able to Track the current location of the device. If the robber changes the SIM card, immediately then location details are sent to the alternative Phone number of the original User. In this paper, both the logic of tracking the Theft Phone with SIM Card & Theft Phone with changed SIM Card is tracked continuously. The registered mobile numbers can get the SMS alert from the Theft Mobile. This process is reworked continuously to track the android mobile phone.

**Keywords:** Location tracking, Android, Smart Phone, Context, Tracking.

## 1. INTRODUCTION

Location privacy has become a major concern due to the proliferation of GPS devices, web location services, WLAN and cell ID based positioning technologies. The ability to locate a wireless device has been looked into by several researchers. Localization can be active or passive. In passive localization, the users do not carry any device (having radiofrequency transmitter) but in active localization the users carry devices, where is the users where about are known to others. The location with the help of some basic components like mobile devices, mobile communication network, service provider like the Global Positioning Service (GPS) and Geographical Information System (GIS) etc. Even a mobile device without a GPS monitoring system can able to send the location information to the user with the help of radio signal transmission[1].There are two major actions,

They are:

- Obtaining the location of user
- Utilizing the above information to provide a service.

These 2 actions are used to answer 4 questions below for a mobile user in a new, fast, more accurate way:
Where am I…?
Where is the nearest ...?.
Where is my ...?,
How do l get there?

### 1.1 OBJECT TO BE TRACKED

- Network-based: In this category all the necessary measurements are performed by the network (by one or several base stations). The measurements are usually sent to a common location center that is part of the core network. This center takes over the final computation of the terminals' positions [1].
- Terminal-based: In terminal-based localization approach, it accounts for position determination. Since it consumes significant battery power and needs proper equipment, it is applicable for legacy terminals [1].
- Network-assisted: Here the final calculation of the terminal's position is taken over by the terminal. However, possible assistance data can be sent by the network. This can be done either on request (pull) or in a push-manner [1].
- Terminal-assisted: This process is a hybrid implementation of the other methods, where the terminal measures, reference signals of incoming base stations and provides feedback reports to the network. The final position computation takes place in a central location center within the network [1].

Availability of many devices such as smartphones, tablets, laptops, net books, wristwatches, TVs, etc. that can utilize various sensors like accelerometers, temperature gauges, GPS receivers, gyroscopes, etc. and the availability of wireless Internet have made localization easier and more effective. Since smart handhelds have a variety of sensors like accelerometer, compass, gyroscopes etc., it is possible to make tracking systems not only location aware, but also context aware. Location is a part of context but the context also encompasses conditions like, if the user is moving, if he is taking turns etc. Gathering context helps to better track an individual especially for surveillance. For instance, if the device is stolen, it would be easy to predict the exact location of the device at some future time instant if the context (including location) of the device is known at the current time instant. Moreover context information can be utilized to minimize network data transfer for these kinds of applications. For example, if the device is static or moving slowly there is no need of sending updates to the tracker device frequently. However effectiveness of context sensing depends on various other conditions like if the user is carrying the device in his/her pocket or holding the device in hand etc [1].
Consequently, in this paper, a service for context tracking of Smart handheld devices is proposed that takes into account both location of the device and user context for better surveillance. This technique can be applied for tracking location of individuals, lost or stolen devices etc. in a user friendly manner that saves considerable power. Also by comparing contexts of friends, nearest neighbour may be identified when needed [1].

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The remaining of this paper is organized as follows: In Section II, related works in this area are discussed. Proposed work is in Section III. Modules is in Section IV. Architecture is in Section V. About Android is in section VI. Implementation and Result is discussed in Section VII and VIII end with conclusion.

## 2. RELATED WORK

In this paper, it analyze shortcomings of the basic system, and develop and evaluate solutions to address these shortcomings. Additionally, describe several new enhancements, including a novel access point-based environmental profiling scheme and a viter bi-like algorithm for continuous user tracking and disambiguation of candidate user locations [1].

A frequently proposed solution to protect location privacy suggests that mobile nodes collectively change their pseudonyms in regions called mix zones. Because this approach is costly, self-interested mobile nodes might decide not to cooperate and could thus jeopardize the achievable location privacy. In this paper, we analyze the non-cooperative behavior of mobile nodes with a game-theoretic model, where each player aims at maximizing its location privacy at a minimum cost [2].

The motivation for every location based information system is: "to assist with the exact information, at right place in real time with personalized setup and location sensitiveness". In this era we are dealing with palmtops and iphones, which are going to replace the bulky desktops even for computational purposes. Vast number of applications and usage where a person sitting in a roadside café needs to get relevant data and information. Such needs can only be catered with the help of location based services [3].

Typical location determination systems require the presence of a physical device that is attached to the person that is being tracked. In addition, they usually require the tracked device to participate actively in the localization process. In this paper, the concept of device-free passive (dfp) localization has been introduced. A dfp system is envisioned to be able to detect, track and identify entities that do not carry any device, nor participate actively in the localization process the system works by monitoring and processing changes in the received physical signals at one or more monitoring points to detect changes in the environment [4].

The proliferation of lightweight, portable computing devices and high-speed wireless local-area networks has enabled users to remain connected while moving inside a buildings. This emerging paradigm has spurred a lot of interest in applications and services that are a function of the mobile user's physical location. The goal here is to enable the user to interact effectively with his or her physical surroundings. Examples of such interactions include: printing a document on the closest printer, locating a mobile user, displaying a map of the immediate surroundings and guiding a user inside a building. As the surroundings change, so does the computing that happens. The interaction between computing and location may also be less direct. For instance, when in the boss' office, pre-fetch facts and figures on business performance and project-status for ready access but while in the cafeteria, turn on the sports score ticker [5].

## 3. PROPOSED SYSTEM

This paper presents a technique to improve anti-theft for android based mobile phones by using different services like SMS, Camera. Android based Application is installed in user mobile which is used to track the SIM Card ID (IMSI). If Android Phone is stolen obviously SIM card would be changed, as our Application parallel working in background of the mobile, it will Track the SIM Card ID. If the SIM card is changed then GPS is initiated automatically and exact location of the thief has been captured [6].

SOME BENEFITS ARE:

- Easily identify the theft mobile
- Less time consuming process
- All Automatic Process
- No Manual Interface is required

## 4. MODULES

- Mobile Client
- Server
- Tracking IMSI Number
- Google Earth Initiation & SMS Alert

### 4.1 MOBILE CLIENT

Mobile Client is an Android application which is created and installed in the User's Android Mobile Phone. The Application's First Page Consist of the User registration Process. The user login page is creating with the help of text field & button in the android mobile. While creating the Android Application, we have to design the page by dragging the tools like Button, Text field, and Radio Button. It get completed designing, by writing code for each. After creating the full mobile application, it will generated as Android Platform Kit (APK) file.
This APK file will be installed in the User's
Mobile Phone an Application. Using this APK user will be registering with the server by providing Alternative mobile number & Email ID. User's IMSI number is also captured by the server.

### 4.2 SERVER

The Server Application which is used to communicate with the Mobile Clients. The Server can communicate with their Mobile Client by GPRS and GPS. User will be initially registering with the server. Server will track the user with user's IMSI number.

### 4.3 TRACKING IMSI NUMBER

In this module, if mobile is stolen by some anonymous person, by using phone IMSI no, through the application anonymous person will be tracked. After the mobile is theft by an anonymous person tries to change the Sim card. Mobile Application will identify the change in the

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IMSI number then automatically GPS is initiated to exact location of the anonymous person.

4.4 GOOGLE EARTH INITIATIONS AND SMS ALERT
In the section if the mobile is stolen then the location of the anonymous person is traced by the GPS application in the mobile so that it update every movement of thief location and send the location value to the owner of the mobile. SMS alert the GPS location of the thief is sent to the owner so that they can easily trace the location of the anonymous person by clicking the link of the location URL which was send as SMS Alert.

## 5. OVERALL ARCHITECTURE

System architecture is a conceptual design. That defines the structure and behavior of a system. An architecture description is a formal description of a system; organize in a way that supports reasoning about the structural properties of a system. It defines the system components or building blocks and provided a plan from which products can be produced and system developed, that will work together to implement the overall in a way that supports reasoning about the structural properties of the system.

❖ REPRESENTS
- Mobile stolen by attacker.
- Sim card change.
- IMSI verification.
- Detection of alerted ID.
- Automatic GPS location initiated SMS to 6 numbers.
- Email the URL link and location of the attacker.
- Identify the attacker.

5.1 DISCUSSION
It has been discussed with 3 layers:

- Application
- Middleware
- Data Service

➢ APPLICATION
This represents a specific application such as a "find my friends" application. This consists of a Smartphone component, which has a number of sensors and potentially a server component that includes application-specific data (such as location tagged information) [7].

➢ MIDDLEWARE
This wraps access to Core Location based services Features (Location Tracking, GIS Provider and Location Collection Services) to provide consistent interface to Location Based Services applications [7].

➢ LOCATION TRACKING
This component stores the location trace of individual users. This represents a fundamental component in next generation Location Based Service as it contains the data that allows a user's route to be determined and potentially predicted. In particular, this component would typically support the following functionality:

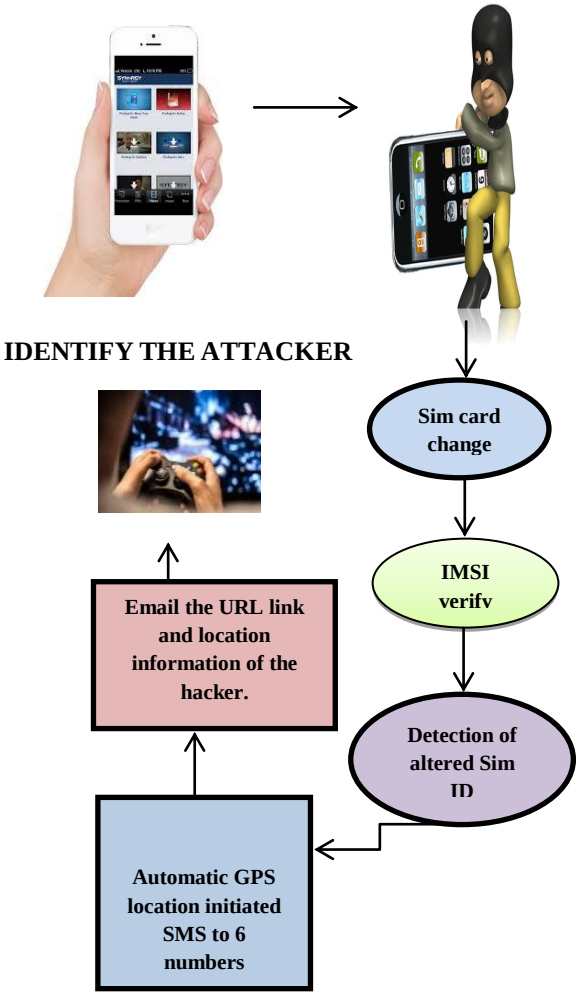


Fig1-Architecture Diagram

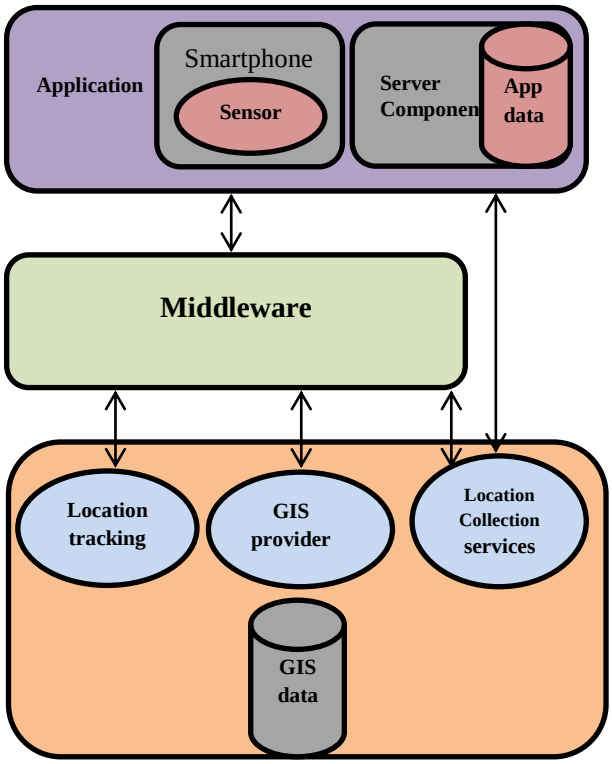


Fig 2-Location Service Diagram


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- Keep records on user's current and past locations.
- Notify other components when a specific user has moved, or when they move in or out of an area.
- This supports Location based notification being sent to users.
- Determine which users are within a defined location this supports geo-coding features.
- Queries of location trace to generate user movement models [7].

➢ GIS PROVIDER

This component provides geospatial functionality for many Location based service including map information, map visualization and directory services. Google Maps with its API can be considered a GIS provider [7].

➢ LOCATION COLLECTION SERVICE

This component performs location collection to get a latitude and longitude for a specific user. Depending on the technology, this component may be accessed via the Middleware (e.g., mobile network triangulation via a service provider) or directly (e.g., via GPS receiver in the Smartphone) [7].

Android provides access to the above components to facilitate the implementation of Location based services through the help of following classes;

- Location Manager
- Location Provider
- Geocoding
- Google-Map

➢ LOCATION MANAGER

Location Manager Class of android is present to manage all other components needed to establish a system [9].

➢ LOCATION PROVIDER

Location provider represents the technology to determine the physical location i.e., to handle GIS. Location provider component of Android application is a present to facilitate the determination of available provider and selection of suitable one. Finding the List of Available Location Provider to get a list of names for all the providers available on the device, call get Providers, using a Boolean to indicate if you want all, or only the enabled, providers to be returned:

```
Boolean enabled Only = true;
Listproviders=locationManager.getProviders(enabledOnly
);
```

In addition to this GPS provider and Network provider can be accessed directly by using the static variables defined in the LocationManager class:

```
LocationManager.GPS_PROVIDER
LocationManager.NETWORK_PROVIDER
```

Furthermore for finding the provider on the basis of some criteria we can use the criteria class and then can find the best provider for defined criteria using the Best Provider Method as shown in the following code snaps:

```
Criteria criteria = new Criteria();
criteria.setAccuracy(Criteria.ACCURACY_COARSE);
criteria.setPowerRequirement(Criteria.POWER_LOW);

// more criteria here
StringbestProvider=locationManager.getBestProvider(crite
ria, true);
```

If more than one provider is available fulfilling the given criteria then the one with best performance is returned. On the other hand if no provider is found for the defined criteria then criteria are loosened in order Power use, Accuracy, Ability to return bearing, speed, and altitude[9].

➢ GEOCODING

Reverse geocoding provides a way to convert geographical coordinates (longitude, latitude) into street address and forward geocoding provides a mean to get geographical coordinated from street address[9].For forward geocoding we use getLatitude() and getLongitude() method as shown in the following code Block

```
double latitude = location.getLatitude();
double longitude = location.getLongitude();
```

For reverse geocoding we use get From Location method with geocoder variable as shown in the following code Block

```
//geocod is geocoder variable
addresses=geocod.getFromLocation(latitude, longitude,
10);
```

➢ GOOGLE MAP IN ANDROID

Android provides a number of objects to handle maps in Location Based Services system like MapView which displays the map. To handle this Map, Activity 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 Map Controller [9].

Following code-line shows the Map Handling in Android:

```
<com.google.android.maps.MapView
android:id="@+id/map_view"

//specify different attributes/>// map controller
MapControllermapController=myMapView.getController(
);
mapController.setCenter(point);
mapController.setZoom(1);

//List of present overlays
List<Overlay> overlays = mapView.getOverlays();

// adding a new overlays
MyOverlaymyOverlay = new MyOverlay();
overlays.add(myOverlay);
mapView.postInvalidate();
```

## 6. GPS IN ANDROID

Android is an open source and Linux-based Operating System for mobile devices such as smart phones and tablet computers. Android was developed by the Open Handset

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Alliance, led by Google, and other companies. Android offers a unified approach to application development for mobile devices which means developers need only develop for Android, and their applications should be able to run on different devices powered by Android. The first beta version of the Android Software Development Kit (SDK) was released by Google in 2007 where as the first commercial Google announced the next Android version, 4.1 Jelly Bean. Jelly Bean is an incremental update, with the primary aim of improving the user interface, both in terms of functionality and performance. The source code for Android is available under free and open source software licenses. Google publishes most of the code under the Apache License version 2.0 and the rest, Linux kernel changes, under the GNU General Public version [4].

- Built-in GPS receiver.
- Requires 2 lines of codes.
- Requires 1 XML file for properties.
- System is responsible for updating location change.

6.1 ANDROID ADVANTAGE &LIMITATIONS
Advantages of an Android are listed as:

• Time for a change.
• Android scales to every device.
• It's supported by some hardware manufacturers and more to come in the future.
• Open source.
• Third party development is encouraged. In contrast to advantages Android has following limitations:
• Not supported by any big company yet except HTC
• Does not support some applications like Firefox
• Some limitations exist in blue tooth.

## 7. IMPLEMENTATION AND RESULT

The Application development includes the application features and the technologies required for its development.

➢ SYSTEM REQUIREMENTS
It is directed to two user profiles, the client& the server to be tracked. The server side requires any android based Smart phone starting from version Android 2.2 having theft detection app installed in it with GPRS and GPS enabled. The client side requires any other OS based mobile phones for receiving SMS [3].

➢ APPLICATION FEATURES
Each SIM card is identified by its Integrated Circuit Card ID (ICC-ID). ICC-IDs are stored in the SIM cards and are also engraved or printed on the SIM card body during a process called personalization. When started, the application compares the ICC ID of the current SIM card and the predefined ICC ID to detect unauthorized SIM card in the device.

Immediately after the SIM replacement we will get notification about the IMEI/IMSI number and details of new SIM inserted .The user is expected to hardcode a mobile number in the application which enables to send notification to that number.

The application automatically deletes the outgoing messages from the Smart phone where this app is installed such that the new owner of the cell is clueless about it all [8].
The data flow diagram of application is shown in figure 3.

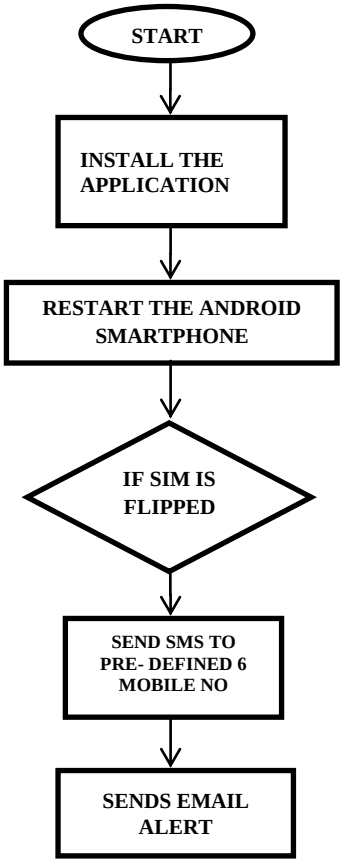


Fig 3- Data Flow Diagram

➢ TECHNOLOGIES
The theft detection is developed in Java programming language using the Android software development kit. The development tool chosen for this application was the Eclipse SDK [5].

➢ SNAPSHOTS


Fig 4- Screen Shot 1


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Fig 5- Screen Shot 2

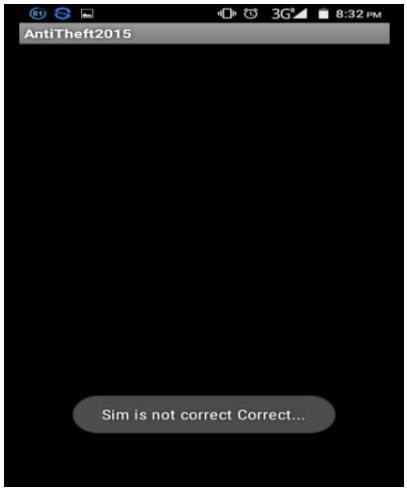


Fig 6- Screen Shot 3

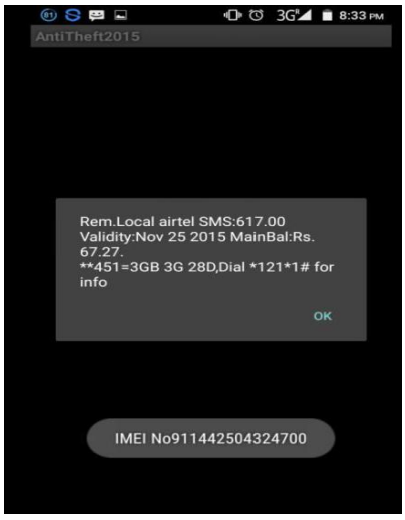


Fig 7- Screen Shot 4

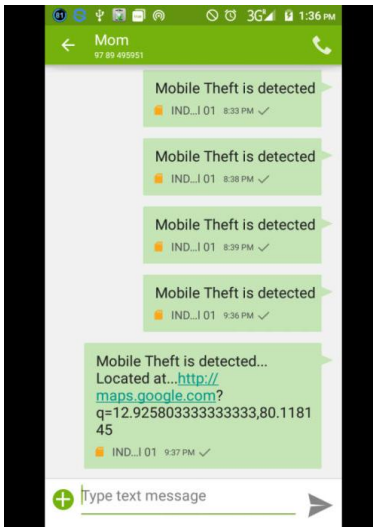


Fig 8 – Screen Shot 5

## 8. CONCLUSION

This paper presents a novel anti–theft application for android based devices. The application deploys an enterprise security solution that meets users immediate and long term requirements by providing the message and location via SMS and email, which makes easy for the user to identify the thief and make him/her get caught and arrested. It enhances the application by providing the information about the location of the android based smart phone with the help of text messages. With the advent of time, this technology evolving every day. This application will further be developed and improved. Currently this application is available for android based mobile phones. Future work involves development of the application by capturing the photo and video of the thief [1].

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