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AN ADVANCED MOBILE TRACKING SYSTEM WITH PIN POINTS USING ANDROID SMART PHONES

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Abstract—* : *Smart Phones has surely become one of the valuable gadgets for human beings. It is necessary for us to have a dependable device which will provide all the facilities other than the basic functionalities available in a mobile phone. This project involves an Android Application Development of a Personalized GPS based Location Tracker in which any Android mobile device (app installed) can locate any other GPS enabled handset (app installed). Though target user may be located anywhere in the world, he must have network connectivity, provided GPS enabled. Personal Tracking Systems are the devices specially built up for personal safety. This tracking system has been implemented, which adopts various extended features that the existing system does not have. Our application provides the functionality in which user's safety is ensured.

***Keywords* — Tracking, Global Positioning System (GPS), Global System for Mobile Communication (GSM), Android, Mobile Application, tracking using a Smartphone**

I Introduction

Android is a mobile OS (Operating System) based on Linux Kernel and currently developed by Google, with a user interface based on direct manipulation. Android provides a rich application framework that allows you to build innovative apps and games for mobile devices in a Java language environment. Android apps are built as a combination of distinct components that can be invoked individually. Turning the GPS module on the phone would not cost us anything but getting a location usually involves transaction with cell phone service provider so as to extract the location fast and with as little network connectivity as possible plus non visibility of satellites. Able to install custom apps from the market, GPS, Location through the network, use all social media sites and e-commerce sites through their apps are most popular features.

There are many companies where they have a need to track their employees periodically throughout the day reasons being to avoid employee cheating the employer by not visiting the places he has been asked to or to track employee performance by real-time data or showing miscellaneous expenditure without actually spending or using it example, travelling charges. Earlier GPS systems uses only single user tracking environment to track the location. The main disadvantage of these earlier systems is that it takes a large amount of time to track the exact location of the user. In this paper, we are proposing an application using Andriod environment which is used to track two users and also for every 30 sec it tracks the exact pin-point location of the user continuously until our application is turned off.

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II Related Work

Most applications in the market are not user friendly because they do not provide precise data, nor allow multiple ways to access the data. Currently GPS tracking system using android Smartphone's only locates maps with reference to longitude and latitudes. This technique only gives location details. So it is not an easy task to find exact location. The proposed system is meant to resolve such deficiencies. It uses the cell phone service provider to locate the requester for a registered service. Present technique differs from many other types of mobile services because it is not just mobile in the sense that it can be carried with the user but it can actually be used on the move . In addition, it takes into consideration the usage situations that may affect the location's physical environment (e.g., background noise, illumination, weather).It also takes a lot of time to track the moving object which has resolved in the proposed system.

III MATHEMATICAL DESCRIPTION

PSEUDOCODE:

Input: radius of the sphere(r), longitudes long1, long2 of both the points p1 and p2, latitudes lat1, lat2 of both the points p1 and p2.

Output: distance(d) between two points p1 and p2.

Method:

1.Calculate r = radius of the sphere

1. Calculate lat1 = latitude of point 1
2. Calculate lat2 = latitude of point 2
3. Calculate long1 = latitude of point 1
4. Calculate long2 = latitude of point 2
5. Calculate a = Sin^2((lat2-lat1)/2) + Cos(lat1)Cos(lat2) * Sin^2((long2-long1)/2)
6. Calculate c= 2 * a * tan2(Sqrt(a) * Sqrt(1-a))
7. Distance d = r * c

IV System Design

An Advanced Mobile Tracking System with Pin Points Using Android Smart Phones introduces the architecture and component models of Android, and analyzes the anatomy of an Android application including the functions of Activity, Intent Receiver, Service, Content Provider, and etc., The method of a location-based mobile service is implemented using Android. This design example shows that its much effortless to implement self-location, to trace the user's location, to perform query and to flexibly control the real-time map on Android.

Here in this Android Application Development of a Personalize GPS based Location Tracker in which any Android mobile device (app installed) can locate any other GPS enabled handset (app installed). Though target user may be located anywhere in the world, he must have network connectivity, provided GPS enabled.

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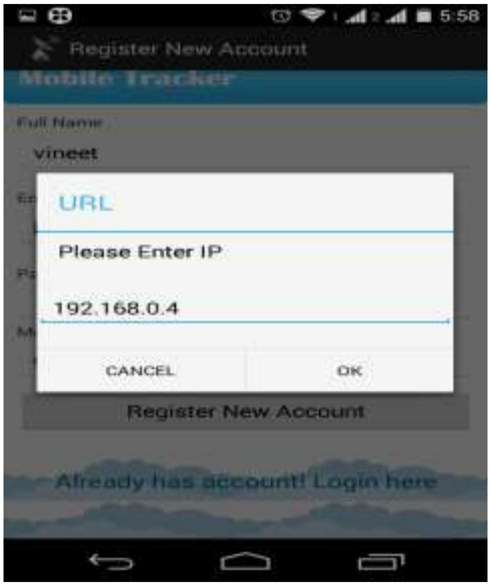


Screen 1

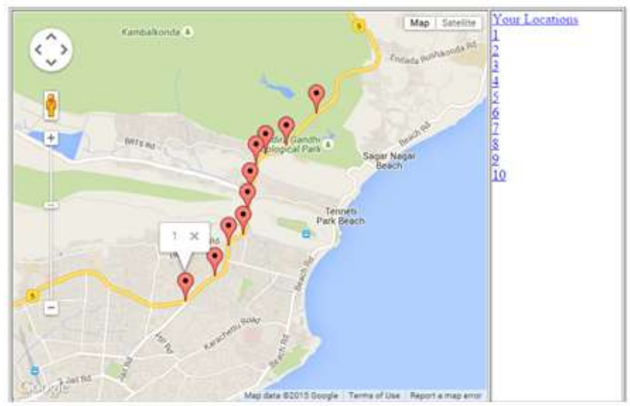
Providing the users IP address in the URL and even providing the server URL, will help in pushing the user location data to server till the GPS is disabled.

Screen 2

Once the tracker is enabled in the server side it locates the user device in a map.

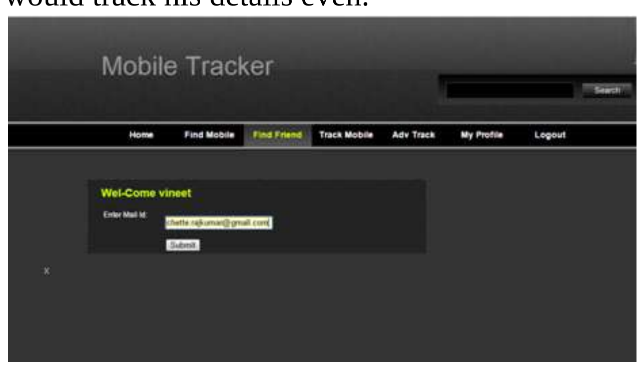
Screen 3

This screen shows the pinpoint locations for every 30 seconds of the user who is moving until the GPS is off.



Screen 4

Here in the Mobile Tracker on providing the second user i.e(Friend's Mail Address), would track his details even.



Screen 5

The obtained pin point locations on the map are been traced, which are obtained by the perodic updated locations of the devices

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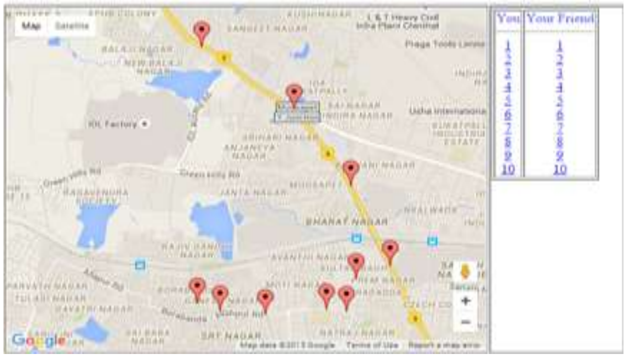
from the servers information.

This pin pointed locations are been trajected till the GPS is disabled.



Screen 6

Once the details are been provided, the locations of the individual users are been traced on a map. Thus we achived the pin point locations of these devices.

Screen 7

VI Algorithm/ Techniques Description

HAVERSIN ALGORITHM

This Algorithm is used for calculating distance between two Geographical Locations. When you want to calculate the distance between the locations, you cannot head towards the east direction in a straight line, where you will be stopped before 30 meters from the destination point because the earth is spherical and it follows different Geographical Poles.(The Northern direction is always the shortest route). Hence, we always calculate with 90° because it's navigation is on North Side and it goes in a clockwise direction as positive.

Formula: For any two points on a sphere, the haversine of the central angle between them is given by

$$havers\,in\left(\frac{d}{r}\right) = haver\,\sin\left(\phi_2 - \phi_1\right) + c$$

Where haversin is the heversine function

$$haver\,\sin\left(\theta\right) = \sin^2\left(\frac{\theta}{2}\right) = \frac{1-\cos\left(\theta\right)}{2}$$

- *d* is the distance between the two points
- *r* is the radius of the sphere,
- ϕ_1, ϕ_2: latitude of point 1 and point 2
- λ_1, λ_2: longitude of point 1 and point 2

On the left side of the equals sign d/r is the central angle, assuming angles are measured in radians (note that φ and λ can be converted from degrees to radians by multiplying by π/180 as usual).Solve for 'd' by applying the inverse haversine function:

$$d = r\,\text{haversin}^{-1}(h) = 2r\,\arcsin\left(\sqrt{h}\right)$$

Where *h* is haversin (*d*/*r*) , or more explicitly:

$$d = 2r\arcsin\left(\sqrt{haver\sin\left(f_2 - f_1\right) + \cos\left(f_2\right) haver\sin\left(\lambda_2 - \lambda_1\right)}\right)$$

$$= 2r\arcsin\left(\sqrt{\sin^2\left(\frac{\phi_2 - \phi_1}{2}\right) + \cos(\phi_1)\cos(\phi_2)\sin^2\left(\frac{\lambda_2 - \lambda_1}{2}\right)}\right)$$

4.The law of haversines :

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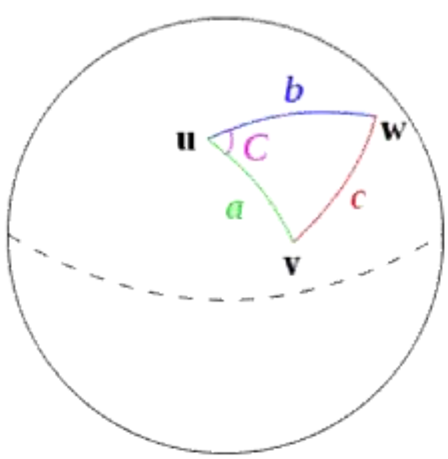
Given a unit sphere, a "triangle" on the surface of the sphere is defined by the great circles connecting three points **u**, **v**, and **w** on the sphere. If the lengths of these three sides are a (from **u** to **v**), b (from **u** to **w**), and c (from **v** to **w**), and the angle of the corner opposite c is C, then the law of haversines states:

(the law of haversines)

$$\text{haversin}(c) = \text{haversin}(a-b) + \sin(a)\sin(b)\text{haversin}($$

$$\text{haversin}(c) = \text{haversin}(a-b) + \sin(a)\sin(b)\text{haversin}(C)$$

Since this is a unit sphere, the lengths a, b, and c are simply equal to the angles (in radians) subtended by those sides from the center of the sphere (for a non-unit sphere, each of these arc lengths is equal to its central angle multiplied by the radius of the sphere).



Spherical triangle solved by the law of haversines.

In order to obtain the haversine formula of the previous section from this law, one simply considers the special case where **u** is the north pole, while **v** and **w** are the two points whose separation d is to be determined. In that case, a and b are $\pi/2 - \varphi_{1,2}$ (i.e., $90° -$ latitude), C is the longitude separation $\Delta\lambda$, and c is the desired d/R. Noting that $\sin(\pi/2 - \varphi) = \cos(\varphi)$, the haversine formula immediately follows.To derive the law of haversines, one starts with the spherical law of cosines:

As mentioned above, this formula is an ill-conditioned way of solving for c when c is small. Instead, we substitute the identity that $\cos(\theta) = 1 - 2\,\text{haversin}(\theta)$, and also employ the addition identity $\cos(a - b) = \cos(a)\cos(b) + \sin(a)\sin(b)$, to obtain the law of haversines, above.

VII Methodology Description

With modern technology, it's now possible to do many things on mobile phones and smart phones. Apart from the obvious convenience of being able to call colleagues and friends whilst on the move, smart phones can also be vital tools for use in business and commerce. But did you know that you're smart phone's built-in GPS receiver can also help you and your loved ones stay safe, by avoid them getting lost or find your way to that crucial meeting on time? By using a combination of GPS data, your current location can be established wherever your phone is capable of receiving a signal (even in hazardous climates). So, is this a good thing to make sure we are safe . Phone-tracking can be useful in both business and private life. Therefore my aim is to develop a mobile tracking application which is advantageous to know the precise location of an employee or family member at any given time.

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VIII Conclusion

The localization on GPS is difficult when the objects are indoor or sheltered from the buildings and trees. The localization on wireless networks only has low accuracy and work in the situation of a disaster like the earthquake. A localization combined with GPS and wireless networks is built to make sure the consumers can expect greater safety and high accuracy location based services. It is a step towards pervasive positioning service. A J2ME mobile application based on providing Location Based Service using Global Positioning System (GPS) as a location provider is presented. The application is aware of the user with his current location coordinates and shows it on Google Maps. The application is also implemented as a client server system that helps users to locate their friends or anyone with whom he wants to share his location. The average location accuracy using this system is believed to be within a couple of meters. The application works in open space areas only since it relies on GPS. 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.

Other future extensions can be summarized as follows:

- Improvement in user Interfaces.
- Supports Multi-users to track their location.
- Support for external Bluetooth GPS receiver.
- Accuracy can be improved by several algorithms

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