**Vision Based Indoor Navigation System for Shopping Complexes**

# Abstract

Indoor Navigation systems help people navigate inside large buildings such as shopping malls.A smart location based mobile shopping application for Android device is proposed. The proposed system is a vision based indoor navigation system for shopping complexes which will be implemented as a mobile application. The need for this kind of an application arose because the issues in GPS system. In outdoor environments, the Global Positioning System (GPS) can provide good location estimates. However, the GPS solution cannot be used in indoor environments. In this kind of environment, the GPS signal is very poor because of the lack of line of sight between satellites and the receiver.

Global Positioning Systems (GPS) cannot provide acceptably accurate mapping, as it is only accurate to within 100-200 feet. This is one reason that th e GPS industry does not provide this type of mapping. The same is true for cellular network providers, as the accuracy is also 100-300 feet, and then only when the signal is available. Signal availability is often a problem indoors.

Indoor Navigation location is a need for finding out the exact location and navigating in big buildings like shopping malls. In shopping malls finding out the location of shops is a tedious job. Before this wall printed maps are used to find out the location of shops. The main aim of our system is to develop an indoor positioning and navigating system for shopping mall using Bluetooth technique. As there are many techniques like Wi-Fi, Bluetooth, inertial sensors of smartphones for localization. The Bluetooth beacons are used in this system as it is cost effective and more accurate than other. It contains mobile android application for positioning, navigating and for showing the customized offer as per user's location.

# Introduction

In the world of smart phones there is need of doing smart work in all day to day life activities. For big commercials buildings like shopping mall finding out the exact location must be a smart activity. For this localization of user is most important. GPS (Global Positioning System) is not feasible for indoor location as it gives very poor result for indoor localization. To solve this issue, indoor navigation system is used for tracking shops, restaurants, car parks, play areas in shopping malls. Several thousand visitors come to a shopping mall every day. Not only do visitors quickly lose track of what's going on there and quickly miss good and current offers, or find the wash rooms with their children not quickly enough. In addition, the shops in the multi-stored shopping centers are not even found; and it is particularly problematic for parents whose children can no longer be found or the car cannot be located in the large car park, even after a long search.

In this system there are two parts one for admin to add maps and one for user to navigate in mall. Admin will be added the photographs of the sign boards of their shops of shopping mall, add the Bluetooth beacons details, and add relevant offer for the specified location as per shops. These data gets stored on database server. On the other side user in android application can download these data using internet connection or Wi-Fi facility at shopping malls. As user enters into the shopping mall, first user opens the android application and Bluetooth of that smart phone. Application will start finding nearby Bluetooth beacons. Using the values which are already entered by the admins, application will find out the exact location of user in the map. This system can be used by any shopping mall authority by customizing for that respective area. User can find its location and navigate in mall. Also user can see the customized offers for specific location.

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# Related Work

In a survey of several positioning technologies many approaches were applicable for indoor use. Since it is clear, indoor applications may have very different requirements. But the application should be user friendly for the user, so that the user will not find any difficulties while performing various operations on that application. In order to find the location of the user we will treat each floor as an independent WiFi zone. Separate data base for each floor will be maintained. Database will contain information about the floor like changing rooms, billing counter, emergency exit, parking zone etc.

* Energy-Efficient Indoor Localization of Smart Hand-Held Devices Using Bluetooth: We can localize or find the location of a device using another device. Here for this they used Bluetooth RSSI (Received Signal Strength Indicator) values. It uses localization algorithm to obtain the match record from the database to find location. Algorithm used for this is MADT (Motion-Assisted Device Tracking algorithm).
* A Bluetooth Signal Strength Based Indoor Localization Method This is an indoor localization system. In this system they have used Bluetooth as low cost and widely available device. It uses Base station and Transmitters as Bluetooth devices. In this error function is calculated using RSSI. This error function is based on modified Mean Square Error (RMSE) metric. A low calculated error value indicates high probability of user location. The main reasons for errors in this system are the base station is blocked with some obstacles.
* Design and Realization of A Mobile Seamless Navigation and Positioning System Based on Bluetooth Technology: The whole system is divided into foot inertial data acquisition module (IMU), mobile phone self-contained sensor data acquisition module (IMU) and mobile phone positioning module for navigation. It uses Micro-electromechanical Systems (MEMS) sensors of phones. This system can calculate the position of pedestrians and monitor the human body motion. The data from foot inertial sensors is transferred to mobile phone using Bluetooth.

3D Indoor Location and Navigation System Based on Bluetooth: This system uses 3D design model instead of normal 2D design for finding out location in the 3D world. It uses Bluetooth radio technology. For building 3D designs it uses 3D design tools with M3G formats. It also uses RSSI. For calculating locations KNN method is used.

* Guide Beacon: Beacon – Based indoor WayFinding for the Blind, Visually Impaired and Disoriented. This paper presents an indoor WayFinding system called guide beacon for Blind, Visually impaired and Disoriented. It uses Proximity Detection (PD) algorithm. The objective of guide beacon system is to find the shortest end to end path from a given source point to destination point. User interfaces are built upon the speech recognition within Android OS and Text-to-Speech from Google.

# Advantages

* Cost-effective
* Unremarkable hardware (it does not require any additional hardware)
* Low energy consumption
* Works where other positioning techniques do not have a signal
* Bluetooth Compatible with iOS and android
* High accuracy compared to Wi-Fi
* Flexible integration into the existing infrastructure

# Conclusion

We are going to develop an approach to provide indoor navigation for mall based on Bluetooth. This application can be used in any mall where indoor navigation is necessary. An indoor localization application to be implemented in smart phones. Not only it will reduce stress of getting lost, but this technology also can improve the shopping experience. In this we have used Bluetooth low Energy beacons for installing in the mall.

# References

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