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Tourist Guide Information System using Google Map and GPS

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***Abstract*—** *With the evolution of technology, the tourists can be effectively guided by the aid of Location Based Service of their smart phone. Solo travelling is popular in today's touring industries and therefore mobile tourist guided system can efficiently support to solo traveler. By applying the combination of Location Based Service of the mobile phone and Google Map services, this tourist guide information system is developed. The purpose of this system is to provide user's current location, the detailed information of the nearest places and the routes to reach their interesting nearest place. This smarter tour guide system use mobile phones' GPS for the current location access and also use Google Maps for efficient guidance to users. The tour guide system provides real-time and location-sensitive tourist information of the Yangon region.*

Keywords — Location Based Service, tourist guide system, Google Map, Harversine Formula.

I. INTRODUCTION

With the large of globalization, tourism also widely increases in nowadays. The technology in tourism also increase and the tourist can find the tourism information on blogs, forums and websites and etc. However, the mobile tourist guided systems are more conveniently supported to user by their real time and location sensitive information. Due to this fact, this system is proposed as the tourist guide information system for the mobile smart phone. The goal of this system is to provide the personalized access to tourism information at anytime from anywhere in Yangon City. In this system, the user can easily check their current location by the use of the Location Based Service of the mobile phone. Users can also get the find the detailed information of the nearest places from them. Users can also easily be guided to their interesting nearest places by the Google Map service.

The local information of Yangon city is stored in online server database. The distance between the user's current place and nearest place is calculated with 'Haversine' Formula. By using the web version of Google map instead of Google Map API, this system can be used in every mobile phone even if it doesn't have the Google play services. Since the system use the online server database, the database can easily be updated at anytime and anywhere. The complexity will be reduced since the user interesting places within the user desired distance range can be easily viewed at the same time on the simple Graphical User Interface. This paper is organized as follows: the related works are described in section 2. The section 3 is about the background theory of the system. In section 4, the design of this system is described. The section 5 is the conclusion of this paper.

II. RELATED WORKS

The research about the tourist guide system [1]"Tourist Guide using GPS" is developed for the Mumbai city. In this research, the system can provide information of Buses to guide the tourists in their trip. PS is used to fetch the user current location and display the result in map based interface. "Tour-Guide: Providing Location-Based Tourist Information on Mobile Phones" by Xiaoyu Shi[2] expressed the tour guide system designed foriPhone. Since it is specialized for the iPhone, it uses Xcode (version 3.0) in the MAC OS environment. In that system, the users can get tourism guidance information they need anytime and anywhere. It can be used by both on-line and off-line phases. In off-line phases, it displays the list of all tourist cities and the user's current location and the nearby attractions are displayed on map in on-line case. Alexander and Krill[3] research the tourist guide system that support the tourist during the trip and is not aimed to provide the real time information.

There are two stages in the system, (1) plan preparation before trip and (2) tourist support during trip. The first stage use internet connection and the second stage can process on offline mode. Uses third party services (e.g.-Wikipedia) to obtain attractions when the user select the target region, and pre downloaded them and store in device memory. On the trip, the android app can support the user by displaying that predownloaded information. In the research of Sawsan Alshattnawi [4], it presented the tour guide system that contains two steps; the first step is discovering the location and the interesting points on the website before the real visit. After that, the application is built and installed in the mobile phone and can be used during the trip. The website is online mode and the application is offline mode. To use the website, the user must register and sign up the account.

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Location Based Services (LBS) are information services accessible with mobile devices through the mobile network and utilizing the ability to make use of the location of the mobile device. Almost all LBSs are based on four components: Service and Content Provider, Mobile Device, Positioning Systems, and Communication Network. These components are presented on figure. The main advantage of LBS for users is that they don't need to enter location information manually but it is automatically collected [5-10]. Location Mainly, four components are considered for the Location Based Service (See Figure. 1).

Fig.1: Components of the Location Based Service

III. LOCATION INFORMATION

GPS Receiver determines its position using a process called trilateration. Assume that GPS-like signals are being transmitted from radio towers in FRESNO, LOS ANGELES, and LAS VEGAS. Assume that you can decode the signals so that you know how far away you are from each transmission tower (R1, R2, R3).Use this known distance as the radius for drawing a circle around each tower.

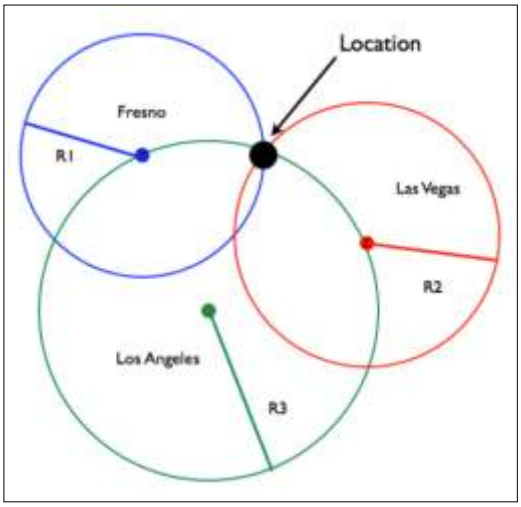

Fig.2: Tirlateration Method

If you only have the signals from LAS VEGAS and LOS ANGLES, then you could be at one of the intersection points for those two circles. But if you can add the satellite from FRESNO, then you can figure out where you are exactly because there is only one intersection points for all three circles. The GPS receiver on the Earth is located at the intersection of those spheres. The 'Trilateration Method' is illustrated in Figure 2.

The Haversine formula is an equation important in navigation, giving great-circle distances between two points on a sphere from their longitudes and latitudes. The Haversine Formula is

dLon = lon2 – lon1
dLat = lat2 – lat1
a = (sin (dlat/2)) 2 + cos (lat1) * cos (lat2) *
Sin (dlon/2)) 2
c = 2 * atan2 (sqrt (a), sqrt (1-a))
d = R * c
Where,

R is the radius of the Earth.
lat1 is the latitude of the location1.
lat2 is the latitude of the location2.
lon1 is the longitude of the location1.
lon2 is the longitude of the location2.
d is the distance between place1 and location2.

IV. PROPOSED SYSTEM

In outline, the system has the following steps.

1. Initialize the system, check whether network enabled and GPS enabled.
2. Retrieve the current location.
3. Input the category and distance range.
4. Retrieve the relevant data.
5. Calculate the distance between the location items and the current location.
6. Output the relevant location items.
7. Input the place to view details on the map.
8. Output the details of the place and show the location on map.

The proposed system develops an application system that provides the tour guided information of famous places in Yangon City. Generally, the user can search the tour guides information by means of categories (Pagodas, Museums, Hotels, etc…) and distance ranges (1mile, 2miles, 3miles, etc….). The system is composed of three components: a mobile device (front-end), server devices (middle-tier) and database (back-end).The system architecture is shown in Figure 3. The front end layer interacts with the user and gets the user's current location by the GPS and shows it on Google Map. The distances between the user's current location and the location of the places in the mobile phone's DB are calculated at the middle layer. The details of a place (Latitude, Longitudes, image, etc….) are stored in the mobile server repository of back end layer. Based on the user selected categories;

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the data are abstracted to the mobile phone's DB of middle layer.

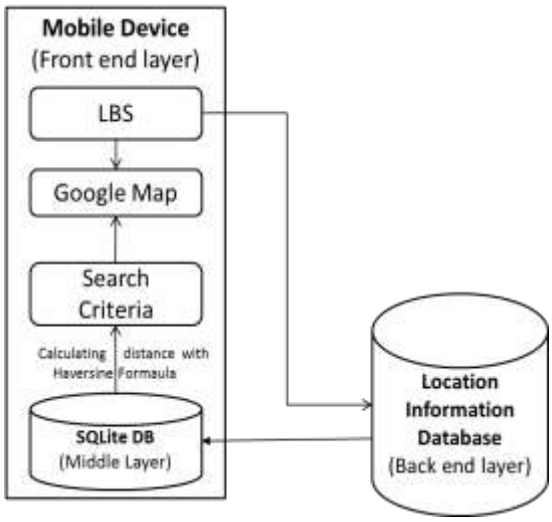

Fig.3: The system architecture

Creating Database

To store the location data of the system, the type of spatial database is used. Spatial database is used to store and query data that represents geometric objects such as points, lines and polygons. Some spatial databases handle more complex structures such as 3D objects, topological coverage, linear networks, and TINs. In this system, the database contains the two tables named 'Category' and 'Near'. 'Category' table contains the three attributes namely 'ID', 'cat' and 'type'. The 'Category' table is designed in Table 1. In 'Near' table, there are eight attributes; 'ID', 'name', 'lon', 'lat', 'des', 'detaildes', 'cat', 'image' and 'cat' is the primary key.The design of 'Near' table is shown in Table 2.

Table.1: 'Near' Table

ID
Cat
Type

Table 2. 'Category' Table

ID
Name
Lon
Lat
Des
Detaildes
Cat
Image

Available Services of the system

The available services of the system are shown in Table 3.

Table.3: Available Services of the system

No.	Available Services
1	Pagoda
2	Churches
3	Mosque
4	Hinduism
5	Musician
6	Historical Buildings
7	Chinese Restaurant
8	Myanmar Restaurant
9	Indian Restaurant
10	European Restaurant
11	Airport
12	Railway Station
13	Depot
14	School
15	University
16	Shopping Mall
17	Market
18	Embassy
19	Banks

Upon the user desired distance range, the system will find the nearest famous place. By applying the Haversine formula, the distance between Shwe Dagon Pagoda and Sule Pagoda is 2.875004819709077 km, the distance between Hledan Center and Sule Pagoda is 6.453772614821444 km and the distance Shwe Dagon Pagoda and Hledan Center is 3.6059009151724584 km each (see Table 4).

Table.4: Calculation using Haversine Formula

Place 1	Place 2	dLon	dLat	a	c	Distance (km)
Shwedagon Pagoda (96.1465332, 16.7984419)	**Sule Pagoda** (96.156641, 16.7744656)	-4.18465377494E-4	1.76414390133 0848E-4	5.0909864921 404E-8	4.5126 42413 605E-4	***2.8750048 19709077***
Hledan Center (96.1283111, 16.8257796)	**Sule Pagoda** (96.156641, 16.7744656)	-8.95598253949E-4	4.94450 031760 5423E-4	2.5653 822241 315E-7	0.0010 12992 09148	***6.4537726 14821444***
Shwedagon Pagoda (96.1465332, 16.7984419)	**Hledan Center** (96.1283111, 16.8257796)	4.771328 7492245 996E-4	-3.18035 641624 5753E-4	8.0085 218436 265E-8	5.6598 66449 80765 7E-4	***3.6059009 15172458 4***

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V. EXPERIMENTS AND RESULTS

Before the system intialize, the user may chech whether the internet access enabled and GPS enabled. When the system initialized, it fetch the current location of the user by the GPS of the mobile phone. Figure 4 show the GUI of the system.

Fig.4: The illustration of developed GUI

In developed application, the current location is also available by using the button of " My Location" .See in figure 5. To find the nearest interesting place, the system is customized by the user.Figures 6 shows the category and distance range that can be inputted by user.

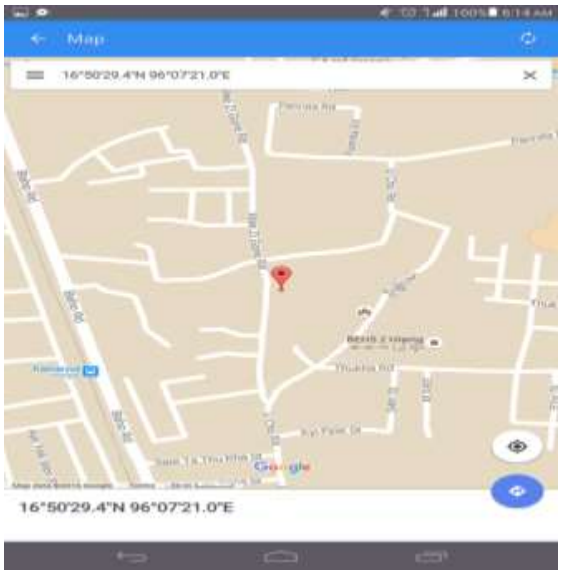

Fig.5: The current location of user' on the Google Map

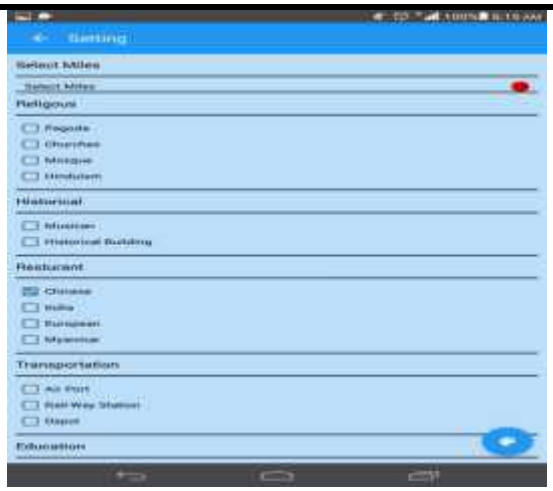

Fig.6: The category and distance range of the system.

Retrieving all the nearest location items

After calculating distance range by the 'Haversine Theory' the user interesting nearest places can be shown,Figure 7 shows the screenshot of the system showing the user's desired nearest famous places.

Fig.7: User's desired nearest famous places

Fig.8: The detail of selected famous place

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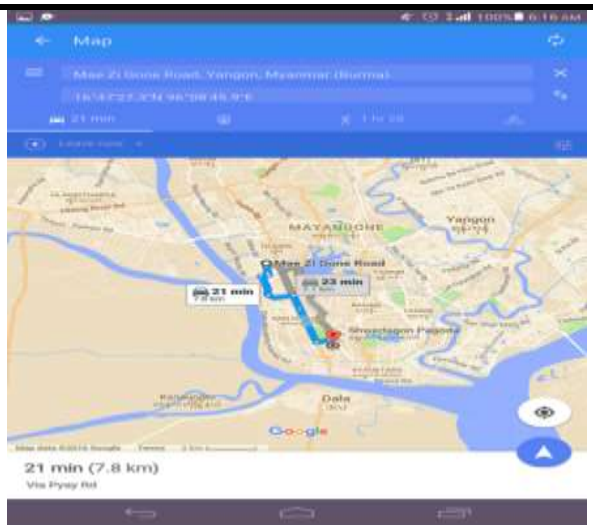

Fig.9: Location of current and desired famous place

If the user select one item from them, the detailed information of that place is giving as an output.Figure 8 shows the screenshot of the detailed information of the user selected place. After viewing the detailed information, the user can get the route from the current location to there. Figure 9 shows the screenshots of the route from the user current place to the interesting nearest place on Google Map.

VI. CONCLUSIONS

The mobile application for location based tourist information tools is developed in this research. This system use the Location Based System including the GPS feature of smart phone and the Google Map to efficiently assist the tourist. By this mobile tourist guide information system, the tourist can conveniently visist in Yangon City.This system is firstly intended to develop tour guide mobile application for Yangon City.Aftherthat, it can be updated to be used for the whole Myanmar Country.

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