A New Approach for Location based Tracking

Shaveta Bhatia[1], Saba Hilal[2]

**[1] Research Scholar ,Manav Rachna International University,
Faridabad, Haryana, India**

**[2] Director, Fausta and Research pvt ltd
Faridabad, Haryana, India**

Abstract

Location Tracking is becoming very popular in the modern era. It offers innovative applications in the market for Mobile user. The Technology is helpful for the parents who wants to be aware of where their children are. In this paper, a "Localize Intelligence Algorithm" is developed in the field of Location tracking where user can micros define a particular area. Such information is not generally available through satellite. For example, if a mobile user is at his own home or his relatives place, the application tells us his approximate location. for example the sector no. The paper also presents the comparison of various techniques and applications of Location Tracking along with this new approach.

Keywords: *GPS, GPRS, Assisted GPS, LocationMap API, GooglemapAPI.*

1. Introduction

Location Tracking seems to be an interaction of various technologies such as Mobile telecommunication systems, Cell Identification, Global system for Mobile Communication (GSM), General packet Radio service (GPRS) and Geographic Information systems (GIS). In Today's world, the development of smartphones is gaining significant progress in the market with extreme performance parameters. During the last years the development of mobile devices has gained significant progress with respect to memory capabilities, advanced processing power and higher transfer rates to name only a few performance parameters. Navigation and positioning is one of the most enomorous features available today, most liking and useful entity for the user. These features are mow available in mobile phones. When Localisation, Positioning and telecommunication technologies are combined, they lead to basis of various real time applications for future.

2. Applications

Today Location based services is defined as a new emerging, promoted and a valuable application for a Mobile user. The areas where Location based services used are: one is navigation where one can get the exact route and directions while moving to a new place. Second is push services where advertisement and marketing information are send to the user for particular geographical area. Third is Location Tracking includes searching friends, security of child, security of products for business perspective, vehicle Tracking etc.Sarvani Sammetla [2] proposed and develop a demo project Paramount for the safety of commercial public in the mounations.The System is build for a naïve user.Mohammed Mustafa al-Habshi [5] design and develop Location based system for Geocoding and recording road accidents in Malaysia. This works for security of public on road. The system established a Map service that helps policeman to identify the Location of accident if occurs.Martijn Pannevis [3] implemented a context aware Location and Time based system to show the relevant information regarding the current environment where user is present. Johannes Sornig et al [4] developed and implemented a system based on the idea that multiple decision criteria of user. The result is to get the information regarding the best hotel to the user. The work is implemented in Geographical information system. There are

various wireless technologies available for the implementation of location based Tracking. These applications are defined in next section.

3. Techniques

The Location Tracking techniques can be worked with all today's market cell phones with networks such as GSM(Global system for Mobile Communication),GPRS(General Packet Radio Service) and CDMA(Code division multiple access).The comparison of various techniques to locate mobile device is defined below.

3.1 Cell Identification

It is a simple, easy and cost effective technique to provide the Location information of cell phone. This Technique operates in GSM and WCDMA cellular networks. It determines the serving cell of wireless Network, which the device is using. The Location of Base station is send as a Location of mobile user. The accuracy of cell identification technique depends upon the size and density of cells. The systems having smaller cells have more precision i.e in rural areas than the systems having large cells. The precision of cell identification is between 200m to 20 km which is inaccurate. The accuracy of cell identification can be increased by adding Time advance and signal strength. But this technology is only used if mobile user is 550m or more away from base station.

3.2 GPS

GPS is a navigation system using worldwide .It gives accurate precision and higher accuracy. The system consist of networks of 24 satellites in six different 12 hour orbital paths spaced so that atleast five are in view from every point on the globe and their ground stations.trilateration is the base of GPS.one can determine the Longitude, Latitude and altitude of device.GPS gives much higher accuracy as compare to cell identification, but it updates the location of device after every 5 sec.Therefore its response time is slow which is the major drawback of GPS. To calculate the exact location of GPS user, one can know the exact position of satellites at all the times. The other limitation of GPS is to locate device indoor. It works only outdoor not indoor.

3.3 Assisted GPS

Assisted GPS covers the drawback of GPS for detecting a device indoor. Assisted GPS receiver in the mobile can detect and demodulate the weaker signals which are needed by GPS receivers for accuracy. The air interface traffic is optimized by the A-GPS.An another advantage of A-GPS that the user can hold the data for privacy and the network operator restricts the assistance to service providers.

3.4 Various Radiolocation systems

These are the systems that measures radio signals which are exchanged between mobile device transceivers and various set of fixed stations. These technologies tried to get the Location but gives inaccurate results. Few of them are landmarks, Dead Reckoning, Celestial and Loran. These technologies have limited precision because of environmental factors.

3.5 Accelerometers and Electronic Compass

Although GPS is good method for Location Tracking but it has a drawback of poor indoor accuracy, Long acquisition time and low accuracy in densely populated area[6]. Therefore in Today's world the alternative solution is use of Accelerometers and Compasses in addition to GPS.It gives better accuracy in indoors and has better energy utilization. They have accuracy of less then 30 meters. But the drawback of techniques is: extremely noisy and too expensive.Also, the change of motion and orientation results in error in Location.

With the use of above technologies, positioning is classified into three categories: Self Positioning system where position is determined on the base of measurement of appropriate signals received from satellite. The System uses only GPS technique. Network positioning system where receives signals from one or more locations and the combined data is sent to central server to determine the position. The results send to receiver by showing location on a map or through SMS.Indirect positioning system where data is transferred between Self positioning system and Network positioning system for more accuracy. This approach uses Assisted GPS.
Although many technologies are used to determine the Location, each has some prons or cons. The technologies are used combined in order to get the accuracy in Location

IJCSI International Journal of Computer Science Issues, Vol. 10, Issue 3, No 1, May 2013
ISSN (Print): 1694-0814 | ISSN (Online): 1694-0784
www.IJCSI.org

75

4. Related Researches

Pardasani et al [1] developed an internet based prototype tool for locating structural steel components at construction site equipped with wireless Ethernet. This approach is helpful for the business perspective. It helps iron workers in a factory to locate the structural steel. The tool used in the system runs on a web browser which shows the Location of an assembly. It saves the time that was wasted while searching of assemblies The Technologies used in the system is GPS (Global positioning system) and RFID (Radio Frequency identification).

Timo Salminen et al [7] proposed a Region based positioning method for locating a user in cellular networks. The system works with GSM network cells. The method is used to determine the geographical area where user is located. This application runs on user mobile phone. But the system does not provide any way to assign fixed coordinates to user location. The system uses Cell identification with WLAN and Bluetooth method to get the position. But it does not get the accuracy. The results only describe the physical area.

C.Vinothkumar et al [8] proposed a Wireless sensor Network based Locating Tracking algorithm for shipment Industry. The algorithm works in both Indoor and outdoor environment. The Technology used to implement the system are Wireless Sensor Networks. The system finds the Location of objects which is helpful for shipping industries. This is three dimensional system using the method of Trilateration.But it is an expensive method as it uses sensors.

Kim Nee Goh et al [9] proposed a Road management system through which the road users can send complaints to the relevant authorities, if they are in any problem. The system uses GPS (Global positioning system) approach for GSM (Global system for Mobile communication) Networks. The users can view their own Location on a map while walking or traveling. They can send the SMS if they have any problem.
Joh Froehlich et al [10] proposed a system called UbiGreen which was used for tracking a transit activity that support Green Transportation habits. The system uses sensors which senses and gives information about transportation.This system is built using C# and .Net.

Ameet Chatwaal et al [4] developed an Android based LOGLIFE project which is analogous to Tracker application. The application maintains the log of all the places visited by the mobile user. The current Location of the mobile user is also shown on the map. This is a simple user friendly application.

5. New Directions

The current state of the work done in the area of location tracking includes alerts when friends and children are nearby, mapping of photograph of a person with location. record accidents of particular area, make log of various locations. In all previous works done, it is difficult for the user to define its own area. The proposed framework is based on an Algorithm called "Localize Intelligence Algorithm" where a particular area is micro defined and named based on Latitude and Longitude differences. It helps to enhance accuracy of user's position location and the algorithm.

6. Localize Intelligence Algorithm

The Algorithm is implemented on Android 4.0 version Mobile phone. The UML package of algorithm is shown in Figure no. 1 The Steps of Algorithm are:-

1. The Android Client receives the Signals and Coordinates from the Satellite.
2. We will design a Localized Location Engine. The Engine works in two parts:-
   - (a) **The Location Engine** : the Engine works in coordination with Android Location API.The Process is as follows:-
   - (i) **Get Coordinates**: It will take Coordinates of Android Client received from satellite.
   - (ii) **Reverse Geocoding**: The received Coordinates are then converted into geographical place.
   - (iii) **Localized Refinement:** Each geographical place is now matched with Localized data (user defined locations). The User defined Locations or pre-specified Locations are stored in Database called SQLite hosted on android Server. The result

provides the relevant and refined Locations.Ex Retech Society is nearby Vasundra.

(iv) Plotting engine: This Engine takes the Refined Locations and plotted them on map. The Engine works in coordination with Google map API.
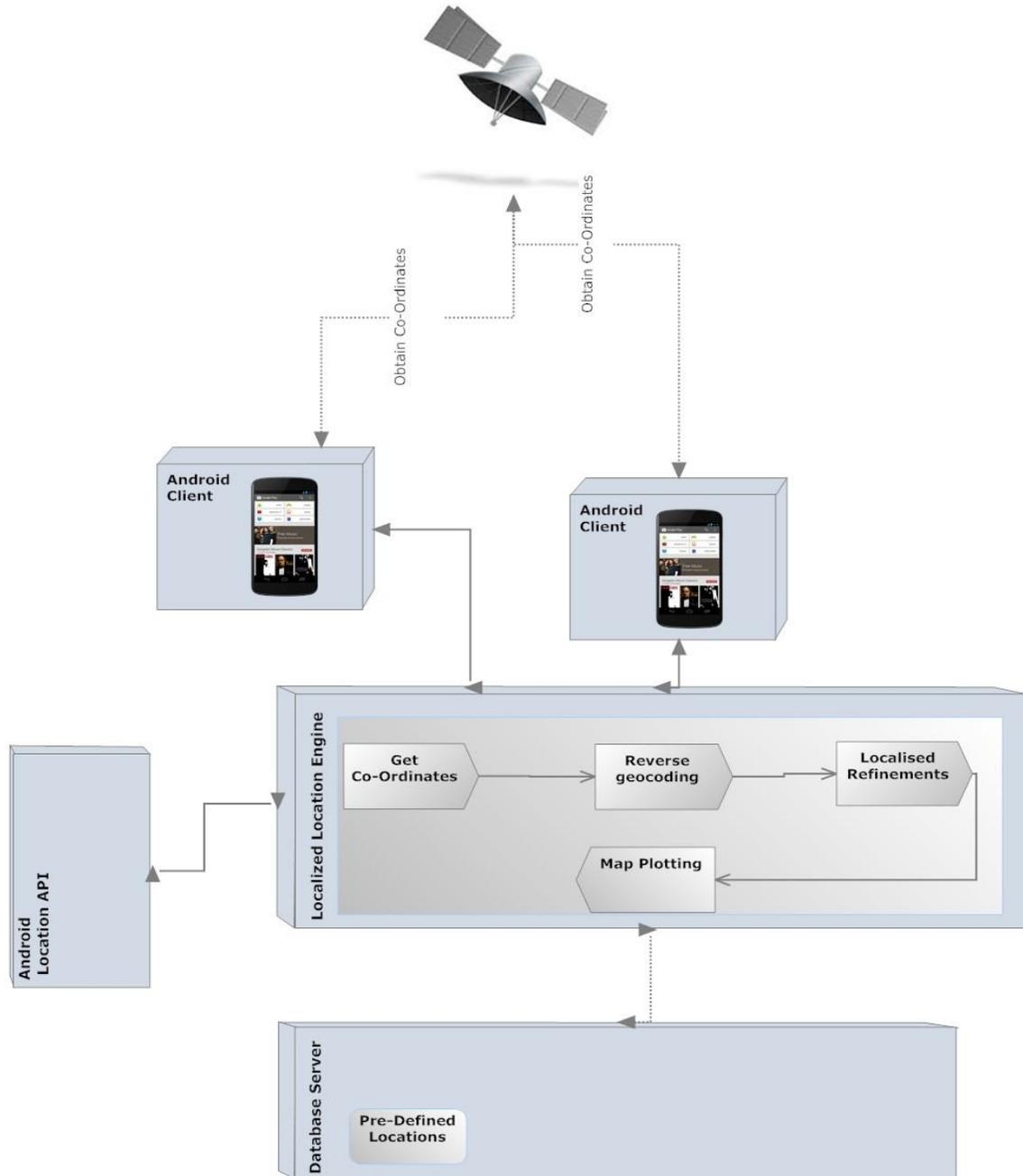

Fig.1 UML package Diagram for "Location Intelligence Algorithm"

IJCSI International Journal of Computer Science Issues, Vol. 10, Issue 3, No 1, May 2013
ISSN (Print): 1694-0814 | ISSN (Online): 1694-0784
www.IJCSI.org

77

The SQLite [11] is a light weight database engine that uses small amount of memory and used for various operating system such as Android on Mobile phone. Android Location API [12] contains interfaces and classes used for Location based Services. Google maps API [13] adds Map for applications that uses Google map data.

The Algorithm is tested on Mobile phone with Android 4.0. The results contain Longitude and Latitude coordinates for prespecified locations of user. Secondly, it shows all the Locations with their names on a map. For example, if a person reached his home, a map shows his location with the name of Home Place. It also gives Longitude and Latitude of coordinates of particular place.

7. Conclusion

This paper has presented the approach for micro defining the area locations for enhancing the accuracy of user tracking. This can be implemented as an algorithm. As the work done is under progress and the results being analysed, this paper has given the framework details for further studies.

References

[1] Paradasani and vantorre,"Location Tracking of prefabricated construction assemblies", National Research of Council Canada, June 2009, pp 1-12.

[2] Sarvani Sammetla,"Mobile Location based Services for Mountaineering", Master of Science thesis, Nov 2011.

[3] Martijn Pannevis,"Location based system for mobile phones", Master Thesis Business Information Systems, University of Amsterdam, August 2007.

[4] Johannes Sornig," Development of a distributed Service Framework for Location-based Decision Support", Thesis, Spatial Decision Support Systems: Geographic Information Science and Operations Research,Villach,August 2008.

[5] Mohammed Mustafa al-Habshi", Development of location based services for geocoding and recording road accidents data", Thesis, University Putra Malaysia, 2008.

[6] Romit Roy Chaudhry and Injong rhee,"CompAcc: Using mobile phone compasses and Accelerometers for localisation ", ACM Hotmobile 2012.

[7] Timo salminen and Simo Hosio, "Region based Positioning Method for Cellular Networks ",Mobility 06,Oct 2006,ACM.

[8] C.Vinothkumar and S. prabakaran,"WSN based Three dimensional Location Tracking algorithm", International Conference on Computing and Control Engineering (ICCCE), April 2012.

[9] Kim Nee Goh and Yin Ping Ng,"Architecture of GPS Road Management System", Journal of World applied Sciences, Vol 12, 2011, pp 26-31.

[10] Jon Froehlich,"Investigating a Mobile Tool for Tracking and supporting Green Transportation Habits", CHI 2009, April 2009, ACM.

[11] Code Project, "Using SQLite database with android" available at http://www.codeproject.com/Articles/119293/Using-SQLite-Database-with-Android.

[12]Developers,"Android.Location" available at http://developer.android.com/reference/android/locatio n/package-summary.html.

[13] Developers," Location and Map", available at http://developer.android.com/guide/topics/location/ind ex.html.

[14] Ameet Chatwaal et al,"Android based distributed Tracker application LOG LIFE", a project available at www.cs.rit.edu/~ark5993/final_report.pdf.

Shaveta Bhatia is Research Scholar and working as an Assistant professor in Manav Rachna International University, Faridabad.She has done MCA (Kurukshetra Univerity, 2003), MPhil (Computer Science) and pursuing Ph.D.She has 10 years of experience in the field of Teaching. She has participated in various National Conferences and actively involved in various Research projects.

Prof. Saba Hilal is currently working as Director of Fausta Research And Development Pvt. Ltd., Faridabad. She has done MCA (AMU, 1994) and Ph.D (Area: Web Content Mining) from Jamia Millia Islamia, New Delhi, and has more than 18 years of working experience in industry, education, research and training.
She is actively involved in research guidance/ research projects/ research collaborations with Institutes/ Industries. She has more than 70 publications/ presentations and her work is listed in DBLP, IEEE Explore, High beam, Bibsonomy, Booksie, onestopwriteshop, writers-network etc. She has participated in a number of International and National Conferences and Educational Tours to USA and China. More details about her can be found at http://sabahilal.blogspot.com/