A Networked Multimedia Distributed Kiosk System for Commercial and Home Appliances

Nong Si *, Ke-Bin Jia†, and Chang Xu‡
College of Electronic Information and Control Engineering, Beijing Laboratory of Advanced Information Networks
Beijing University of Technology, Beijing 100124, China
Email:*nongsi@ieee.org †kebinj@bjut.edu.cn ‡alice89frog@gmail.com

***Abstract*—Under the rapid development of information technology in todays society, kiosk system has become an indispensable part in many fields. Especially in retail business, retailers use the kiosk system to meet customer demanding and promote overturn. These systems have been widely used in food chains, department stores, book stores, entertainment and recreation services and supermarkets, which have highly improved the service productivity. This paper describes the background, analyze, design and architecture of a new networked multimedia distributed kiosk system mainly focuses on commercial and home appliances, in order to solve the sale space limitation problem in supermarkets and e-markets.**

***Index Terms*—networked system; ASP.NET; authorware platform;**

I. Introduction

The hypermarkets are self-service shops with a selling area exceeding 5,000 square meters and a correspondingly high turnover. Typically the stores offer a comprehensive range of nonfood items in addition to a complete food range. Depending on the individual design, the nonfood area space cannot be equivalent to that of a department store owing to a smaller area [1] . Especial for the commercial and home appliance, due to its bulky, always has a limited sale field space which often was arranged showing in the corner of hypermarket within a far fewer display samples than the specialty store.

However, following the rising sale proportion of the home appliances in the whole market recent year, many hypermarkets attempt to change the present situation by selling more appliances. Unfortunately, the present commercial and home appliance selling field space is unable to satisfy the requirement of sales growth. It is impossible to utilize one small corner to display hundreds of appliances, or even attract the customers. The space limitation blocks the development of appliance selling in hypermarket. Whereas, the demand for a low-cost, feasible is becoming urgent, because the stores start to realize the restrained selling opportunity for other hundreds merchandises is a big lost.

Nevertheless, through the investigation in the professional electronic appliance shop we found the main purpose of this sort of shop is to display products. Consumers cannot get the product immediately after they paid. Instead, the product will be sent to consumer from warehouse lying in other place one or two days later. Base on this fact, we propose the concept of kiosk to solve the problem. A kiosk system is a computer-based information system, located in public areas, with which through an intuitive and multimedia user interface, from mostly anonymous users, predominantly while standing and for a relatively short time, information can be recalled or transactions can be triggered [2]. Besides, interactive info kiosk systems and mobile bar-code scanners for self-checkout are already available in various markets and represent just the beginning of technology applied in retail stores[3]. Therefore, the kiosk system applied in the supermarket is feasible and conforms to the reality.

The e-catalogue appliance kiosk system (EAKS) in this paper addresses the space limitation problem by being a digital sale point replacing the real object exhibition. This paper describes the background, analysis and design of EASK that enriching product choice and striking a balance between the supply ability and customer demand. The remains of this paper is organized as follows: Section II describes the background and related work of EASK. Section discusses the analysis and design of EAKS. Section concludes the paper and presents the current situation of EASK in hypermarket.

II. Related Work and Background

Kiosk system located in public areas including bank, library, train station, airport, park, school and etc. It has integrated into everyone daily life. Among them, some kiosk systems substituted the human work, with which have saved the cost while increased of efficiency. The railway ticket system [4] provides a better service to customer and gets more efficient in ticket purchase. The digital photo kiosk system intends to economize time of photo printing [5]. The Airline check-in kiosk system [6] reduces the labor cost and increases the customer satisfaction. Other information kiosk system such as the one in Slavery Today, a permanent exhibition at the National Underground Railroad Freedom Center installed the interactive displays and many of the video components of the exhibit to educate public [7]. And the healthcare kiosk [8] provides useful medical information to people.

In contrast to current kiosk system, EAKS aims to solve the limitation of commercial and home appliance sale field. Though it belongs to information kiosk system, EAKS is equipped with selling function. Since there are few studies concerned the solution of for hypermarket service space problem, this kiosk system extends application in such area.

In supermarket, kiosk system has been widely used in other field. Customer can use a self check out kiosk to pay the

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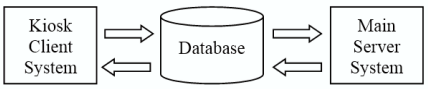

Fig. 1. Architecture of EAKS

merchandise without standing in a long waiting line [9]. The healthy kiosk tells the customer healthy and nutrition of the food in their cart [10]. The searching item kiosk system help the customer to locate the position of the item they want to buy [11]. EAKS designed to boost the sale in appliance is a novel application in supermarket.

III. ANALYSIS AND DESIGN OF EAKS

The EAKS adopts from the client-server architecture. The advantages of client-server architecture are the well-known principles and the failure semantics[1].

A. Architecture of the EAKS

The client system installed with a multi-points touching screen, which is used to display the variety products through e-catalogue interface. Owning to this, customer can choose from the menus to change the displaying content according to the category, properties, price etc. Apart from the products presentation, the purchasing procedure can be performed and finished directly in the client system either.

The server system can be set up through the workstation computer in the office area of supermarket by the authorized salesmen to manage. The system is primarily used to manage the product data, pictures, sales prices and kiosk client system settings. Those altered data will affect the content of kiosk client system in certain time. Database is a bridge connects the kiosk client system and main server system. Instead of changing the other desktop system straightly to ensure the system can be used as normal office computer in the future, a separated database server was designed and only the authorized server and client systems can write and read the data from database.

B. Kiosk Client System

The kiosk client system stalled in the touch screen is implemented by Authorware Platform to meet the abundant requirement of complex animation in order to attract customers attention when customer is switching different product pictures. The client system can be divided into two primary functions: display and purchase.

1) Display function: Using the architecture of e-catalogue to realize, the display function can be split up into 4 layers.

- Electronic appliance category list
- Product searching condition list
- Product list
- Product detail

E-catalogue is a customer-driven approach via internet/intranet that provides an efficient means in order to capture the customer eyes and make them satisfied [12]. It offers a query of methods to help the customer search and view what they want. In the client system we use the attribution query to find the appropriate appliance.

The home page of client system is the list of commercial and home appliance categories which is generated from the category table. Customer needs to choose one major appliance category first, and then the page will go to the product searching condition list. In this page, the list content is retrieved from database related to condition which vary according to the category choice in the former step. After confirmed the current selecting condition, the system will search the product to satisfy the requirement in database automatically, and the final result will be shown on the product list page. Clicking any of the products, detail information can be browsed. Multi-angle pictures with fascinating animation between switching and comprehensive introduction of the appliance let customer have an overall understanding of the product. In this product detail page, both displayed picture and information are retrieved from product data table via database server.

Despite the distinction among those four different list pages, the operation is same: choosing one object within the whole options. Accordingly we create similar flow path to the four list pages in Authorware. The main part of flow path is the interactive process which is in charge of connecting with following page and indicating the specific content in the next page. Since the attribute of interactive process, plus the data retrieving and the other data operation can be done in calculating process, the e-catalogue architecture in internet/intranet is more suitable to carry out in Autherware Platform.

2) Purchase Function: In the product detail page, customer can choose to buy button to enter the product purchase page. The purchase item in client system can be divided into two types.

- The purchase of product
- The purchase of guarantee extension

In the purchase page, the purchase list shows the selling information of product when customer feels like to buy. If customer chooses to buy the guarantee extension of one specific appliance, the system will add the corresponding item in the purchase list. In this list customer can add or decrease the amount of any commodity with the price changing automatically. When customer finally make a decision, clicking finish button the order form will show in the submit page. And then clicking the print button, customer will get an order form printed by EAKS.

Comparing to the other pages, the flow path of purchase page is consists of interactive process and calculate process. The interactive process focuses on the operation in purchase page including the selection, quantity and price modification and etc. The calculate process as the primary step which is responsible to read data form database and show the results on the touching screen. In order to print the order form, we make the order form display in the web page, via the print function of Internet Explorer browser the order form can be printed by any printer which increases the compatibility of kiosk system in a great degree.

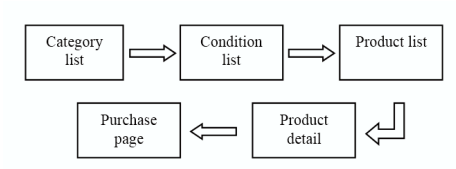

Fig. 2. Flow Chart of Kiosk Client System

Apart from those main functions mentioned above, the log in and out of the client system was also designed to meet the needs to confirm the user activities. We hid the exit access on the specific small area of the front page in the touching screen to avoid customers logging out system inadvertently. The salesperson need to double click the specific top left corner of the home page to activate a keyboard which will show on lower right corner and then by entering the password to exit the system.

Considering the size of touch-screen in practice, we add a process in the flow path to auto adjust the proportion of the screen. Since the resolution of the most screens we test on site are 1280*800 pixels in supermarket and the touch-screen is 1024*768 pixels, we change the proportion via evaluating the specific variance of Autherware Platform.

The significance of client system interface design should not be ignored. For the object user may have no special knowledge in touch screen computer operation, hence the simplicity as a vital element through our design with the gorgeous animation affect remained. The whole interface embodies the succinct and practical.

C. Server System

The server system is based on the ASP environment. Salesman can upload and revise the product data in database through server system, as well as some display settings in client system. We categorize the function of server system into two groups:

- Product management
- Default setting

The product management contains edit, change and delete function of the information related to product. We divide the management in the following categories as different roles.

- Which kind - Category management
- Which maker - Brand management
- What to sell - Product management
- What is new - Adding product

In category management, salesman can add a new category of household appliance or remove the old one. We mark the commercial and home appliance category with different number in database. The later data retrieve can be easily achieved by the unique ID, since other tables in database is classified under same category ID naming algorithm. The operation of brand management is similar to the category management such as add and remove function.

In product management, salesman can change the detailed description of one product include general information and

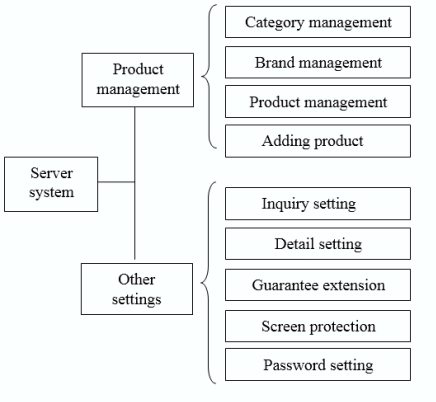

Fig. 3. Structure of Server System

product property. We add a simply search function in the management page. Salesman can filter product through appliance attributes or brands which facilitate the editing of the product parameters.

If the salesman wants to add a new product, choose the adding product menu and fill every item of product adding form, after click the finish button all the information will store in the product data table in database. However, for the input information we have no idea about their type, in that case we add an extra step before the data write into database. In this step salesman needs to check the box if the input content is an unique ID number, then we use the regexpTest function to extract the number and store them in the specific column in product data table. When we select a product under a particular range in client system, the data in such column will match the some input limits, which is safe for future data searching. The default setting is applied to set displayed content in client system. We divided the other setting into five categories in accordance with their function.

- Before sell - Inquiry setting
- During selling - Detail setting
- After sell - Guarantee extension setting
- Secure sell - Screen protection setting
- Secure kiosk - Password setting

In the inquiry setting page, salesman can add, delete or edit a searching condition for a kind of commercial and home appliance, as well as the item searching attribute setting. All the changes will show in the product searching condition list in client system simultaneously. The available of a range divide the searching condition into two types. We use a number to distinguish them in the database. 1 represents the data does not have a range and 2 means it does. The range consists of two limits which are normally number store in the corresponding column of condition detail table. When we search a product, the client system will find appropriate product item which comfits the presetting.

The detail setting is used for edit the description item of product which involves the changes in other two pages:

Adding product and Inquiry setting. The product list of client system will show the final result of such change.

The operation towards guarantee extension setting page is to edit the price of two different guarantee extension service, one year and two years. We can see the final price in the purchase page in client system.

In screen protection setting, we can upload picture stored in the computer. The path of that picture will write in the database and the picture will be stored in the appointed folder. Client system will show the picture in the screen protection process according to the stored path.

For the way of logging in the server system is to compare the input content with the password stored in the database. Hence, the password setting function servers to rewrite the old one in the database.

D. Database and Security

To make sure the system under a maximum data security frame, we implemented the kiosk system under several password levels and secure USB memory stick protection. The database security is mainly related to the client and server system, which allows store and authorized staff to retrieve the data from those system after passing the relative password checker.

In that case, the data tables have to be designed to satisfy EAKS security requirement. The structure of the data secure table involves password table, searching condition table, category table, order form table, brand table, screen protection table, condition detail table and description table. To protect the customers sensitive information, we presented a periodical password changing USB memory stick to the highest level staff. The password is stored in the memory with Rijndael Algorithm to prevent from deciphering

IV. Conclusion

In this paper we design a system, EAKS, aiming to solve the shop space limitation problem. The concept of kiosk system promotes the idea of EAKS be proposed and implemented. EAKS facilitates customers to realize the diverse commercial and home appliances, at the same time helping the hypermarket store to push and increase the sale. EAKS implemented by Authorware Platform and ASP.NET, which is not a common combination, successfully reached the anticipatory goal. A group of customer tested the experimental software and their feedback was very positive. The EAKS has been installed in a few testing points at Carrefour Supermarket Store currently and it will be promoted in other branch stores in China in a few months.

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