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Location-based services using geofencing

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ABSTRACT

Geo-fencing (geofencing) is a great feature in a software program that uses Global Positioning System (GPS) or radio frequency identification (RFID) to define the geographical boundaries feature. Actually geofence is a virtual barrier. Geofencing is an innovative technology, an online marketplace for proactive contextual services that allows users to easily find interesting services, can easily subscribe to it and to allow providers offer their services for a variety of applications such as electronic toll collection, contextual advertising or tourist information systems, even without additional infrastructure. The main objective of this research was to understand how the use of spatial data can improve advertising performance for customers. Tracking systems and monitoring, based on global navigation services by satellite, and include geofencing function, could also contribute to the exact location of an institution or company and increase sales and business perspective efficiently. Instead of large billboards they can now advertise on smartphones which is economically and accurately tested.

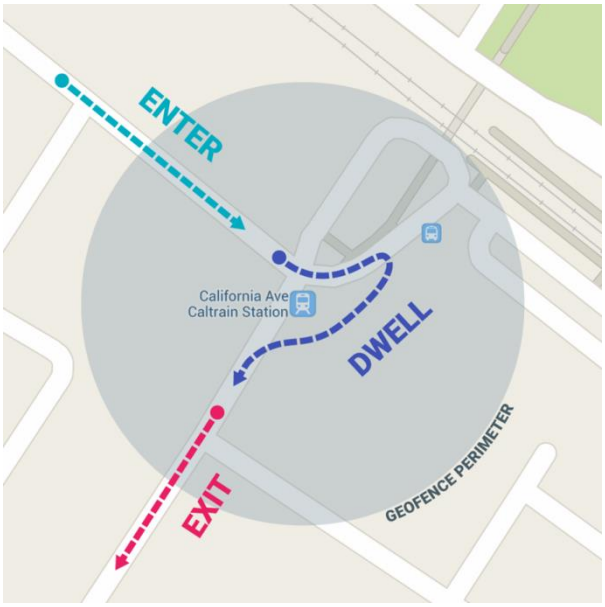
Keywords: *Geofencing, GPS, Geo Location, Geofence, Geotification, Geo-Tourist Guide.*

1. INTRODUCTION

The location-based services (LBS) have recently undergone a massive shift in popularity.While the first generation of LBS has not attracted much attention in recent years. Knowledge about geographical location of a mobile device. Geo-spatial information is being used in many fields such as computer software, physical security. In this context, most of the existing technologies focus on identifying the exact location of the user via Global Positioning System (GPS) in outdoor environments. A different view of the location aware computing is to focus on the presence of a user in a virtual perimeter of a given geographical landscape. This second alternative view, which complements the first one is called Geo-fencing and has brought in many benefits. Geo-fence refers to a virtually fenced geographical area. According to almomani (2011). This concept has been employed to implement various tasks including equipment theft control, tracking, or automatic house arrest monitoring systems. Social networks have also brought new ideas and use cases for Location Based Services, including geo-spatial networking. Moreover, various techniques are studied in order to improve the robustness and security of such a system. The focus of these studies is develop a geofencing system which will be used in theft controlling management, house arresting, and event management etc using android phone. The objectives include:

a) To develop an automation system that identify theft in a particular geofence region using gps technology.
b) To analyze the importance of geofencing system geofencing combines awareness of the user's current location with awareness of the user's proximity to locations that may be of interest. To mark a location of interest, you specify its latitude and longitude. To adjust the proximity for the location, you add a radius. The latitude, longitude, and radius define a geofence, creating a circular area, or fence, around the location of interest.

You can have multiple active geofences, with a limit of 100 per device user. For each geofence, you can ask Location Services to send you entrance and exit events, or you can specify a duration within the geofence area to wait, or *dwell*, before triggering an event. You can limit the duration of any geofence by specifying an expiration duration in milliseconds. After the geofence expires, Location Services automatically removes it.



Overview of geofencing

2. LITERATURE SURVEY

A geofence is a virtual perimeter for a real-world geographic area. It can be a radius around a location or a pre-defined set of boundaries. With Plot Researchs you can create Geofences with a radius of between 50 to 50,000 meters. The process of using a geofence is called geofencing. Geofencing allows you to send notifications to your app users when they are in the vicinity of, for example, your store. A geofencing is a virtual barrier program that allow an administrator to set up triggers when a device enter (or exits) the boundaries defined by the administrator so that a text message or email alert can be sent. Geofencing is a technology used to monitor mobile objects (vehicles, persons, containers…), located by GPS. The geographic coordinates of the tracked object are automatically and regularly sent to a control center, via mobile phone networks (Almomani, 2011).Referring from the above research works a new use of geofencing can be in historical and archaeological sites for the purpose of guiding the tourists when the reach the site.

Geofencing Techniques

Geofencing can be of benefit in numerous domains and has many functions: the monitoring of mobile assets and people within geographical areas. Various geofencing techniques have been developed to meet different pragmatic needs. The main techniques are presented below

Geofenced Area

This technique provides automatic monitoring of mobile objects moving around or inside a geofenced area. Alarms are generated when mobiles respectively enter or exit the boundary. The size of the area can range from a few tens of meters to several kilometers. The shape of the geofencing can be a simple geometric figure, like square or rectangle, or a more complicated one, like complex polygon.

Proximity with a point of interest

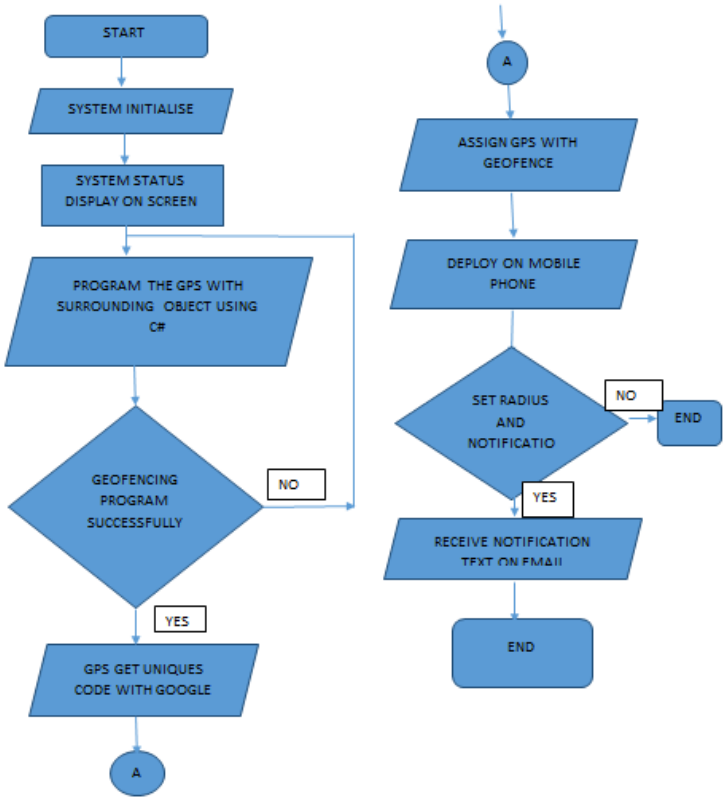
This technique is intended to detect the proximity of a vehicle in relation to a point of interest (POI). In practice, the geofencing is a circle, and the POI is located at the center. The radius is parameterized according to the distance that is regarded as "proximity" to the POI, from a few meters to several tens of kilometers. This method is the simplest way to implement geofencing, Because it only needs two parameters, coordinates of the center and value of the radius. The algorithm calculates the distance between the mobile object and the center of the circle. According to whether this distance is lower or higher than the value of the radius, the mobile object will respectively be considered inside or outside the geofencing.

Route adherence

This technique relates to the monitoring of a mobile object throughout a journey, from the departure point to the final destination. Geofencing makes it possible to ensure that a vehicle does not deviate from its allocated route.

Review of Related works on Geofencing

(Fabric et al, 2012)This research deals with geofencing: an innovative technology, based on telematics and satellite positioning. Geofencing enables remote monitoring of geographic areas surrounded by a virtual fence (geofence), and automatic detections when tracked mobile objects enter or exit these areas. The research presents fundamental concepts of geofencing and some applications based on this technique. Sturdevant Rick W. (2009) affirmed that the Navtar Global positioning System (GPS) is the first satellite navigation system that enabled users to determine precisely their location in three dimensions and time within billionths of a second and grew from a concept into a fully operational system in slightly more than two decades. The widely-used GPS system are the US-based GPS (Global Positioning System) and Russian-based GLOSNASS (Global'naya Navigatsionnaya Sputnikowaya Sistema, Global Navigation Satellite System) satellite positioning systems. By 1972,the U.S. Air Force(USAF) and the U.S. Navy had been studying for several years the possibility of improved satellite-based radio navigation. The main reasons for GPS development were the need to deliver weapons precisely on target and to reverse the proliferation of navigation systems in the U.S. military. Petri (2015) in his research Locating and Tracking Assets using GPS, states that "Accurate locating or tracking is required in many fields from navigating for rescuing wounded people in emergency situation to decision-making for striking the target during the military operations.



Recommendations for using geofencing with the location APIs for Android

We can use the following techniques to optimize power consumption in your apps that use geofencing:

- Set the notification responsiveness to a higher value. Doing so improves power consumption by increasing the latency of geofence alerts. For example, if you set a responsiveness value of five minutes your app only checks for an entrance or exit alert once every five minutes. Setting lower values does not necessarily mean that users will be notified within that time period (for example, if you set a value of 5 seconds it may take a bit longer than that to receive the alert).
- Use a larger geofence radius for locations where a user spends a significant amount of time, such as home or work. While a larger radius doesn't directly reduce power consumption, it reduces the
- Frequency at which the app checks for entrance or exit, effectively lowering overall power consumption.

3. CONCLUSION AND RECOMMENDATION

Conclusion

This paper deals with the concept of geofencing. It presents various applications used in the field of surface transport, and the main control and monitoring techniques based on geofencing.

Recommendation

Lastly, future applications based on geofencing should benefit from satellite navigation services, where great improvements are also expected in location precision, and By providing better accuracy and improved confidence in mobile positioning to integrity mechanisms, these systems will lead to more efficient geofencing applications.

4. REFERENCES

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