Chapter 1
A Geo-Fencing Approach for a Location-Based Alert System

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ABSTRACT

The advancement in technology has brought with it a plethora of resources that can be used to make one's life easier. The Global Positioning System (GPS) is one such resource. Knowing the location of the user can come in handy and provide a wide range of services. Location-based alerts are a new type of location-aware, just-in-time service, which can alert the user of the location at the right time and the right place. The objective of the project is to create a GPS-based application that can sound an alarm to notify users when they arrive at a predetermined location. The final solution enables the user to quickly set off an alarm, and based on the user's remembered position, the alert will sound when the user arrives at the desired area. This location-based alert service will help those who frequently go to new locations or people who do not want to miss their destination for a variety of other reasons not to miss it.

DOI: 10.4018/979-8-3693-1578-1.ch001

1. INTRODUCTION

The Global Positioning System is one of the most underused resource that is available and it has a lot of untapped potential. The major goal of this project is to make commuting more effective, convenient and safer for people by utilizing readily available data and technologies such as location and GPS. The most common issue encountered while travelling is missing one's destination due to falling asleep or not knowing when and where to stop. There have been a lot of cases wherein commuters miss their stops or their destinations for a variety of reasons, including being unaware of surroundings due to crowds or falling sleep or simply because of being first time travelers. Time based alarms hardly help with the aforementioned issues. The amount of time it takes to go from one location to another is unpredictable and is influenced by a variety of factors such as traffic and traffic signals. Setting up alarms based on location will yield more accurate results. The goal is to fix that very issue and introduce several more features that help utilize Global Positioning System (GPS) to its maximum potential.

Location, velocity, and time synchronization are all provided via the GPS global navigation satellite system. GPS is a navigation system that synchronizes location, velocity, and time data for travel on land, at sea, and by air using satellites, a receiver, and a variety of algorithms. Trilateration is a method used by GPS to operate. Trilateration uses signals from many satellites to output and return position information by calculating location, velocity, and elevation. It is frequently confused with triangulation, which measures angles rather than distances. A GPS device placed on or near the earth's surface receives signals from satellites orbiting the planet that are read and decoded by the device. A GPS gadget needs to be able to read signals from at least four distinct satellites in order to determine its location. Creating a virtual geographic boundary with the use of GPS or RFID technology, allowing software to react when a device enters or exits a specific area. It serves as a fictitious boundary for a physical geographic region.

A geo-fence is created dynamically to match a predetermined set of limits that are specified by coordinates or to form a radius around a particular site. Geofencing is the use of a geofence, and one example is the entry or exit of a geo-fence by a location-aware device of a location-based service (LBS) user as shown in figure 1. This action could send a message to the operator of the geo-fence and alert the device's owner. In order to tackle this difficulty, we're going to combine these two ideas.

The rest of the work covered in this article is separated into the sections below. Section 2 delves into the important and related research that has been done in the subject of Geofencing till date. Section 3 discusses the motivations that lead to the development of a project concept like this, as well as the challenges that were encountered while working on it.

Figure 1. A geofence