

Implementing Campus Indoor Location Tracking System

S.Neelakandan¹, S.Muthukumaran², R.Annamalai³,

¹,snksnk07@gmail.com,Assistant Professor, Department of CSE,Jeppiaar Institute of Technology

²smkumaran83@gmail.com,Assistant Professor, Department of CSE,Jeppiaar Institute of Technology

³annamalai@jeppiaarinstitute.org,Jeppiaar Institute Of Technology,

Abstract

Digital electronic maps are used to track the location in outdoor and indoor environment. Most of electronic maps are useful for outdoor environment. There is no efficiency technology for search the indoor location. Many smart-phones are used to track the location by electronic map. The electronic maps may be the Google map, GPS navigation, waze and offline GPS maps. These are only useful for outdoor environment. Indoor based location tracking system can be implemented by using the Indoor Atlas Android SDK. It provides an API for developers to create application for inside building navigation. This app also useful for vision it have impaired people because the speech recognition for searched location and also include the event details in indoor based location tracking application. Using this app to find the shortest path for desired location.

Keywords- Indoor plan, Navigation module, Indoor plan infrastructure

I. Introduction

Now a days most of the people using the smartphones for our daily purpose. Because the android smartphones have the memory capacities, good processing speed and higher data transfer rate. Android is Linux based operating system with java support and it comes with open source software.

Many map based android application is available in the Google play store. Map is used to transit the users from one place to another Google map, GPS is used for finding the specific location in outdoor environment. Using this application people can easily find the location such as roads, bridges, airport, shopping malls, etc. GPS (Global Positioning System) is one of the popular navigation system in the world. But it gives higher accuracy for

outdoor environment not for indoor environment.

Many university campus, shopping malls and organisation are very large, so the people are difficult to find the location inside the shopping malls, university campus and organization. There is no effective features for finding the location inside the buildings. In the application, using the indoor location based services is used to find the current location of the mobile clients. Indoor Location Based Services is the extension of location based services. It is used for tracking the location inside the buildings or campus. Indoor Atlas android SDK is used for indoor navigation. The SDK offers the features like the indoor positioning with higher accuracy and obtaining floor level. In Indoor Atlas to track the desired location then update the floor details for desired location and after fixing the route inside the buildings.

Speech recognition is included in this application for vision impaired people. If any event happen inside the university or organization, this information also available in this application. So people can easily know the event information like place, time and date. Using this application people can find the shortest path for the desired location from our source location.

II. Related Work

In 2015, Susovan Jana and Matangini Chattopadhyay developed the university campus navigation system based on the android platform. This application is used to find the buildings internal of the campus. For instance computer science and engineering department block can be identified by this application. Using GPS to find the desired location. It identified the buildings inside the campus but not the classroom inside the buildings. It is outdoor based map application. Using this application, to find the shortest path and update the event information.

During 2014, the mobile navigation application for Osun state university is developed. This application included Google map, Quick response scanner, android development kit and augmented reality is coupled with location based system. It provides the information about the buildings, roads and bridges. It offers information for visitors about the university facilities through the mobile devices.

An application named "Campus Assistant System based on android platform". This application gives the current location of the users with help of GPS. This have the map editor tool to edit the map and manage the campus. It provides the facility to know the starting and destination location inside the campus.

Context-aware android based application is developed by combining the navigation system

and custom maps. This application is useful for location tracking and also provides information on surroundings point of interest within the particular distance. Using this application to know the surrounding place of desired location.

Using GIS to develop the campus information navigation system. It is used to achieve the intelligent management information of the campus. This information could be collected from the data collection, database design etc. This system gives some function such as education management service guide and information inquiry. It is best system for information navigation of the campus.

Indoor location can be identified by the Bluetooth technology. GPS can be used to find the location for outdoor environment. Bluetooth technology acts key enabler for indoor environment to find the location inside the building or campus. Bluetooth terminal is connected to the network, it provide the location data inside the hotspot area. This application is used to know the information about the site of interest such as airports, bus station etc.

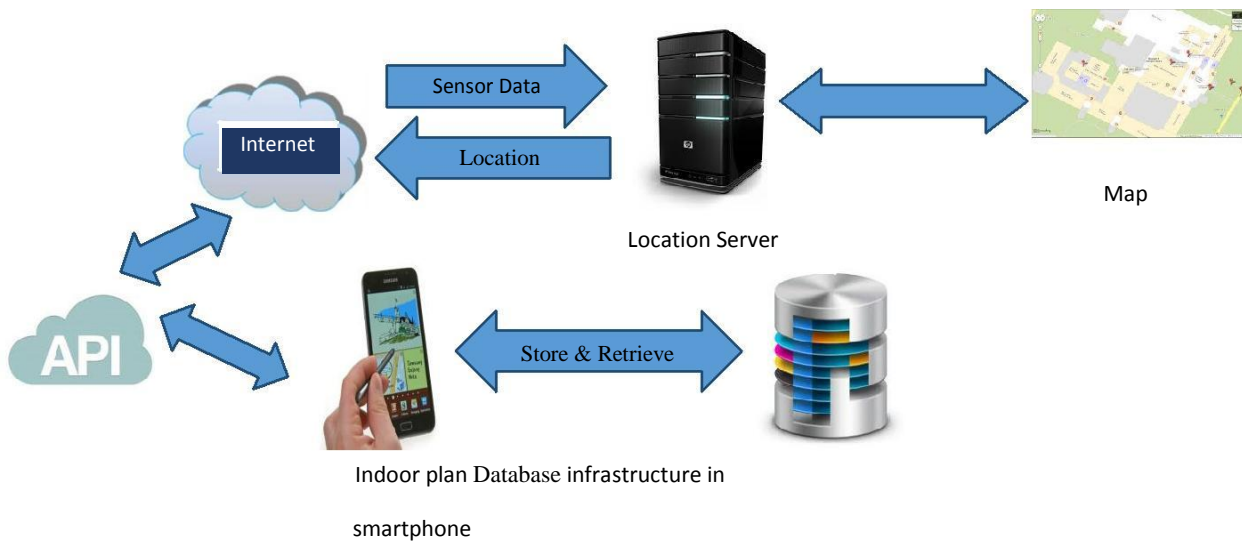
Department of Geomatics Engineering developed the Map Aided Indoor and Outdoor Navigation Application. Indoor Navigation is done by using the Map Matching Algorithm, Geospatial Data Model and Pedestrian Dead Reckoning (PDR).

Map Matching Algorithm was used to match and project the navigation position estimates the geospatial map.

Pedestrian Dead Reckoning (PDR) based on the smartphones accelerometer and magnetometer sensor for navigation. These algorithms to test the indoor environment position accuracy.

The developed map aided navigation system will use two geospatial models to calculate the system performance. It simply GIS maps with specific attributes for applications. The attached attributes include height change factor plays import role in indoor application.

III. Architecture Diagram



IV. Proposed System

Indoor Atlas is used in proposed system. Indoor plan infrastructure to identify the campus indoor structure. The application server is responsible for identifying the policy corresponding to a particular location and performing the necessary action. To measure the acceleration and rotation using sensors -accelerometer, gyroscope and compass.

Indoor Location based services is used to specify the current location tracking indoor position helps to navigate the users. Conference, seminars, symposium information are described by college event information. Apart from this, it notifies the user if he comes near the library or the seminar hall. IndoorAtlas MapCreator for Android is used to create maps to test the indoor navigation and also to record the sensor data.

Indoor plan infrastructure is 2D plan for constructing the indoor structure of the college. Indoor plan infrastructure is main requirement for indoor location tracking system. Based on the infrastructure to develop the indoor application on the android platform. It is used to find the indoor location.



V Implementation

The software packages used for implementing the system are as follows:

- Android SDK 19
- Android version 2.2(min)
- Indoor plan
- Eclipse ADT

The languages used in the proposed system are php in server side, java in client side. Android is an operating system based on Linux with a Java programming interface. The Android Software Development Kit (Android SDK) provides all necessary tools to develop Android applications. This includes a compiler, debugger and a device emulator, as well as its own virtual machine to run Android programs. Android Software Development Kit (Android SDK) with Eclipse ADT is used for client side or for main application implementation. SDK 19 is used to develop the application.

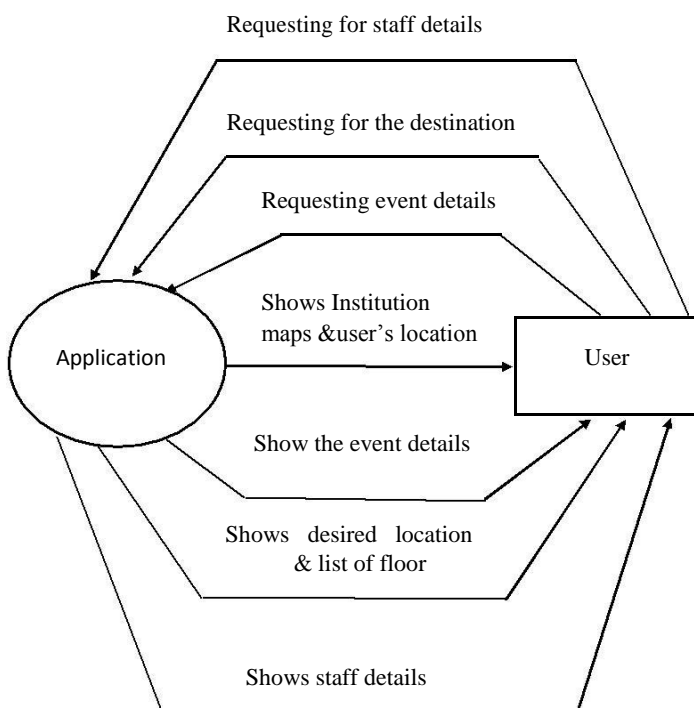


Fig.2 Data Flow Diagram

Data Flow Diagram shows the DFD Level0. It shows the interface between the client and server. Initially, home page will be displayed in the application. When the user inside the campus, can

view their current location. The user request the desired location in the map application. It shows the current and desired location with floor details. Using this application, user can know staff and event details. The user can request the staff or event details to the server.

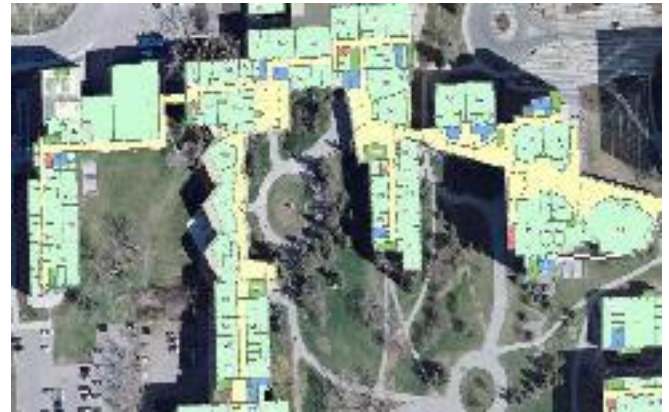


Fig.3 Sample Room Finder Interface

Digital electronic maps are used to track the location in outdoor and indoor environment. Many smart-phones are used to track the location by electronic map. Database is used to store the events held in the organizations. Indoor plan locates the current and desired location of the user.

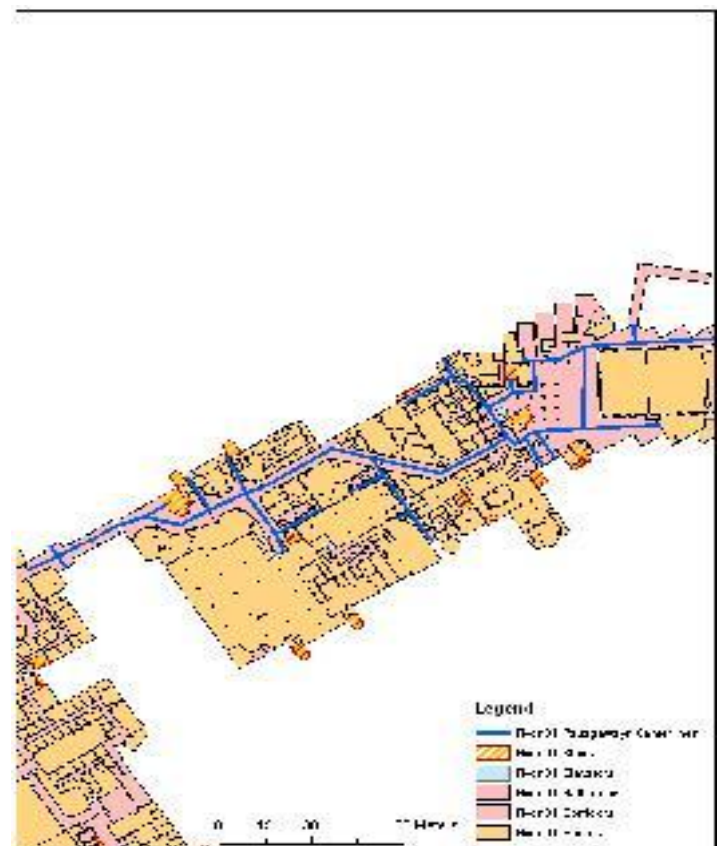


Fig.4

Sample indoor map with specified location

An indoor positioning system (IPS) is a system to locate objects or people inside a building using radio waves, magnetic fields, acoustic signals, or other sensory information collected by mobile devices.

API is the navigation module to conclude the location of user. Indoor location tracking system is implemented in Indoor Atlas Android SDK where the floor structures are placed on the outdoor map of the institution. Each single floor details are placed in it, to prepare the Indoor plan infrastructure map. Now the user can view their source position in the indoor plan. During the time, API key will generate at server side. With the help of API key, can implement the coding part in client side.

Indoor location-based search (LBS) is growing as a natural extension of location-based search and marketing. Location-based services (LBS) provide personalized services to the mobile clients according to their current location. People can track own location and also navigate from one location to another location very easily.

Conclusion

In recent years with the help of Google maps, location searching becomes a new trend, when people are not aware of their location. Google maps provide lots of functionalities like showing any location, alternative path from any location to other location and estimates time to reach the location. But it is not well developed for indoor navigation. It is very difficult to find and get shortest path from current location to any location inside university like entrance gates, departments, canteen, library, playground and parking lots etc. for the new admitted students and visitors. To reduce this pain inside the campus, implement the campus indoor location tracking system on android platform has been designed, implemented and tested successfully in this work. This application provides shortest route guide for users from his/her own location to desired location and event updates with its proper place.

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