Efficient and Optimal Power Management System for Road Network-Aware Geo Alarms

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Abstract

Road network aware geo alarms are used when we travel from one destination to another. The Geo alarm is a travelling assistance technique which is used to alert when the user reaches a specific location. One of the specialities of Geo alarm is that it never let you miss your stop. All the user needs to have is the mobile phone with android platform. Road network-aware Geo alarms extend the concept of time-based alarms to geological dimension. Road network-aware geo alarms processing system, called ROADALERT is an alarm application where in which the user can customize according to his destinations. This proposed ideology can overcome the energy consumption drawback of the existing system by assigning certain time complexities. It overcomes the drawback of the existing systems by not allowing the device to enter the network without the permission of the user. Another advantage of this proposed ideology is that it reduces unnecessary client wake-ups. The geomap technique is used for getting the accurate results. Our results shows that the road network aware geo-alarm processing significantly outperforms existing Euclidean-space based approaches by reducing the battery consumption.

Keywords: Geo alarms, geomaps, road network and GIS

I. INTRODUCTION

In this era of mobile computing, the road network based geo alarms are having high importance. The geo alarms can be used when a person have to travel to an unknown location or place. This alarm service can be a friend to frequent travellers who visits new places. The road network spatial alarms[1] which is an existing method which uses Euclidian distance based approach have the power consumption drawback.

A. Geo alarms

Geo alarm is a travelling assistance technique used specially by persons who travel to unknown locations. The proposed ideology of geo alarm is based on the geo maps. Geomaps[2] are special maps of continent, countries and regions, where values and colours are assigned to specific locations[3]. We use location based services which is a mobile service that has it capability to provide real time information based on the users current location. Geographic Information System (GIS) is the heart of location based services. System which will be developed will act as collection centre, storing and supplying the geographical data for being manipulated by the application. Through this application, data will be collected to trace every unit location and every unit also can update any additional information. GIS integrates hardware, software and data for capturing, managing, analysing and displaying all forms of geo-graphically referenced information.GIS allows us to view, understand, question, interpret and visualize data in many ways that reveals relationships patterns and trends in the forms of globes, maps, charts and reports. Also this application could be used to find the nearest place to malls, hotels, markets etc

The existing works based on the road networks tends to incur high client energy due to continuous use of the application. Due to this, there is a chance that the alarm might get off before the user gets into the location.
The proposed work (Fig.1) can overcome this drawback by providing longer hibernation time. The proposed work retrieves the user’s current geological coordinates (latitudes & longitudes) & allows the user to enter new alarm for a particular location. The mobile user gets an alert when he reaches the location in form of sound & vibration. Along with alarm user can optionally put reminder text to be put on. Once the user reaches near the location the alarm will ring and also if there is any reminder text it will be displayed to user.

Fig. 1: ROADALERT System Architecture

User can edit, delete, update, enable and disable the alarms. User can see the location on Google map to find out how far he is from the expected location. With the help of this application user can set alarm on the basis of time, space and distance constraints. It is a GPS (Global Positioning System) based affordable technology with huge advantages.

II. RELATED WORKS

Nowadays there is number of location based systems that can [4] automatically generate alarm by using the smart phones. The main advantage of android is it scales to every device. The currently two most common technologies are GPS & the position evaluation using cell ID (Non-GPS) from nearest base transceiver station [5].

There are many existing studies on continuous queries to find objects in a predefined range or k-nearest objects from a query centre point. Some are based on road networks & some are based on land surface[6][7]. Location based services provided by the android helps to find the location. It is the one which computes location with the help of the location providers. Two widely used location providers are GPS provider & network location provider. With the help of this free service the alarms can be implemented. GIS along with the GPS can be integrated with the LBS for better result.

The Wake App[8] is a geo-map based alarm which helps the user to reach a specified location. This app helps the user to wake at the point. The main disadvantage of this existing application is that it can’t save a location for later use & the power consumption.

Another alarm available widely is the bus-snooze alarm[8]. Where in which the user can set alarm on the basis of time & distance. The alarm can ring at when time meets or distance met. The location tracking is done by the GPS & network location. Wake me[8], another alarm application based on location. It let the user to choose any location on the map & set up alarm. Mobile location alarm which is a more modified application let the user to enter a new alarm for particular location & the alarm rings along with reminder text. This work helps the user to edit, delete, update, enable & disable alarm.

The google map can also be considered similar to these applications. It can alert and inform when we travel through an already specified location.

Geo alarm extends the concepts of all these works efficiently. It is used to reach a location, it provides alert in form of sound, vibration & text, it save location for future use, it saves battery, internet consumption is low, reduces frequent alarm checks & client wake-ups, it can set alarm on the basis of google map. Application can check the location using the devices with GPS sensor. Experimental results revealed that the proposed method effectively updated approximations of a concept in practice.

III. MATERIALS AND METHODS

The road network aware ROADALERT is an android-based application which can run on all the smartphones. Since ancient ages the man travelled with an estimated map to places. Now it can be successfully replaced by the smartphones.

The proposed system has used Android Google API, Android development tool plug-in, Eclipse and Sun JDK to develop the application. It can be simulated in windows XP/Vista/7. For coding java 1.6 is used & android 2.2 used as the platform. Android platforms give a world-class platform for creating applications.

A. Android

Android [9] is a Linux based operating system. It primarily designed for touch screen mobile devises such as smart phones. It is an Open Handset Alliances (OHA) mobile operating system. This application platform is very similar to java SE.
The Android (Fig.2) SDK is available for Windows, Linux and Mac OS free of charge. Developers can use popular java development tools like Eclipse and Ant. The Android platform recently becoming very popular, this application will reach a lot of users who are using vehicle for transportation.

The combination for GSM mobile and satellite-based GPS in one innovative unit gives users the ability to initiate an alarm. The Android phones are multitasking, Google integrated and easy to access thousands of application via the Google app market.

B. SQLite

Android provides several ways to store user and application data. SQLite is one of storing user data. SQLite is a very light weight database which comes with Android OS.

The android.database and android.database.sqlite packages offer a higher-performance alternative where source compatibility is not an issue.

C. XML

Extensible Markup Language (XML) is a markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable. XML is used for the creation of UI layouts in android. The advantage in declaring the UI in XML is that it enables the user to separate presentation of the application from the code that controls its behaviour. UI Descriptions are external to the application code which means that the user can modified or adapt it without having to modified the source code and recompile.

D. GPS

Global positioning system[10] is a satellite based medium earth orbit (MEO), navigation technology. GPS relies on a constellation of at least 24 satellites to provide location speed and direction information to its user. It works by using a technique called trilateration combined with atomic clocks in the satellite in order to accurately determine the correct location. GPS finds the user position by calculating differences in the times the signals, from different satellites, take to reach the receiver. GPS signals are decoded so the high phone must have inbuilt receiver. The accuracy of GPS is relatively high coopered to most other technique. To be able to find out in the user is inside or outside the area one must first find a suitable method to define this area. When a GPS is used the area is defined as a circle with radius are and the centre coordinate (xc,ye).

E. Dijkstra Algorithm

Dijkstra algorithm[10] is used for finding the shortest path between nodes in a graph. It was concaved by computer scientist EW Dijkstra in 1956. Also another intuitive baseline approach to road network-aware geo alarm is to use Dijkstras network expansion algorithm[11].The algorithms exists in many variant Dijkstras original variant found the shortest path between two nodes., but a more common variant fixes a single node as the source node and find shortest paths from the source to all other nodes in the graph, producing a shortest path tree.

1) Let the node at which the user we starting be called the initial node.
2) Let the distance of node Y be the distance from the initial node to Y.
3) Set the distance to zero for our initial node and to infinity for all other nodes.
4) Set the initial nodes as current. Mark all other nodes unvisited. Create a set of the entire unvisited node called the unvisited set
5) For the current node, consider all its unvisited neighbours and calculate the tentative distance.
6) When we are done considering aloof the neighbours of the current node, mark the current node as visited and it removed it from the unvisited set.
7) If the destination node has been marked visited then stop.
The methodologies for the geo alarm application are various.

**F. Google Places API**

Google announced the opening and general availability of the google places API [12] on 10th May 2011 at the google I/O developer conference in san Francisco. Google places API is a service provides information about places, spatial locations, geographic locations, places of users choice-using http requests.

The places API available are, place searches, place actions, place photos, place auto complete

**G. Reminder As Per Situation**

Different location may require different communication behaviours like video or text conversation, is not good when driving. User agents usually based on location attribute, instead of geo spatial coordinates or civil address can choose appropriate communication behaviours. In allocation based alarm system we need to provide an alert when user reaches any famous spot in city it provide knowledge and information for mobile users current location.

![Sample Application](image)

**Fig. 3: Sample Application**

**H. Implementation & Evaluation**

Implementation is the part where the theoretical design is turned out into a working system.

For the implementation of this application we need android platform. The modules that should be implemented are user module or authentication module, alarm module, customizing the app, real-time/motion based module. The speciality of the alarm is that the alarm can be viewed, deleted & edited by the mobile user.

The app need to be customized at first by setting the location, the app goes for finding the current location, then the app will search for the destination, after that the location will be shown on the map, the location will be saved, on entering the location the alarm will start to alert. The mobility traces are generated on the google map by using the random trip model[13].

Google play services used in the project so that the application can take advantage of the latest Google-powered features such as Maps, Google+ and more with automatic platform updates distributed as an APK through the google play store.

For displaying the map two classes are used are “Google Map” and “Map Fragment”. The location update retrieves the latitude and longitude value of the selected target current location in a separate window.

**IV. RESULTS AND DISCUSSION**

As the GPS is mainly used in the road network-aware geo alarm we can consider that this technology will be used in India widely in future.
Once the alarm gets on, then the application will go to the hibernation mode. According to the time complexity, the user have provided, the alarm will access the net. While considering the Road Alert system with other alarm application it can save battery power efficiently.

While discussing the future scopes of this paper the focus should be enhancing the mobile application that should automatically tell/ suggest the user that where they are & what are the famous places nearest to them. And also this application can be extended for the use of blind persons by integrating additional settings such as voice recognition & automatic alarm updates according to new place.

V. CONCLUSION

We have evaluated the performance of this application with existing methods. The results show that all other application consumes a lot of battery when they access the internet. Proposed work provides efficient & scalable approach to road network-aware geo alarms. This alarm never misses a spot.

REFERENCES