A Survey on Technologies used in Mall Assistant

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Abstract -*During the last decade, research on developing user friendly mall assistant has focused on various technologies such as augmented reality, Chatbot, artificial intelligence and machine learning. The aim is to provide the customer a user friendly and pleasing shopping experience. Such mall assistants include functionalities like Chatbot, indoor navigation, automated bill generation and bill payment methods. Efforts are also being made to include visually impaired and disabled customers into the main stream users with the inclusion of features specially designed from the point of view of physically challenged users.*

Key Words: Chatbot, Indoor navigation, Artificial intelligence, NFC tags, QR code, Mall assistant.

1. INTRODUCTION

A mall assistant is an application or a device that is used to facilitate shopping in malls and supermarkets. In the current competitive and e-commerce era, various organizations focus on providing number of facilities and services to their customers, and a mall assistant can be one of them.

The following paper is a survey of current state of research and development in the field of mall assistant application.

A mall assistant can be a mobile application or an individual hand held device. Indoor navigation for finding or locating a desired product , Chatbots for giving information about the product to be purchased and helping in navigation , automated bill generation and bill payment are the areas where various mall assistant focus on. The main aim of these devices is to ease the shopping process and provide a user friendly shopping experience for the customers. Besides, these applications can further be used for increasing the organization's profit by using business intelligence.

'Smartcart-Mall Assistant' device contains number of above mentioned features in a single device. Various other applications and devices have been developed which contain such features. This paper contains analysis and comparison of various applications and technologies that can be used to develop a mall assistant.

2. CHATBOT

ChatBot can be described as software that can communicate with people using artificial intelligence. Chatbots are used to perform tasks such as responding to users' query, providing information and providing better service to customers.

The paper 'Android Based Educational Chatbot for Visually Impaired People' [11], describes a mobile application based Chatbot specifically designed for the blind. The proposed idea is an android application that can provide any kind of information which is present on the Wikipedia according to the need of the user. This application enables the users to frame their own questions. It takes the input in form of speech. The received input is further converted into the desired format and processed. The processed output is received in the voice format. Thus this android based Chatbot is useful for the visually impaired. This application can run on any android mobile phone. The mic of the mobile is used for receiving input whereas the speaker acts as an output device.

The paper 'Chatbot for University Related FAQs '[12] describes a Chatbot designed for answering the queries of students and faculties associated with the university .This Chatbot has a set of predefined question and answers. As this Chatbot is used for a specific purpose the developer can design the application with a set of predefined questions. As this application is used for specific purpose, the queries solved by this Chatbot has certain limitations. The flow of this Chatbot is as follows, user discussion as a rule begins with welcome or general questions. User The figure below describes the flow of working of the inquiries are first taken care by AIML check piece to check application whether entered inquiry is AIML script or not. AIML is characterized with general inquiries and welcome which is replied by utilizing AIML formats. This operation is divided into three parts:

- User post the query on Chatbot
- Processing is done on the users query to match the predefined format by the developer
- Pattern matching is performed between user entered query and knowledge (pattern).

Finally pattern based answer is presented to the user to answer their query. This paper presents the Chatbot for educational sector, where user (a student or parents) can ask query regarding college admission, about college information and other things related to academics. As discussed earlier, user can post their query on Chatbot and response is generated based on pattern matching techniques presented in this paper.

3. INDOOR NAVIGATION

Indoor navigation technique is similar to the GPS based navigation system used for travelling on roads. As the name suggests the indoor navigation is used for navigating inside a complex or a building thus limiting it to a certain area. This method of navigation can be achieved in number of ways such as augmented reality or by the use of tags.

The paper 'User Conventional Root Detection for Indoor Mall' [2] tells us about an android based device used for locating desired products in a shopping mall or a supermarket. The proposed technique uses

1) Shortest Path Algorithm (Dijkstra's Algorithm) to find location of the product
2) The QR-Code Scanner for scanning the product and adding into the cart
3) Payment Predictor for paying the bill generated by the server.

Customer adds the product to the cart by scanning QR Code of the product. Then mark the bought product in the list. The Customer can check out after completing the shopping. Then the bill is generated by the server with the help of cart details. This bill is send to the customer device (mobile) and he/she can make payment online.
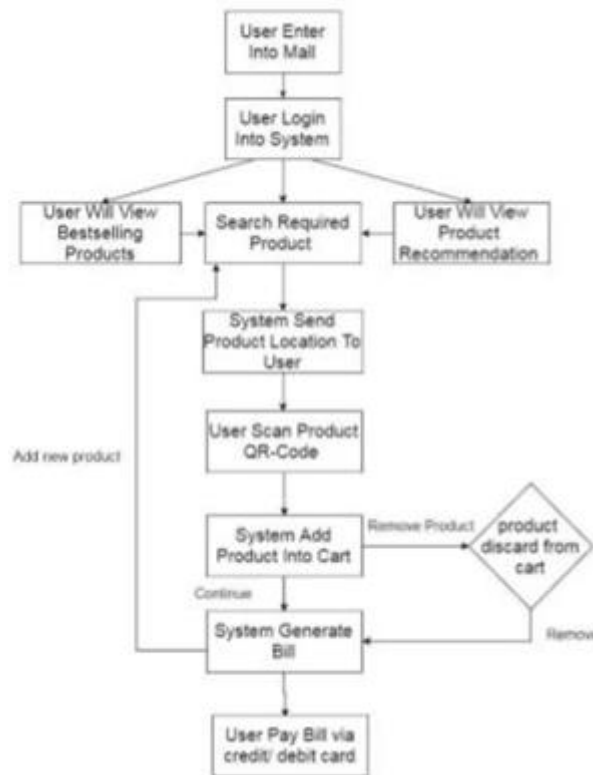

Fig 1 : Flow Chart of the System [2]

The device 'PERCEPT-II: Smartphone based Indoor Navigation System for the Blind' [6] is a smart phone based navigation device specifically developed for the blind. Percept-II is a low cost and user friendly indoor navigation system for blind and visually impaired users. Using an Android Smartphone that runs PERCEPT-II application with accessibility features, the blind user obtains navigation instructions to the chosen destination when touching specific landmarks tagged with Near Field Communication tags. The application needs to have NFC tags installed in the environment of the building where is supposed to be used, whereas our proposed android application makes use of augmented reality for navigation. The use of NFC tags puts limitations on the use of the application.

The following figure shows the architecture of the Percept-II application.
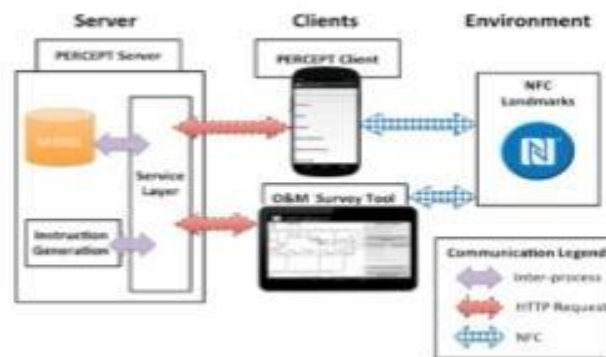

Fig 2: Percept II Architecture [6]

PromoPad device described in the paper 'Personalized In-store E-Commerce with the PromoPad: an Augmented Reality Shopping Assistant', tells us about a device similar to the Percept-II. The difference between the two devices is that the first device makes use of NFC tags whereas the second one is an augmented reality based device. PromoPad is the concept of a shopping assistant that utilizes augmented reality technologies to provide personalized advertising and in-store shopping assistance based on dynamic contextualization. This PromoPad system is a step towards pervasive and ubiquitous computing in the highly lucrative grocery shopping segment. The development goal is to offer a pleasant and inviting shopping experience that is mediated by an augmented reality-based Tablet PC. Our proposed solution is an android based application, whereas PromoPad is an individual hand held device with functionalities similar to the SmartCart-mall assistant application.

4. BILL GENERATION

Scanning the QR code or bar code present on the product by the QR code scanner or the bar code reader respectively and manually entering the values in the database at the counter are some of traditional ways of generating bill at the malls. Scanning the code in order to generate the bill is efficient and advanced technique as compared to manually feeding the data into the database.

Bill generation using RFID tags and smart cart is described in the paper 'Smart RFID based Interactive Kiosk Cart using wireless sensor node' [10]. Kiosk is an interactive cart designed specifically for billing purpose and avoid long queue in the shopping malls. The specifications of the products available in the mall are stored in a database. The product list can be browsed by the customers with the help of onscreen in the display connected to the Kiosk cart. The cart can communicate with the main server in order to access the product details. As the user adds the product into the cart the generation of the bill takes place simultaneously. Besides bill generation, Kiosk cart takes into consideration the item details such as MRP after the discount, expiry date, name of the product etc. It also provides the facility of removing the product from the cart. Thus the system proposed in the paper can provide the consumers a user friendly and time saving shopping experience.

CONCLUSION

All the papers have mentioned their own methodologies for various features. For Chatbot, most of the papers use the system of querying the particular central database and some of the papers have used particular set of instructions only. For indoor navigation, the proposed methodologies include NFC tags, AR based systems, WiFi router, etc. For bill generation the paper describes a smart cart which automates the process of billing. The papers studied in the survey proposes applications or devices which consists of a single functionality. All the above mentioned technologies can be clubbed together in a single device in order to build more user friendly device.

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