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Offline Location Based Services Using Android OS Implemented In Smartphone and Beagleboard Xm

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ABSTRACT

Recently trends and technologies are growing drastically, where the internet connectivity plays a significant role. But the disappointment is that the connectivity is not present in all locations. In this case study, we took the location based services which completely rely on connectivity, example, if the user loses his or her connectivity they will not be able to receive or get updates of the location based services. So we implemented an offline location based service where the users can get profited even when there is no connectivity. This system is proposed by developing an android application which contains all location based contents using database management system, and implemented it on a smart phone.

Key words: Android, offline location based services.

INTRODUCTION

Navigation and tourist guide applications have recently shown a tendency to facilitate offline access to contents. The downturn of these solutions is that they provide the contents in a proprietary format embedded into applications. The offline map applications on mobile device works anywhere. It does not need network coverage or Internet connection.

Taking into consideration, user need not be a computer expert, desired properties of this application for its quick adaptation, are as follows:

Simple

User need not have to learn to use the offline maps application, just download and start the application.

Availability of maps in offline

Download and store the entire map data to user's mobile phone locally, and use the map without an Internet connection.

No mobile roaming charges

Application stores maps on SD flash card of user's mobile device and uses them every time when user start it, so it works without Internet.

Zoom in facility

Allows zooming in with high resolution. Multi-touch pinch-to-zoom is supported or double taps to zoom in, tap the zoom out button to zoom out.

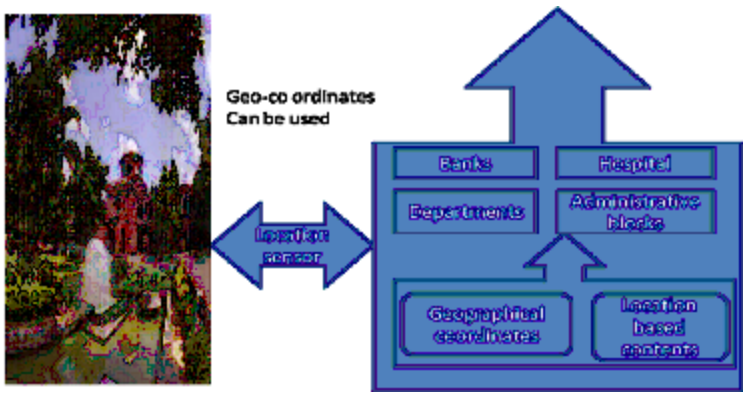

Fig.1: Layout for information structure about a place in physical world

Potential technologies used in location based services(LBS)

Satellites

Satellite navigation systems provide geo-spatial positioning with global coverage. Currently there are several global navigation satellite systems dedicated to civil positioning. The advantage of satellite systems is that receivers can determine latitude, longitude, and altitude to a high degree of accuracy. However, line of sight (LOS) is required for the functioning of these systems. This leads to an inability to use these systems for an indoor environment where the LOS is blocked by walls and roofs.

Cellular communication network

A Cellular Communication Network is a system that allows mobile phones to communicate with each other. This system uses large cell towers to wirelessly connect mobile devices. The range of cellular communication networks depends on the density of large buildings, trees and other possible obstructions. Maximum range for a cell tower is 35 kilometers in an open rural area. This method is a basic technique using Cell-ID, also called Cell of Origin, to provide location services for cell phone users.

Bluetooth

Bluetooth is a wireless communication method used by two devices over short distances. Bluetooth is the IEEE 802.15 standard and is similar to Wi-Fi. Maximum distance for Bluetooth communication is up to 100 meters for a class 1 Bluetooth set. The devices can send a maximum of 3Mb/s. Implementation can be highly expensive.

Methods and techniques used in offline location based services

Offline location based services

Location based services deliver Information about location to people without wireless connectivity.

Geo-tagging

Geo-tagging is the process of adding geographical identification metadata to various media such as a geo-tagged photograph or video, websites, SMS messages, QR Codes or RSS feeds and is a form of geospatial metadata. This data usually consists of latitude and longitude co ordinates, though they can also include altitude, bearing, distance, accuracy data, and place names. Geo-tagging can help users find a wide variety of location-specific information. Geo-tagging-enabled information services can also potentially be used to find location-based news, websites, or other resources.

Package

An organizational entity, the platform that aggregate a collection of locations and their associated contents.

System Architecture

The OLBS (offline location based services) consists of the following components which are essential for the obtaining location based contents at offline, which in our case the offline location based contents is obtained for the campus College of Guindy, Anna University.

Mobile terminal, which are equipped with

Fig. 2: Celkon A85

Fig. 3: Beagleboard Xm

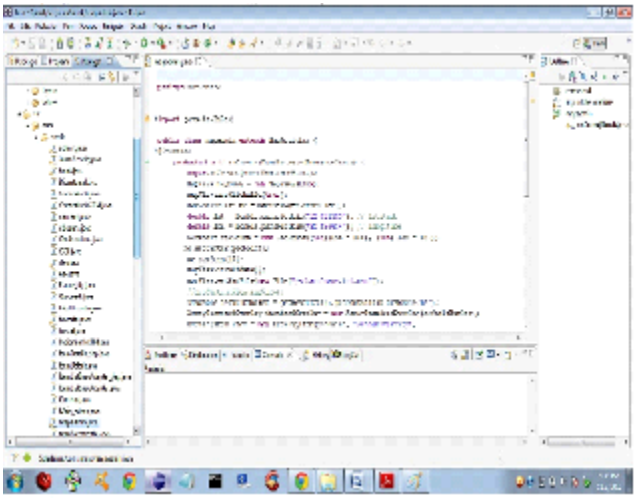

Fig. 4 :Eclipse IDE

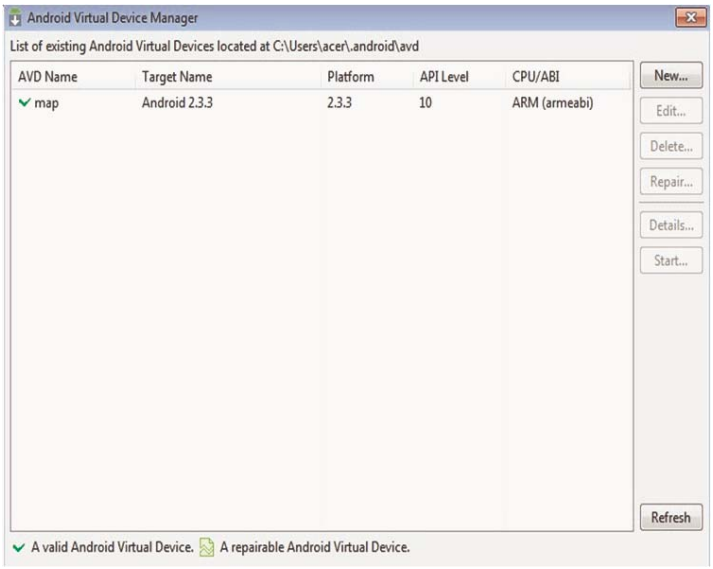

Fig. 5: AVD manager

Fig. 6: Basic map layout

Android OS: laptops, PDA, cell phones, hand-held gaming console, etc.

Android Application, which facilitates user with an intuitive user interface displaying the list of the categories, under each one there are list of buildings, through which user requests the location based contents at offline

Android Application Functionality and Deployment

The software which has been developed and deployed into the mobile device for the estimation of location based content is based on

Fig. 7 :Application display

Fig. 8 :Application Display

Fig .9 :Application display

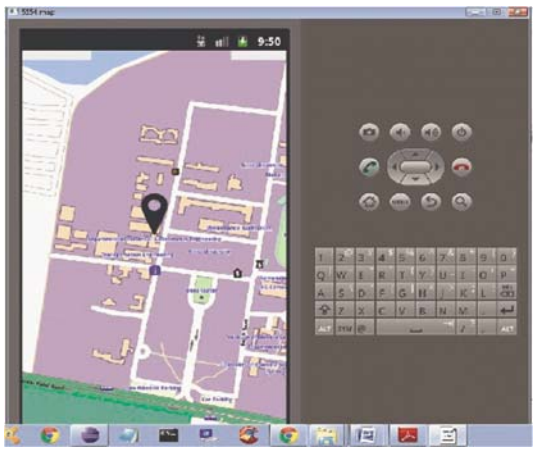

Fig.10: Map display

the Android platform. Its functionalities are

1. Sending application download request to the server.
2. Downloading the application.
3. Option to select a location in the application.
4. Displaying all buildings and its associated contents.

The application developed for the android device is of the API level 10 and version Android Gingerbread 2.3.9.

Process of System Operation

Summarizes the steps involved in the user position estimation and route determination

1. Offline location based services is deployed into the mobile device.
2. An activity with a list of categories is displayed, click the required category.
3. Another activity is opened which has list of requested category.
4. For example when the category is clicked, department electrical and electronics department frame layout (contains image of department, details and clickable map).
5. When map button is clicked, the map is loaded.

Project Specifications

Hardware perspective

In the experimental setup the hardware used is Celkon with ARM processor and CPU operating speed of 1 GHz, the Smartphone is preloaded with Google's Android Gingerbread V2.3.9 operating system. Also Beagleboard Xm with specification as follows:

1. Architecture:ARMv7 and cortex A8
2. Processor TI DM3730 1GHz
3. RAM 512 MB
4. Micro SD slot
5. USB 4
6. Ethernet 10/100

Software specification

Software's that has been used in the project are as follows:

1. ADT plug-in for the Eclipse (Helios) IDE which provides an Integrated Development Environment for Android application development.
2. Android SDK (Platform)
3. Java JDK 1.6 (Development Kit for Programming).

RESULTS AND DISCUSSIONS

With mobile Emulator

The experiment was performed in the campus, College of Guindy, Anna University, Chennai. An area of 45,154 m² was used for the experiment. Fig.5 shows the basic map layout of the campus latitude and longitude; the Smartphone used is Celkon A85 made by Celkon and has Android 2.3 O/S.

Fig 7 shows the first screen that shows the list of categories (departments, administration, bank, hospitals, shops and canteen). Fig 8 shows the list of departments when the user request. Fig. 9 shows the corresponding departments location based contents as per the user request Fig 10 shows the map view with a marker on the place, where user requested.

CONCLUSION

We have proposed and developed an offline location based services and implemented in a mobile phone and on embedded device Beagleboard Xm. The platform consists of a database for location packages, providing a friendly way for the user to list, packages from his device. We expect our OLBS system to be used in various indoor and outdoor places like shopping malls, airports, hotels in near future.

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