GEOSILENCE – LOCATION TRIGERRED DEVICE MUTING

Dhanasekar S[1], Gowthaman K S[2] , Naveena P[3] , Sathyamoorthy J[4]

[1] *Student, Computer Science and Engineering, Bannari Amman Institute of Technology, Tamil Nadu, India*
[2] *Student, Computer Science and Engineering, Bannari Amman Institute of Technology, Tamil Nadu, India*
[3] *Student, Computer Science and Engineering, Bannari Amman Institute of Technology, Tamil Nadu, India*
[4]*Faculty, Computer Science and Engineering, Bannari Amman Institute of Technology, Tamil Nadu, India*

ABSTRACT

Mobile devices have become an integral part of human lifestyle. The convenience offered by mobile devices usage can't be denied. However, there are growing concerns about the disturbances caused by usage of mobile devices. One of the concerns is the disturbances caused by ringing sound of mobile devices at places that require silence such as mosque, library, cinema, and meeting room. Mobile device owners often forget to turn on silence mode on their devices in these places. To overcome such problem, this paper proposes an auto-notification application for mobile device using geofencing technique. Geofencing technique is used to detect virtual boundary that have been preset around required places. When a user enters the particular place, the application will detect that the user's mobile device has crossed the virtual boundary and will automatically notify the user to turn the silence mode on the device. The opposite process will happen when the user crosses the boundary to exit the place. The main advantage of the application is that it will remind mobile device users to mute their devices when they are entering places that require silence. Nearly everything around us holds significance, be it data, expensive items, land, people and/or animals. It is essential that we keep all that matters to us safe and secure. To employ the highest form of security, we want to keep track of all the significant things on our own. This gives rise to the need for the meantime tracking o anything which is highly valuable to us. Hence, GPS tracking is employed in this technological solution to keep track. Innovative technology, based on telematics and satellite positioning, is the subject of this study on geofencing. With the use of geofencing technology, users can create virtual boundaries in the context of the actual world. By automatically detecting when monitored mobile items enter or leave geographical areas that are encircled by a virtual fence, it aids in the surveillance of those areas. A geofence is a virtual barrier that is set up around a specific region of interest utilizing several technologies, including Wi-Fi, cellular mobile, RFID, and GPS. A specific radius area on the map can be specified by the user. If any entry or exit is made from that location, they will be updated in real time. This assures the asset's safety and security and provides a system for inspection to deter any unwanted activity.

Keyword : *Auto notification,Cellular mobile, Geofencing, GPS, Mobile device, RFID, Window phone.*

1.INTRODUCTION

With geofencing, a location's boundaries are defined virtually using GPS technology. A geofence is a hypothetical fence that encompasses a certain location. A geofence can be any boundary that the user definesor a circle with a specific radius. GPS is used for tracking. Positioning, navigation, and timing (PNT) services are offered by the Global Positioning System (GPS), a U.S.-owned service. GPS is a system of satellites and receiving equipment used to pinpoint a specific location on Earth. Some GPS receivers have a precision of 1 centimeter, allowing them to pinpoint their location. As a result of atomic clocks on board, GPS satellites emit radio signals that include their positions, operational status, and accurate time. The GPS radio signals move through space at a rate of greater than 299,792 km/s, or the speed of light. The radio signals are picked up by a GPS device, which utilizes the precise time of arrival to determine how far away each satellite is from it. Using geometry, a GPS device can locate itself on Earth in three dimensions after it knows how far it is from at least four satellites. When a tracked object crosses the virtual border (geofence) set by the Smart GPS Geofencing System, an alert is generated. A base location and a threshold distance will be configured in this device. The buzzer will automatically begin to alarm when the gadget senses that it has moved past the predetermined distance, and at the same time, a message notifying the designated numbers to the crossing will be sent. Any asset, person, or animal can be tracked with the help of the Smart GPS Geofencing System. It can be used for numerous things. It can be used for a variety of purposes, including tracking package locations, fleet and freight management, preventing vehicle theft, child surveillance, school bus monitoring, rental car operations, taxi operations, employee tracking, employee safety, surveilling prisoners or those under house arrest, pet care, and tracking the movement of livestock, among others.

2. GLOBAL POSITIONING SYSTEM (GPS)

The Global Positioning System (GPS) is a satellite-based navigation system that was originally designed in the early 1970s for the United States (US) military by the US Department of Defense (DoD) [2]. Current GPS system offers critical capabilities to military, public and commercial users around the world. The system is maintained by the United States government and is freely accessible to anyone with a GPS receiver. GPS provides location and time information anywhere on Earth where there is an unobstructed line of sight to at least four GPS satellites among a constellation of 31 satellites currently orbiting the Earth. This is made possible through the precise radio signals that the satellites are transmitting which consist of the satellite's position and the time they transmitted the signals. The signals can be easily received by GPS receivers, allowing the calculation and determination of the accurate location, speed and time information. Using the information, GPS receivers are able to triangulate data and pinpoint user location.

3. GEOFENCING

Geofencing is a feature in a software program that utilizes GPS or radio frequency identification (RFID) to define geographical boundaries [3]. A geofence is a virtual barrier. Applications or programs that feature geofencing allow notifications or triggers to be set up so when a device enters or exits the boundaries defined by the administrator, a

series of event can be executed such as a notification being delivered to user, a text message or email alert is sent, or a trigger to perform specific functions on the mobile device. Many geofencing applications incorporate map services such as Google Maps and Apple Maps, allowing administrators to create boundaries on top of a satellite view of a specific geographical area. Boundaries can also be defined by using longitude and latitude. The technology has many practical uses. For example, a network administrator can set up alerts so when a organization-owned mobile device such as tablet or laptop leaves the organization grounds, the administrator can disable and wipe out confidential materials from the device. Geofencing can also be used in advertising where a marketer can geofence a retail store in a shopping mall an automatically send a mobile coupon to customers who has downloaded a particular mobile application when the customer device crosses the boundary.

4. WINDOWS PHONE OPERATING SYSTEM

The mobile device industry is highly competitive and after stiff competition from other mobile operating system (OS) such as Android from Google and iOS from Apple, Microsoft has reenter the mobile OS platform market with a strong emphasis on software, hardware and services [4]. WP is a family of mobile OS developed by Microsoft for mobile devices such as smartphones and tablets as the replacement successor to Windows Mobile (WM) [5]. Unlike WM, WP is primarily aimed at the consumer market rather than the enterprise market [6] and it was first launched in October 2010 as Windows Phone 7 (WP 7) [7]. Windows Phone 8.1 (WP 8.1) was the last public release of WP, released to manufacturing on April 14, 2014 [8]. Windows 10 Mobile succeeded WP 8.1 in November 2015 where it accentuates a larger amount of integration and unification with its personal computer (PC) counterpart, including a new, unified application ecosystem, along with an expansion of its scope to include small-screened tablets [9]. WP 8.1 has been chosen as the mobile OS platform to develop the automatic notification application using geofencing technique. WP 8.1 provides developers with three powerful user interface (UI) technologies for developing applications. The UI technologies are XAML, XNA and Direct3D, and these technologies allows the creation of complex and compelling application design. The geofencing application program interfaces (APIs) in WP allow applications to offer geographically contextual experiences in a timely manner without the need for the application to be continuously running and consuming device resources [10]. Geofencing in WP enables scenarios like popping up a reminder for a user when they are leaving a location or displaying advertisements and coupons when the user gets within range of a store. Geofencing applications in WP define areas of interest or geofences and corresponding trigger conditions, such astriggering when the user enters or exits the geofence. The application registers to be notified when the trigger conditions are met. WP supports hundreds of geofences per application. The OS efficiently manages geofence tracking for all applications. When the trigger conditions for one or more geofences are met, the associated application is alerted even when it is not actively running. This high capacity, power- aware, adaptive geofence tracking system allows application developer to quickly and easily add location-triggered functionality to the application. The geofencing APIs in WP enable applications to do the following [10]:

- Create one or more geofences, or areas of interest.
- Request to be notified when the device enters a geofence.

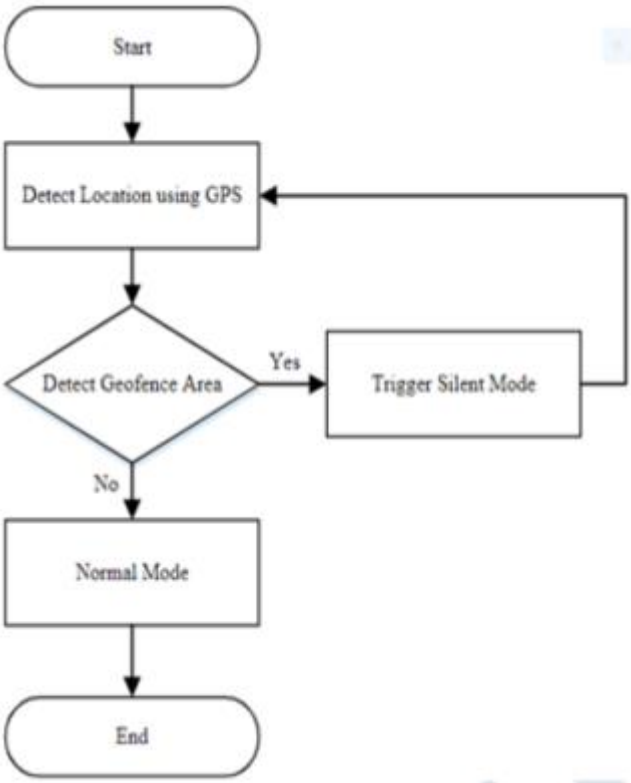
- Request to be notified when the device leaves a geofence.
- Specify a time window during which the geofence is active.
- Specify a dwell time for each geofence. Dwell time is the total time the device should be in or out of the geofence
  before the notification is triggered.
- Dynamically add and remove a geofences from applications collection of monitored geofences.
- Receive geofence events while the app is active.
- Register with the system to have a background task launch when the state of one of application's geofences changes.
- Use simulator to simulate device movement and test your app's geofencing features.

5.APPROACH

Hearing ringtone blasting during an important meeting or wedding ceremony is enough to make anybody cringe. But having ringer turned off and missing an important call can be a big problem. It becomes critical to put the Android phone onto silent when needed and then turn the ringer back on manually. There are several ways to automatically turn silent mode on and off on your Android phone. Few of them are listed below.

- Toggle Silent Mode Using Do Not Disturb.
- Control Your Android Ringer With IFTTT : A popular tool that lets you link all sorts of services together, including functions on your Android device.

The novel approach of geofencing-based auto-silent mode application for Android is developed using Android Studio Software Development Kit (SDK). Android Studio SDK is used to design the user interface (UI) and to code the main activity java codes. It also acts as an emulator to test the running project or application without installing the application on an actual device. Android Studio SDK is the official Integrated Geofencing- based Auto-Silent Mode Application Development Environment (IDE) launched by Google, for Android application development, is based on IntelliJ IDEA's powerful code editor and developers' tools. The project develops application that uses ACCESS FINE LOCATION permission to acquire the user's device address
level location, allowing the application to acquire precise location information of the device. It also uses INTERNET and ACCESS NETWORK STATE permission for Assisted GPS (A-GPS) ability. A-GPS significantly improves startup performance and time-to-first-fix (TTFF), of a GPS, thus allowing faster and more accurate location determination. TTFF is a measure of the time required for a GPS navigation device to acquire satellite signals and navigation data, and calculate the fix position solution .The Google Maps application provides program interface (API) key for the application to access and uses the Google Maps service. The API key is provided by Google to allow communication with Google Services and their integration to other services. Figure 1 illustrates the flow of control of the app. Initially, the GPS of the system is enable. The app fetches the location using GPS. The app checks whether the user is within the Geofence Area and triggers the Silent mode of the smart
phone. If not, the mobile phone switches back into normal mode.



6.RESULTS

Once the application is developed completely, it needs to be tested on real circumstances. The application is side loaded to an Android device by using Android Studio. The application is then evaluated on an actual device to test the stability of the application and the geofence transitions. The virtual device emulator in Android Studio cannot evaluate the geofence transition as it does not have a GPS transceiver. The screen shot of the designed app is given in fig. 2 and fig 3.

Figure 2: Radius of a Location

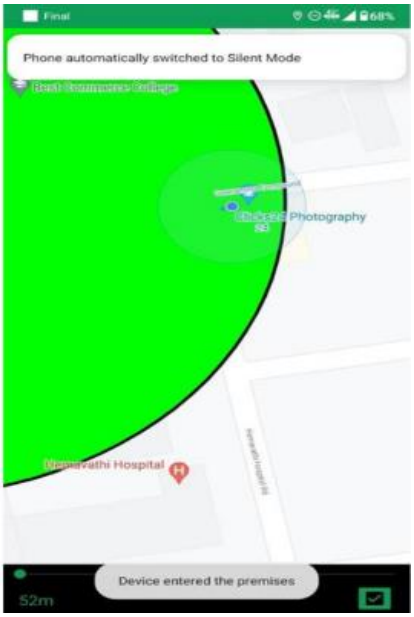


Figure 3: Device entering the premises

After specifying the circular region in which the mobile should be silent, a click of a button at bottom right, app starts the present location and whenever user enters the circular region mobile is muted as shown in the below screenshot. A message “Device Entered the premises” is displayed which is at the bottom and at the top a notification is displayed “Phone automatically switched to Silent mode”. Later a pop-up window is displayed to store that particular location which consists of Name, Address (position at which mobile should be silent. It is

basically the Centre of the dotted circle which is shown in Fig. 3) and the Radius of the location (Fig. 2). When "Save" button is pressed the data will be saved on to the database, and can be retrieved to the other tab present in the app i.e., "Mute Points".

7.FUTURE WORK AND CONCLUSION

In this project, the development of geofencing-based auto-silent mode application has been presented. The application is developed for Android mobile platform using Android Studio SDK, but the concept can be easily applied to other mobile platform such as iOS, Windows Phone or Blackberry. This application is developed based on the geofencing technique where virtual fences will be created around specific areas. Whenever the mobile device crosses the virtual fence into the area, the application automatically mutes or switches the device into silent/vibrate mode. In addition, a notification is sent to the device's notification bar to inform the user. When the device leaves the area and crosses the geofence, the application switched back to normal mode. The accuracy of the location information can be improved by using Assisted GPS (A-GPS) or other positioning techniques. The main advantage of this application over other geofencing applications is that the geofence locations can be preloaded in the application. This concept allows applications with specific purpose to be developed. For instance, an application with the location of all the
mosque/temples in the world can be developed, and whenever users enter any mosque, their devices will be automatically turned into silent/vibrate mode. This will solve the problem of ringing phone disturbing the concentration of congregation performing prayer in the mosque. Separate application for other places that require silence such as cinema, library and lecture halls can also be easily developed.

8. REFERENCES

[1] R. Penwarden, The Rise of the Smartphone, FluidSurveys, 2014.
[2] National Research Council, The Global Positioning System: A Shared National Asset. Washington, DC: The National Academies Press, 1995.
[3] M. Rouse, "What is geo-fencing (geofencing)? - Definition from WhatIs.com", WhatIs.com, 2015. [Online]. Available: http://whatis.techtarget.com/definition/geofencing.
[4] D. Vaughan, Windows Phone 8 unleashed. Indianapolis, Ind.: Sams Pub., 2013.
[5] S. Wildermuth, Essential Windows Phone 8. Upper Saddle River, NJ:
Addison-Wesley, 2013.
[6] P. Bright, "Windows Phone 7 Series in the Enterprise: not all good
news", Ars Technica, 2010. [Online]. Available:http://arstechnica.com/information-technology/2010/03/windows-phone- 7-series-in-the-enterprise-not-all-good-news/.
[7] S. Hollister, "Microsoft prepping Windows Phone 7 for an October 21st launch? (update: US on Nov. 8?)", Engadget, 2015. [Online]. Available:http://www.engadget.com/2010/09/26/microsoft-prepping-windows- phone-

7-for-an-october-21st-launch/.

[8] D. Bass and I. King, "Microsoft Unveils Phone Software With Rival to Apple's Siri", Bloomberg.com, 2014. [Online]. Available: http://www.bloomberg.com/news/articles/2014-04-02/microsoft-unveils-new-phone-software-with-rival-to-apple-s-siri.

[9] J. Sherman, "Goodbye Windows Phone! Windows 10 will take it from here", Digital Trends, 2014. [Online]. Available:http://www.digitaltrends.com/mobile/windows-phone-dead-windows- 10-instead/.

[10] Technet.microsoft.com, "Windows.Devices.Geolocation.Geofencing namespace - Windows App Development", 2015. [Online]. Available: https://technet.microsoft.com/en-us/windows.devices.geolocation.geo- fencing.

[11] M. S. I. M. Zin, M. Hope, A Review of UWB MAC Protocols, 2010 Sixth Advanced International Conference on Telecommunications (AICT), pp.526-534, 9-15 May 2010.