Indoor Positioning and Navigation System for Locating Desired Products into the Shopping Mall by Utilizing Android Application

Manojkumar Balaji Kambale[1], Prof. R. S. Shishupal[2]

[1]Student, [2]Professor

[1,2]Department of Computer Engineering, Sinhgad Institute of Technology, Lonavala, Maharashtra, India

ABSTRACT
The Big Shopping Center's normally give a directory to their accessible shops, yet these directories are more often than not static and don't give any intuitiveness highlights to the customers. In this work, we present the portable shopping Center guide. The primary explanation for our reasonable thought of our proposed venture is on the grounds that we feel that when guests frequently change their arrangement to go to alternate shops rather than the one in their brain, it very well may be of exertion particularly thinking about the swarmed dimensions and an area of the route material. The application created is reasonable and possible; Smart telephones have turned out to be extremely mainstream these days, so we have consolidated the thought. Advanced mobile phone application is helping you in an estranged shopping Center. This thought rotates around our advanced mobile phones and the "WIFI" given by a shopping Center. An application that needs the constant, quick, and reliable data processing.

KEYWORDS: *Indoor navigation system, Smart Phone, Barcode reader, wireless router, Wi-Fi network.*

INTRODUCTION
Now a days big retail malls are increasing rapidly. Mall have same product with different brands. It's very difficult to find the exact product from all product. It's hard to discover expected item in to shopping Centre. In conventional way item is organize by its class like a home & appliances, electronics, sports and so on.

Still this technique isn't that much powerful these days. So to tackle this issue, the propose technique give the route to item. Conventional purchasing system is very tedious. Clients hold up into line by line for bill payment. Proposed technique decrease the bill instalment time. In day today life we use GPS for navigation but GPS not work effectively indoor. Also shopping get irritating at the rush timing. People need to stand in line for long time. Barcode is rising innovation which is fit to adequately store data of item. Barcode help to influence technique to robotize. User search required product in system with the help of Wi-Fi. System send the location of product. The Barcode of the item is scanned by the client and move to the list of things to get on the off chance that they are keen on decision of thing by utilizing the proposed portable application. So as to build up an Android Application that uses a standardized barcode scanner for the obtaining and route of things for store that will act self-checking and automatic payment transaction. User himself scan the Barcode using his mobile while making purchase, retrieve essential details of all products from shops database and generate bill himself. This bill can be sent to the customer's mobile through online banking service thus the user can make quick payment and leave the shop early.

LITERATURE REVIEW
A. Accurate and reliable real-time indoor positioning on commercial smart phones. By. Gennady Berkovich [1]
This paper plots the software navigation generator that was created by the SPIRIT Navigation for the indoor situating on occupational smart phones. A well-marked feature of our methodology is the simultaneous utilization of the different advancements for indoor navigation. Estimations from such advanced mobile phone sensors as IMU (3D accelerometer, spinner), an attractive field sensor (magnetometer), and Wi-Fi the BLE modules, together with the floor premises plan are utilized for hybrid indoor situating in the navigation generator.

Indoor navigation programming uses such advancements like PDR, Wi-Fi fingerprinting, geomagnetic fingerprinting, and guide coordinating. Being mixed in the molecule channel, divergent estimations permit comprehending a lot of the central undertakings. To begin with, the route motor can consequently begin in wherever of a building wherever client switches on his or her PDA. There is no compelling reason to enter the underlying position physically or to begin outside where starting position can be controlled by the GPS/GNSS collector. [1]

B. Location Based Services on Smart Phone through the Android Application. By. Prof. Seema Vanjire, Unmesh Kanchan, Ganesh Shitole, Pradnyesh Patil [2]

In this paper they were dealing with the advanced cell phones, which will trade the massive work areas not withstanding for a computational purposes. The inspiration for each area based information system is to help with the correct data, at the opportune place in the constant with the customized setup and an area affectability such needs must be provided with the assistance of a LBS. but these applications are restricted to the work areas only. They have to import them on cell phones .All the data must be accessible in his cell phone and further more in the client altered configuration. .[2] The paper Android application for the area put together administration with respect to portable' depends on the versatile working system Android', GPS technology & Java technology (J2EE). Android operating system and Java technology rises as one of the most blazing theme in the field of information technology. Location-based service (LBS) is a portable application that is reliant on location of the cell phone. The Android operating system is contained a virtual machine that keeps running on the Linux piece, in addition to APIs, and gathering of inherent applications. A situating segment is generally required in a LBS application to decide the location of client's cell phone. The greater part of the present LBS services don't require the clients to enter location physically, such as giving postal code or your particular street name. [2]

C. Methods and Tools to Construct a Global Indoor Positioning System. By. SukHoon Jung, Gunwoo Lee, and DongsooHan, Member, IEEE [3]

This paper acquaints strategies and apparatuses with develop a GIPS by utilizing a WLAN fingerprinting. An unsupervised learning based technique is received to build the radio maps utilizing fingerprints gathered by means of publicly supporting, and a probabilistic indoor positioning algorithm is created for the radio maps built with the publicly supported fingerprints. A global indoor positioning system (GIPS) is a framework that gives positioning services in many structures in towns and urban communities comprehensively. Among the different indoor situating procedures, WLAN-based area fingerprinting has pulled in an extensive consideration as a result of the wide accessibility of the WLAN and moderately high goals of the fingerprint-based positioning techniques. Alongside these methods, gathering indoor and the radio maps of structures in towns and urban communities is basic for a GIPS. A trial GIPS, named KAIST indoor locating system (KAILOS), was created coordinating the techniques and apparatuses. At that point indoor navigation systems for a college campus and an extensive scale indoor shopping centres were created on the KAILOS, uncovering the viability of the KAILOS in creating indoor positioning systems. The more volunteers who take part in building up the indoor positioning systems works on KAILOS-like systems, the sooner GIPS will be figured it out. This paper expects to gather indoor and radio maps from the volunteers who are keen on sending indoor positioning systems for their structures. The techniques and apparatuses for the volunteers are additionally portrayed during the time spent building up an indoor positioning systems inside a bigger GIPS. [3]

D. Interactive Android-Based Indoor Parking LotVehicle Locator Using QR-code. By. Abdul Razak, Kian Ming Lim, Siti Fatimah Chin Poo Lee, Choon Lin Liew [4]

In this paper, they utilize the movement sensor, standardized identification scanner (bar code scanner function) and a camera function worked in advanced cells. This application can demonstrate the course from the client current location to his left vehicle dependent on an indoor guide of the leaving region stored in the database. QR code has been connected from numerous points of view from the advertising products, finding special things on racks, discovering stores and so forth. In this examination, they give an account of an android based application development meant to give navigation services to find the parked vehicles in an indoor parking spot of shopping centres. Moreover, it is additionally ready to naturally distinguish client's present development dependent on the steps count. A field test was directed in a shopping centre indoor parking spot to assess the execution of an application. And the application has appeared encouraging outcomes. [4]

E. Concept for building a MEMS based indoor localization system. By. Thomas Willemsen; Friedrich Keller; Herald Sternberg. [5]

The main objective of this paper was to gauge the position in GNSS shaded zones to make navigation conceivable. Global Navigation Satellite Systems (GNSS) - based navigation with an advanced cells is exceptionally famous. In any case, in the territories where no GNSS flag is discovered then around then route could be valuable. Precedents are navigation in the shopping centers, in huge workplaces, in train stations or in galleries.

MEMS sensors (Micro Electro Mechanical System) introduced in the present PDAs, for example, accelerometer, spinner, attractive field sensor and indicator permit now navigation additionally in GNSS shadowed regions. In this work, an idea is presented for the development of an indoor route framework system on minimal effort sensors of advanced cells (smart phones). The position estimate from the accessible sensor information shapes a premise of position assurance. Because of the low nature of these sensors, in any case, the help of a position estimate is required. So a position estimation is constantly conceivable autonomous of the location. First outcomes with a Kalman filter and molecule filter. Along these lines the accessible MEMS sensors ought to be utilized as a position estimator and a wide assortment of supporting data can be prepared. A first methodology for usage on a PDA is appeared for instance. The displayed idea fills in as a reason for the development of a PDA based navigation solution for indoor use. [5]

F. GROPING: Geomagnetism and crowd sensing Powered Indoor Navigation. By. Kalyan P. Subbu; Chi Zhang; Jun Luo; Jianxin Wu. [6]

This paper first report that the field inspects with GMI, tests results expect to clarify the GMI experience which isn't fulfilled. They were motivated by the insights obtained, they propose GROPING as an inbuilt indoor navigation engine which is independent of support infrastructure. In view of the examinations with 20 members in different floors of a major shopping center, GROPING can convey the adequate exactness for confinement and subsequently gives the smooth route understanding. Although, the substantial number of Wi-Fi fingerprinting based indoor confinement

frameworks have been proposed, their field involvement with Google Maps Indoor (GMI), the main framework is accessible for open testing, demonstrates that it is a long way from develop for the indoor route navigation. GROPING relies on the geomagnetic fingerprints that are unmistakably steadier than Wi-Fi fingerprints, and it abuses the crowd sensing to construct the floor maps as opposed to anticipating that singular scenes should supply digitized maps. [6]

G. Indoor positioning of wheeled devices for Ambient Assisted Living: A case study. By. Daniele Fontanelli; Luigi Palopoli, David Macii; Panama Nazemzadeh. [7]

In this paper, they aimed that the Indoor positioning is an outstanding examination theme whose importance has been relentlessly developing in the most recent years by the significant business interests just as by the requirement for supporting and controlling the clients in extensive open conditions, for example, stations, air terminals or shopping centers. Individuals with movement or psychological hindrances could see the extensive swarmed conditions as scary. In such circumstances, a savvy wheeled walker is ready to gauge its very own position self-sufficiently could be utilized to manage the clients securely towards a needed goal. Two necessities for this sort of utilizations are there: low sending expenses and the ability to work in vast and swarmed conditions. The position following system displayed in this paper depends on an Extended Kalman Filter (EKF) and is broke down through the reenactments in perspective of limiting the measure of sensors and gadgets in the environment. [7]

PROPOSED SYSTEM

The whole propose system will work in two different module, one is user module and another is administrator module which is high authorized person who can manages the all shopping mall databases and day to day offers. For user we provide an android application to handle the all shopping activities like find product location to bill payment. In administration module we can store the product details, location of the products and we can provide the product recommendation to the users. In this system we used a two algorithms which is apriori algorithm and dijkstra's algorithm. We used apriori algorithm for product recommendation and dijkstra's for finding the shortest path. In this paper, we build up a novel system in which the User login into system which is an android application and after that system will show bestselling items. System likewise give suggestion to User. User look by then system will indicate top selling products. System will in like manner offer proposal to customer. User search the required items into the user provided android application. System sends the item location to a User. When user reach to that location he/she get the searched products. The User scan the Barcode utilizing his/her versatile while buy items, and can recover basic information of all items from the shops database and after that it will create bill. This bill can be sent to the User user's mobile through the online banking service and furthermore client can make prompt instalment and leave the shopping center early. So this kind of technique will be increasingly invaluable for the User by expending less time. Likewise in this User can give rating to the items and furthermore the client will ready to see the rating of item easily. The Barcode of the item is scanned by the user and move to a computerized cart if user are interested on the choice of item by utilizing the smart android application.

Applications of Proposed System:
➢ To call attention to correct place of expected product.
➢ To pay bill effectively on cash counter.
➢ View and give rating to item.
➢ View prominent items.
➢ Easily provide recommendation to the users.

ALGORITHMS
A. Apriori Algorithm steps:
1. Scan the transaction data base to get the support 'S' each 1-itemset, compare 'S' with min_sup, and get a support of 1-itemsets.
2. Use join to generate a set of candidate k-item set. Use apriori property to prune the unfrequented k-item sets from this set.
3. Scan the transaction database to get the support 'S' of each candidate k-item set in the given set, compare 'S' with min_sup, and get a set of frequent k-item set
4. If the candidate set is NULL, for each frequent item set 1, generate all nonempty subsets of 1.
5. For every nonempty subsets of 1, output the rule "s=>(1-s)" if confidence C of the rule "s=>(1-s)" min_conf
6. If the candidate set is not NULL, go to step 2.

Apriori:
➢ Join step: is generated by joining with itself
➢ Prune Step: any (k-1) item set that is not frequent cannot be a subset of a frequent k-item set
➢ Pseudo-code:
➢ C_k: Candidate item set of size k
L_k: Frequent item set of size k
L_1 {frequent items};
For (k=1; L_k!=ϕ; k++) do begin
C_{k+1} = candidates generated from L_k;
For each transaction t in database do
Increment the count of all candidates in C_{k+1}
Those are contained in t
L_{k+1}= candidates in C_{k+1} with min_support
End
Return $U_k L_k$

B. Dijkstra's Algorithm:
Dijkstra's algorithm will assign some initial distance values and will attempt to enhance them in well ordered. Let the node at which we are beginning be known as the starting node. Let the separation of node Y a chance to be the separation from the starting node to Y.
1. Assign a tentative distance value to each and every node: set it to zero for our starting node and to infinity for every other node.
2. Set the starting node as current. Set every single other node unvisited. Make a lot of all the unvisited nodes called the unvisited set.
3. Consider all of its neighbors and calculate their *tentative* distances, for the current node. The current assigned value and assign the smaller one and compare the newly calculated tentative distance. For example, if a current node *A* is marked as distance of 6, and the edge connecting with a neighbor node *B* has a length of 2, the distance from current node *A* and neighbor node B will be 8 (6 + 2 = 8) when *B* was marked previously.
4. When a distance greater than 8 then change present value to 8. Otherwise, keep the present value.
5. When we are finished considering about the majority of the neighbors of the current node, mark the present

node as visited and delete it from the unvisited set. A visited node will never be consider again.

6. In the event that when the destination node has been stamped visited or if the smallest tentative distance among the node in the unvisited set is infinity at that point stop. The algorithm has wrapped up.

7. Otherwise, we can select the unvisited node that is marked with the smallest tentative distance, set it as the new "present node", and go back to step 3.

SYSTEM ARCHITECTURE
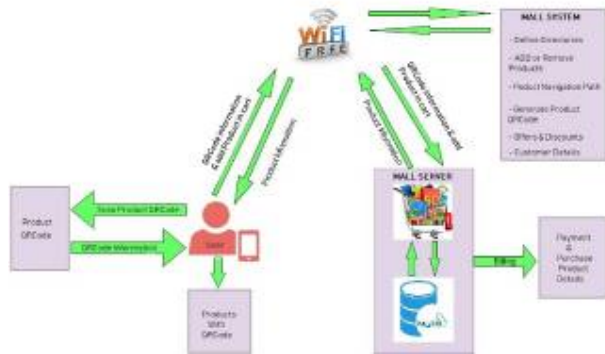
"Fig.1. Basic architecture of the system"

The whole propose system will work in two different interfaces first interface is for user which is an android application and another is web application which is used for shopping mall management and product recommendation. Let's discuss about the first interface which is user interface, first of all when user or customer enter into the shopping mall he/she need to connect there smart phone with Wi-Fi provided by the shopping centers. Remember that both devices uses the same Wi-Fi network. Once he/she get connected to the provided Wi-Fi they need to install the proposed android application into their mobile phones. User need to register that application first time and then he/she free to use the services. Once user login into the system he/she get the certain options like bestselling products, product recommendation and search required products.

System likewise give suggestion to User. Client search the required item in system with the assistance of Wi-Fi. At that point the System sends the location of the particular required item. So it becomes simpler to the user and user can see data alongside the rating of item. System gives an item suggestion to the client. User scan the QR-Code using his/her cell phone while purchasing, and can retrieve the information about the all items from the shops database and create bill. This bill can be sent to the user cell phone through web based banking services along this the client can make fast payment and leave the shop early. User can provide rating to products and also he/she can recommend the products to the other users or their friends or family members.

The other interface (web application) which is handled by the shopping mall authorized team. This interface is mainly used for defining the product directories, add or remove the products, generate the product barcode, define product navigation path, day to day offers and discounts, and manage the customer details and bill payments.

RESULT ANALYSIS

A. Web application interface.

"Fig.2. Add product details into the shopping database"

"Fig.3. Add category into the shopping database"

"Fig.4. Add product path into the shopping database"

B. Android application interface.

"Fig.5. User registration and login"

"Fig. 6.Welcome page & services"

"Fig. 6.Search navigation for product"

"Fig. 7.Scan product

CONCLUSION

In this paper, we develop an advanced shopping techniques and make customers life more easier; we develop a portable shopping center guide that could assume an essential job in the Indian culture overall. The utilization of the Pocket PC shopping mall guide as a shopping mall navigator, notwithstanding helping the clients to discover the shops proficiently and viably at place, we have to develop a system to create awareness in users about usefulness of smart mobile devices for flexibility in almost every day to day task among the shopping.

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