A Review on Mall Map Applications
(An android based mobile application)

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ABSTRACT

The purpose of this paper is to describe the study of literature survey done on shopping related campus navigation applications. The Mall Map is an android based mobile application, which helps the user to position, and navigate inside the shopping malls. This application proposed to enhance the shopping experience of customer by providing floor map layouts, user's current location in the mall, store's location on map, path from user location to shop, navigating by showing graphical shortest path on map. Shop information such as shop name, location, categories, products availability and description will be provided in the application. Users can use this application inside the mall campus for navigating themselves to the desired locations. User can also use this outside the shopping mall campus for searching products availability in particular mall by using search option. It will be developed by using android and sever side module which will act as main database to connect with the customers and shop owners. This project is based on concept of indoor maps, in this project wireless communication technique –Wi-Fi is used to identify the location of the user inside the building.
Keywords: Indoor positioning, Indoor navigator, mall directory, indoor maps, android shopping application.

I. INTRODUCTION

The requirements of shopper's are increasing day by day for various products, brands and goods, the best place to shop all those things are in shopping malls, where they get everything under one roof. The building infrastructures of these Shopping malls are such huge that they may consist of various floors, numbers of shops and variety of products to buy, which causes difficulties to customer for finding desired shop or product in these buildings.

The maps in the current market are static paper maps attached on board in one corner which are difficult to understand and read all the times. One need to look all over the map for finding needed shop in the mall. These maps are difficult to maintain over a period of time also the updating of map will result into recreation of whole paper map. Mall Map application is intended to fill this void. It is designed to be run on smart phones making it easily accessible to users. This application will assist the user in finding the desired shop, check the availability of the products. The locations of the shops will be fixed on map as per the

shops are situated in mall. The map will include a feature which provides details of the stores in the mall if a customer wants to search about a specific product or offers in the mall.

This application will be able to identify the location of the user in map. User can find the shortest path to the destination by using navigation feature of application. This application uses WiFi (wireless communication technique) for identifying user's location. User's location will be identified by the received signal strength indicator (RSSI) from mobile device.[1][2][6][7][8][10]. Mall Map application aims to provide a user-friendly Graphical User Interface (GUI) that can be used on smartphones that run on the Android OS. The Mall Map Application will provide the user real time information on where the shop is located and the product information from the shops. It interacts with a Server to obtain the shop's information. Once this information is received by the application it will display this information in an easy-to-understand way to the user. Mall Map is a simple shopping mall application. The mall map will provide a great shopping experience to a customer.

II. METHODS AND MATERIAL

1. Literature review

A. A Fully Functional Shopping Mall Application -- SHOPPING EYE

In the modern world, shopping has become an essential day to day activity for most of the people. However, their busy life style has lessened the time to do shopping. This has made them to look for quicker and easier ways to do their shopping. Some of the difficulties that people have to go through when they do shopping include having to travel a long distance without knowing the availability of the items, difficulty in finding relevant shops inside a shopping mall, forgetting to buy some items which they intended to buy. In order to overcome the above mentioned problems a fully functional shopping mall application is proposed in this paper. It contains details about all the shops inside a mall, available items, customer wish lists and a map. It consists of a mobile application developed using Android and a Server side module which act as a main database server for connecting with customers and shop owners. Both the modules communicate through web services. In this project wireless communication technique -- Bluetooth is used to identify the vertical and horizontal position of the customer. Augmented reality based technique is used to tag the shops with its promotions, loyalty points etc.[1] It uses Bluetooth for identifying the location of the user.

B. Shopping Mall Directory: A Detailed-Guide Application for Android-Based Mobile Devices

The purpose of this paper is to describe the development of mobile application for shopping mall directory. The Location Based Wi-Fi (Wireless Fidelity) Mall Indoor Directory (LBWMID) aims to provide information for consumers to enhance their experience in the shopping mall. The features that were included in this proposed work are Wi-Fi based indoor Positioning System to locate consumer's current location, directions from current location to another location, shops' information and map module. Current location of consumers could be located using two or more access points that are in the range. Strongest signal will be compared to get accurate readings of the current location. Directions are provided from the current location using a search function to enable consumers to search for shops they wish to visit. A simple directions statement will be provided to guide consumers. Shops information such as shop names, categories, locations, descriptions and floor layout are also provided in this mobile application. Floor layouts are provided with multi-touch and scalable functions that enable consumers to get the accurate readings of the map. Our main contribution here is providing technical details which may be used as a guide for students, developers, and researchers. As a second contribution, we have explained the current solutions for the indoor navigation problems.[2] This application uses Wifi for identifying the location of the user, it also provides the navigation to the user with simply giving directions in statement form.

C. an Event-driven University Campus Navigation System on Android Platform

Any University campus may be very large or it may have many campuses. Every year lots of new students come in the university. Many new buildings are built, new courses are started and some locations are relocated in every academic year. There are no such facilities to find new places like administrative building, departments, library, canteen, etc. in the campus and how to reach there from current location. It creates problem to the new comer to reach easily and timely. The new faculty, staff and visitors also face same problem inside campus. There are no such efficient systems to spread information about any event which will happen just few minute or few hours later in the university campus with its proper location and shortest path from current location. It is very essential for new comers and also for existing student, faculty, staff etc. Nowadays most of the student, faculty and staff use very popular android phone for personal purpose. A GPS based map application will be most helpful to locate desired place and shortest path from current location and to get updates of event information on map with its location. Thus it will reduce stress and confusion inside the campus. To include this feature in android mobile environment, a Google Map based application has been designed and developed on Android Platform using Android SDK. This application has been tested successfully on Emulator. Implementation is done for Jadavpur University both main campus and Salt Lake campus.

[3] This project is based on GPS positioning and navigation inside the college campus map by using google map's API to provide required services, but GPS is not always the solution for positioning and navigating inside the closed buildings.

D. The Campus Navigator: An Android Mobile Application

Navigation is a technique which basically focuses on process of monitoring and controlling the movement of person or vehicle or craft from one place to another e.g.: Land navigation, Marine Navigation, Aeronautic Navigation etc. The campus navigator is the android mobile application which is basically used for navigating routes inside any campus premises e.g.: Mall, College, Hospital etc... Mobile phones are nowadays far more than merely devices to communicate with. Especially, Smartphone's are products that help to make our work and everyday life easier. A long with the advance in technology and popularity of these devices, the use of mobile applications has increased enormously in the last few years. Based on new techniques like GPS, sensors, compass and accelerometer, that can used to determine the orientation of the device, location-based applications coupled with augmented reality views are also possible. There are several commercial navigation applications - such as Google Maps, Yahoo Maps and Map quest that provide users with directions from one place to another. However, these applications must search along existing roads; they are not able to provide routes that are as precise as an on-campus path would require. [4]

E. Smart Campus Map

The market of maps and application related to the maps is saturated with outdoor maps and services. There are many commercial and non-commercial companies and services on outdoor maps platforms. But in recent years growing of telecommunication network and mobile devices from one hand and increasing urban environment and number of smart buildings from other hand raise the need of indoor maps and indoor services which in this work we name it indoor location-based services (indoor LBS). In this sense the need for some standards and specifications both in technology-wise and geographic-wise aspect is desired. Implementing comprehensive indoor navigation systems not only needs technology platform but also cartographic and well-designed maps especially for mobile devices which in this content we call it smart maps. In present study we investigate scientific background of current standard conceptual models for indoor LBS systems and narrow them to a smart campus map. Respecting developed conceptual model we prepare some sample data of Technical University of Munich main campus both for outdoor and indoor area. In detail we discuss the workflow, problems and solutions for data preparation, and enlighten the path achieving a standard campus map model derived from OpenStreetMap and CAD floor plans. Following 3D model standards we provide a 3D model for university campus and visualize various forms. We explain a complementary project of this thesis so called TUM-Navi that implements a replica of mobile indoor navigation system for campus. In particular we propose a mobile application framework for indoor navigation system of smart campus map which covers four main aspects: 2D smart campus map, 3D visualization, outdoor environment and navigation functionalities. Finally we apply a survey to collect students' opinion on an efficient digital smart campus map and mobile Application. [5] This application make the use of WLAN for Location Based Services (LBS). It is developed for Windows platform compatible with windows phone 7.0.

2. Positioning Techniques

This section presents the various indoor positioning techniques that are appropriate for WiFi devices. The majority of the available research is focused on trilateration using the RSSI signal for calculating distances although several fairly recent articles have explored a cell based approach. Research is also being done on fingerprinting techniques.[6][12]

A. Trilateration and RSSI

Trilateration is a way of determining a location by measuring the distance from a mobile device to three other beacons. As there is no direct way of measuring distance using WiFi, these methods rely on the various signal parameters defined in the WiFi specification, such as the Received Signal Strength Indicator (RSSI) and Link Quality (LQ), in order to infer the distance between two devices. Provides a thorough evaluation of all the signal parameters and how suitable they are

for localization purposes. They conclude that it is not possible to obtain accurate distances using signal parameters.

B. Dead reconing

The afore mentioned 3D environment tracking system in also uses RSSI and triangulation for positioning. In order to deal with the slow update rate caused by the inquiry protocol delay and make the positioning more accurate, they make use of the devices' built-in accelerometer and digital compass in order to keep track of the user's position while waiting for the next update. Their proposed solution includes an initial calibration phase where the devices that are to be used must be registered, as well as the RSSI and distance between them. The resulting system was able to obtain fairly accurate positioning (< 1 meter when the accelerometer is correctly configured).

C. Neural Networks

There is ongoing research into applying neural networks in indoor WiFi positioning in order to improve the accuracy of signal parameters, as is shown in. Here, they address the issue of changes in the RSSI values due to user orientation. Their approach is based on fingerprinting and requires two phases: an offline phase where multiple neural networks are trained using collected RSSI values, and an online phase where the system is actually being used. A neural network is selected based on the orientation of the mobile device, which is found using a built-in compass. With this method, the authors were able to increase the accuracy to 0.5 meters. The drawback of neural networks is the computationally heavy training phase, in particular for large training sets, that must be done beforehand, and which might not be desirable for an application developed for smartphones.

D. Fingerprinting

Subhan et al explores the possibility of improving the inquiry-related RSSI measurements using fingerprinting in combination with lateration in. By applying a gradient filter to the measured inquiry-related RSSI values they were able to reduce the average error by 45%, from 5.87 meters to 2.67 meters.

E. Cell based method

Cell based methods rely only on the visibility of WiFi beacons for determining the position of a device. These methods divide the indoor area into sections according to the range of a given beacon, meaning that sections can overlap each other. The position of a device is inferred from which beacons the device can see and which beacons it cannot see.

III. RESULTS AND DISCUSSION

Proposed System

Mall Map application is intended to fill this void. It is designed to be run on smart phones making it easily accessible to users. This application will assist the user in finding the desired shop, check the availability of the products. The locations of the shops will be fixed on map as per the shops are situated in mall. The map will include a feature which provides details of the stores in the mall if a customer wants to search about a specific product or offers in the mall. This application will be able to identify the location of the user in map. User can find the shortest path to the destination by using navigation feature of application. This application uses WiFi (wireless communication technique) for identifying user's location. User's location will be identified by the received signal strength indicator (RSSI) from mobile device.[1][2][6][7][8] Mall Map application aims to provide a user-friendly Graphical User Interface (GUI) that can be used on smart phones that run on the Android OS. The Mall Map Application will provide the user real time information on where the shop is located and the product information from the shops. It interacts with a Server to obtain the shop's information. Once this information is received by the application it will display this information in an easy-to-understand way to the user. Mall Map is a simple shopping mall application. The mall map will provide a great shopping experience to a customer.

IV. CONCLUSION

The conclusion that can be drawn from the above is that using indoor maps with position and navigation in the shopping malls will help the customer to locate the shops easily and enhance their shopping experience with various features of the application.

The creation of digital maps instead of static paper maps will be less efforts consuming, with low maintenance it will be cost efficient for the developers of the map.

This application will assist the user in finding the desired shop, also see the products whether available or not with offers available in it. The locations of the shops will be static as per the shops are situated in mall. The map will include a feature which provides details of the stores in the mall if a customer wants to search about a specific product or service in the mall. Mall Map application aims to provide a user-friendly Graphical User Interface (GUI) that can be used on smartphones that run on the Android OS. The Mall Map Application will provide the user real time information on where the shop is located and the product information from the shops. It interacts with a Remote Server to obtain the shop's information. Once this information is received by the application it will display this information in an easy-to-understand way to the user.

V. REFERENCES

[1] K. M. D. M. Karunarathna, H. M. D. A. Weerasingha M. M Rumy - A Fully Functional Shopping Mall Application - SHOPPING EYE (Artificial Intelligence, Modelling and Simulation (AIMS), 2014 2nd International Conference) IEEE

[2] VijayaPrasad, Nurul Fadzlina, Murad Saadi, Abdelrahman Osman Elfaki, Bader Saadi, Shopping Mall Directory: A Detailed-Guide Application for Android-Based Mobile Devices (ARPN Journal of Systems and Software , VOL. 3, NO. 6, October 2013)

[3] SUSOVAN JANA, An Event-driven University Campus Navigation System on Android Platform (School of Education Technology Faculty council for UG and PG studies in Engineering and Technology JADAVPUR UNIVERSITY KOLKATA – 700032 2014)

[4] P. S. Bangare, P. N. Gandhi, S. B. Diwate, R. S. Gujar, S. L. Bangare-The Campus Navigator: An Android Mobile Application. (International Journal of Advanced Research in Computer and Communication Engineering Vol. 3, Issue 3, March 2014)

[5] Shayan Nikoohemat- Smart Campus map (Technical University of Munich, Department of Cartography, November 2013)

[6] Indoor positioning system https://en.wikipedia.org/wiki/Indoor_positioning _system

[7] Wi-Fi positioning system https://en.wikipedia.org/wiki/Wi-Fi_positioning_system

[8] Received signal strength indication https://en.wikipedia.org/wiki/Received_signal_str ength_indication

[9] Eva Gaudlitz, Indoor navigation using WiFi as a positioning technology(September 29, 2015) https://www.infsoft.com/blog-en/articleid/40/indoor-navigation-using-wifi-as-a-positioning-technology

[10] David Ivan Vilaseca, Juan Ignacio Giribet Indoor navigation using WiFi signalsv (DOI: 10.1109/SASE-CASE.2013.6636772 Conference: Embedded Systems (SASE/CASE), 2013 Fourth Argentine Symposium and Conference on, Conference Paper • August 2013) https://www.researchgate.net/publication/26139 5137_Indoor_navigation_using_WiFi_signals

[11] Maxim Kovalev , Indoor positioning of mobile devices by combined Wi-Fi and GPS signals (Indoor Positioning and Indoor Navigation (IPIN), 2014 International Conference, 27-30 Oct. 2014) IEEE

[12] Anja Bekkelien - Bluetooth Indoor Positioning (University of Geneva March 2012)