Location based Mobile Advertising using GPS

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Abstract— **A location-based service is an information and entertainment service, accessible with mobile device through the mobile network and utilizing the ability to make use of the geographical position of the mobile device. Location based Service can include mobile commerce when taking the form of coupons or advertising directed at customers based on their current location. Location-based services and advertising allow consumers to receive services and advertising based on their geographic location. It can be provided in response to a consumer's manual input of his or her location information into the handset or by using "auto-location" technology to track the location of the consumer automatically and provide a holistic shopping experience.**

Keywords—Location Based Advertising,GPS,Location Based Services,M-Commerce

I. INTRODUCTION

Location based services are the services which provide value added services to the customer based on this location. At present, the LBS, provided by most service providers, are only bounded with their own system. Although this model guarantees privacy, security and the convenience of billing, it limits the extensibility and scalability of services. Roaming of LBS does not work in this model. We can break roaming operations of LBS into two parts: LCS and LBS. As mentioned earlier, LBS are based on LCS. If LCS roams, LBS will be able to roam. The standards of LCS roaming are currently under development. When the LCS roams successfully, the LBS roaming becomes the critical task. But the service providers do not provide personal and customized LBS for users in today's tele-operators infrastructure. [6]

For example, a user uses LBS, i.e. Dining Guide Service that provides restaurants information in Taiwan. The interface of services is familiar to the user in Taiwan. One day, the user goes to France with his personal device and wants to find a restaurant. The Dining Guide Service may not work, or it works with an unfamiliar interface under current operating environment. However, LCS and voice service can roam successfully. The reason why LBS cannot roam is that LBS is still provided by French services providers under current operating environment. [5]

Then, now we consider the problem of LBS roaming. We adopt the widespread standard, Web Services, to solve the problem. Because the communication of services in wireless network also changes rapidly from WAP to various Internet protocols, the Web Service, based on standards like XML and SOAP, can be used on different platforms to achieve interoperability.

Hence, LBS under the Web Services environment make different service providers collaborated and LBS roaming worked.

Changes in telecommunications have changed the ways advertisers reach out to customers. Besides advertising on the Internet, a modern advertising agency is also likely to employ some form of mobile advertising, reaching audiences as they use their cell phones, tablet computers and other Internet-connected mobile devices. Cell phone marketing takes several different forms as advertisers compete in this increasingly growing arena. [7]

- *Audience Targeting*

One of the major techniques in cell phone marketing involves targeting specific audience demographics. When advertisers collect data about consumers, they can use it to send relevant ads, including text messages and voice alerts, to those who fall within a particular age group, income level, education level or employment status. By delivering personalized messages directly to their most likely customers, advertisers can produce more effective campaigns than when using traditional media.

- *SMS*

SMS marketing is a form of direct marketing that utilizes text messages received by cell phone to advertise. This is a permission-based marketing medium in which subscribers opt to receive relevant advertisements from trusted businesses. Advertisers have 160 characters to use in order to convey a promotion that is relevant to the text message recipient's location and needs.

- *Social Network Integration*

Cell phone users frequently use their devices to interact through social networking services. Whether it's sharing photos, posting status updates or reading about friends' activities, this creates a space for cell phone marketing to take place. Advertisers can respond directly to cell phone users' posts about poor service, offering compensation or suggesting an alternative. Cell phone marketing also takes advantage of social networking when it uses a mass message to a network of fans or followers to announce a new product, note a special offer or link to positive reviews on the Internet.

- *Location-Based Services*

Some cell phones include software that enables location-based services. These devices track where users are and allow cell phone marketers to deliver specific content based on that data. For example, a mobile Web service can provide ads for local restaurants, hotels and points of interest when a cell phone user enters a new city for the first time since owning the device. Likewise, cell phone marketing can take the form

of enhanced reality, which uses a cell phone's camera to trigger data about what the user sees. For example, cell phone users who photograph a movie theater's marquee may be able to access discounts or link to a ticket-buying site for that specific theater.There are two different methods:

1.Push: In the push method, advertising content is automatically delivered or served to the end user based on some type of trigger. [4]

2.Pull: In a pull scenario, the advertising is presented as a result of a user-initiated search or information request on the mobile device. [4]

▪ *Global Positioning System(GPS)*

GPS receivers in mobile devices use a constellation of about 30 U.S. satellites to applicable determine the coordinates of the device.

A GPS system consists of

•A GPS enabled product like a GPS phone or a GPS Receiver

•A plan for the extent of GPS data. Some plans provide all information's about the locality you are in. While other plans are used only to track your position.

•A service plan to provide the phone's location.

• Satellites around the Earth which provides your exact position using "Trilateration".[1]

Basically a GPS receiver comprises of a receiver, and the help of the 27 earth-orbiting satellites, which rotates in the medium earth orbit. Out of these 27 satellites only 24 are in use and the rest is kept as backup for any failed satellite. Suppose you want to know your exact position using GPS, the receiver determines the exact locations of a minimum of 3 satellites above you and also your position with respect to the satellite. Then a method called "Trilateration" is used to find your exact location. These satellites make two complete rotations around the Earth everyday. So, a minimum of 4 satellites are assured to receive the GPS signals

Trilateration Method

When the receiver sends the signal to locate itself, it finds out three nearest satellites of known positions. The receiver then calculates the distance between one satellite and the receiver. If the distance is "X", then it draws an imaginary sphere with "X" as the radius from the receiver to the satellite and also the satellite as the centre. Similarly, the same process is repeated for the next two satellites. Thus three spheres are drawn with just two possible positions. Out of these one point will be in space and the other will be the location of the receiver. Thus the exact position of the receiver is found out. Usually the receivers try to locate more than four satellites so as to increase the accuracy of the location. The Earth is made as the fourth sphere so that two points converge with the imaginary spheres of the other three satellites. This method is commonly called 3-D Trilateration method.

Just as phones use radio signals, the satellites also use low power, high frequency radio signals so as to compute the location of it with respect to the receiver. They are also used to compute the distance between the device and the satellites. The distance is calculated by knowing the time it took to reach the receiver.

As explained earlier, to find the distance and locations of the satellite and receiver, the parameter time is computed.

At a time 't', a pseudo-random code is transmitted from the satellite. At the same time the receiver also starts running the same pseudo random digital pattern.
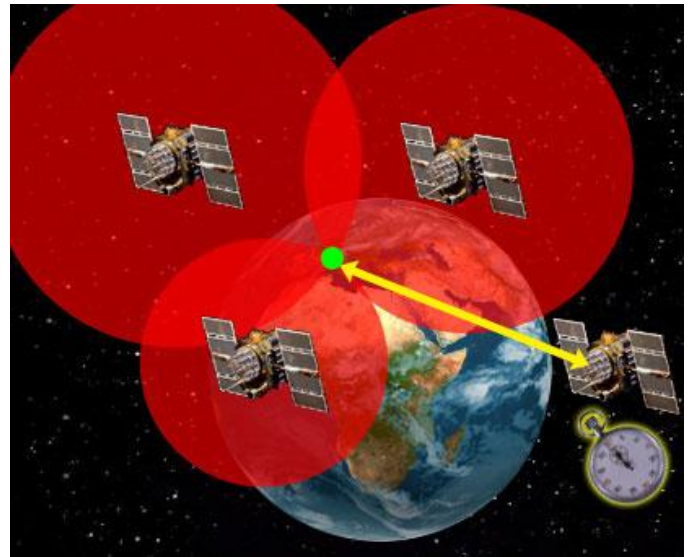

Fig 1:Trilateration method

II. RELATED WORKS

Foursquare, stylized as foursquare, is a location-based social networking website based on hardware for mobile devices. The service is available to users with GPS-enabled mobile devices such as Smart-phone. Users "check-in" at venues using a mobile website, text messaging or a device-specific application by running the application and selecting from a list of venues that the application locates nearby. Each check-in awards the user points and sometimes "badges. [2]

Dodgeball was a location-based social networking software provider for mobile devices. Users text their location to the service, which then notifies them of crushes, friends, friends' friends and interesting venues nearby. Dodgeball was shut down by Google in March 2009 and replaced with Google Latitude.[3]

Besides,there are various companies which have launched their own location based mobile advertisements to enable customers get the notifications of the nearby offers of their products.Some of the prominent ones being Adidas,Dairy,Queen,et al. [4]

III. LOCATION BASED MOBILE ADVERTISING

The proposed system proposes to integrate the roaming services into web services infrastructure. In this case, the mobile users could get the location-based service during roaming.Advertiser registers with the web portal and hosts his advertisements on the portal. The web portal is maintained by an Admin. The admin distributes these advertisements over a network to a subscribed list of users/customers.The user receives these advertisements from time to time via notifications. The user may filter out undesired notifications and advertisements using the pull-approach.The notifications

will depend highly on the location of the user which will be traced using GPS and GSM technologies thus making the advertisements/notifications location-specific.

The functionalities of the proposed system are distributed among the following use cases:

A.User
1.User access the Mobile application system through Mobile interface.
2.User provides the login details of the application,checks available options,selects the desired options.

B.Admin
1.Manages the web-portal.
2.Adds the advertisements.
3.Accepts the registration of customers and the advertisers.
4.Accepts the payments.
5.Maintains the Database

C.Advertiser
1.Contacts the Admin,registers at the web portal
2.Submits advertisement to admin
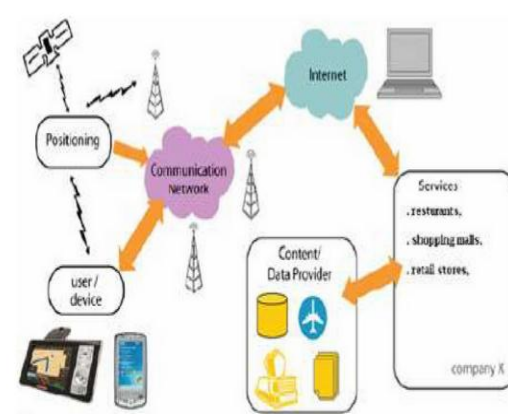3.Updates the advertisements provided by him.
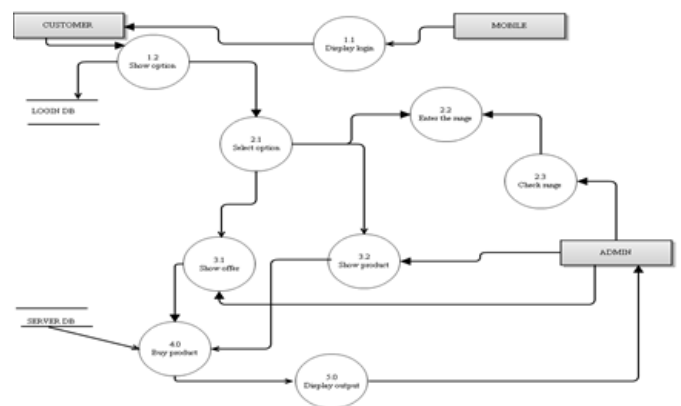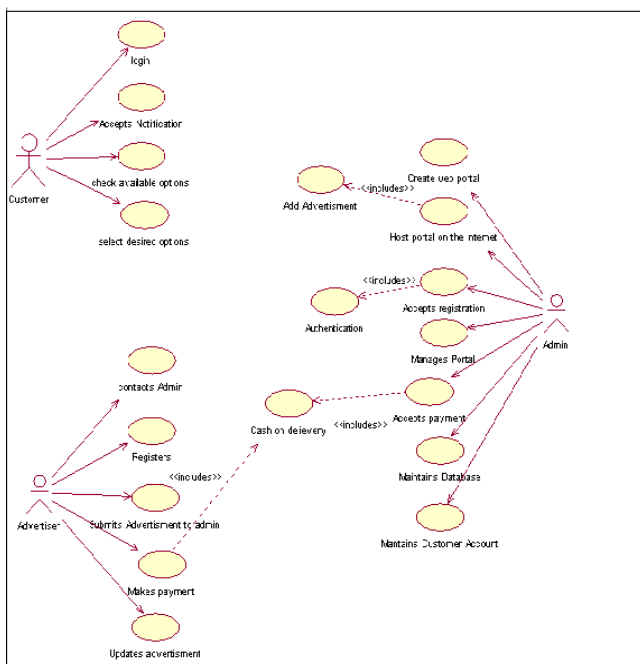

Fig 2:Use Case Diagram(Proposed System)

IV. PROPOSED SYSTEM

Admin manages a web Portal which registers the participating advertisers.Through this web portal Admin manages the services Provided by advertisers
Info can be retrieved from This web server by admin As and when the users Location changesUser has a GPS receiver.Receiver figures which satellites it can hear, gathers messagesThrough position and time, gets to know of its location.Uses GPRS to provide Direct link into Internet from GSM phone.

Fig 3:Architecture of Proposed System

Fig 4:DataFlow Diagram(Proposed System)

The system consists of 2 applications:Web application and an Android mobile app.

1.Web application:Advertisers and users register themselves.Advertisers-for advertising their product and offers. The products could be apparels,foodstuffs,services,mobile and accessories,etc.A new user should register himself on the web portal before he starts accessing the mobile app.Once he has registered himself,all he has to do is download the Android app and enable his GPS for his real time location.The admin maps the offers to the relative location of the user and publishes the offers to the users on the mobile app.One more functionality of the offer is that ,besides based on the relative location of the advertiser and the user,there is also an expiry date to the offers.The offer wont be displayed to the users after the expiry time has elapsed.

Mobile app:The mobile app can be accessed by the user/customer.The mobile application starts by a page which prompts the user to enter his credentials.On successful login,the user will be displayed his current location provided his GPS is on.The user has the option to select by Product or by offer.On selecting Search By Offer,he will be notified of all the offers nearby and by selecting Search by Products,he will get to view the offers based on his selected Product only.He can register to any offer based on his interest and the advertiser would be notified of the offers subscribed for his product.This will give advertiser a broad view of maintaining his inventory.
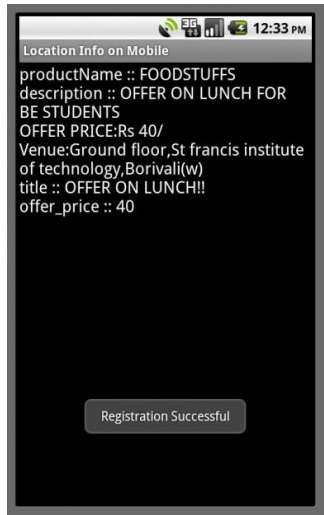
Figure 5: Successful registration of an offer

Features of Proposed System

Advertisers can dynamically deliver mobile coupons which the end user can save in virtual wallet within their application. Coupons can be both textual and graphical enabling to advertisers to tune the coupon mechanism.

Current Location: Whenever a user opens our application on mobile device the user will be welcome by a note displaying their current location. These will be homepage of application.

- Follows Pull Approach
- Pop-ups as notifications for ads
- Data Storage
- E-mail notifications
- Downloading catalogs

V. CONCLUSION

Changes in telecommunications have changed the ways advertisers reach out to customers. Besides advertising on the Internet, a modern advertising agency is also likely to employ some form of mobile advertising, reaching audiences based on their current location as they use their cell phones or tablet computers.In this paper, we focused on building a system which can be effectively used by both advertisers and users. The users need not specifically enter his location and search for offers or products explicitly instead get all the offers and products real time based on his location.The proposed system represents the blend of real time location and m-commerce giving the user a more personalized feel.

ACKNOWLEDGEMENT

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