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Design and Implementation of Digital dining in Restaurants using Android

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Abstract: With the increase in the number of restaurants and population of restaurant-goers, a need to enhance the working of hospitality industry is felt. This research work aims for this betterment of hospitality industry by incorporating technology. A recent survey on the utilisation of technology in hospitality industries showcased that various applications based on wireless technologies are already in use enabling partial automation of the food ordering process. In this paper, we discuss about the design and implementation of digital dining in restaurants using android technology. This system is a basic dynamic database utility system which fetches all information from a centralized database. The tablet at the customer table contains the android application with all the restaurant and menu details. The customer tablet, kitchen display and the cashier counter connects directly with each other through Wi-Fi. This wireless application is user-friendly, improves efficiency and accuracy for restaurants by saving time, reduces human errors and provides customer feedback. This system successfully overcomes the drawbacks in earlier automated food ordering systems and is less expensive as it requires a one-time investment for gadgets.

Keywords: Digital Dining; Automated food ordering system; Android application; Wi-Fi, Dynamic Database.

I. INTRODUCTION

The rapid growth in communication technology emergence of wireless technology and android devices has created quite a stir in the business transactions. Business in the hospitality industry has been greatly influenced and competition has increased due to improved food ordering techniques. In earlier days, food ordering was a completely manual process where a waiter used to note down orders from the customers using pen and paper, take the orders to the kitchen, bring the food and make the bill. Although this system is simple it requires extensive investment in purchase and storage of paper, large manpower and also is prone to human errors and greater time consumption.

In order to overcome these limitations in manual system, some systems were developed later like PDA based systems and multi-touchable restaurant management systems to automate food ordering process.

PDAs (personal digital assistants) are much in use because of their portability feature and ability to communicate with personal computers but they too have some limitations. A PDA-based system lacks ubiquitous communication, is exposed to health hazards, requires training of attendants, the need of having attendants to operate, the inefficiency during peak hours and small screen size.

The multi-touchable restaurant management systems also have limitations like: they usually require low resolution output of the monitor; can produce activation without touching the screen and the cost to produce the special Infrared bezel for touch screens is very high. Taking in view these systems, we have proposed our system with more advanced features, which is specially designed for Android Devices.

II. LITERATURE REVIEW

❖ TRADITIONAL PAPER-BASED SYSTEM:

One of the widely used food ordering schemes is the traditional paper based system. In this system all records are stored on paper. The main drawback of this system is papers can get easily lost or damaged. There is also wastage of money, time and paper. Paper-based systems do not provide any form of dynamicity. Even a small change requires the entire menu-card to be re-printed. Since large manpower is required, this system is error-prone and is time consuming from a customer's point of view.

❖ INTRODUCTION OF COMPUTERS IN HOSPITALITY INDUSTRY:

The emergence of computers pioneered the automation of the food ordering system. A PC was set up where waiter after taking the orders would enter the order in the system. The information was then displayed at a screen in the kitchen. The kitchen staff would then prepare the dishes accordingly and on completion would notify the waiter who collected and delivered the dishes to the respective tables. The system was also capable of intimidating the waiter about the availability of a dish. If a certain dish was unavailable, the waiter was able to ask for changes or even delete a customer's order. After serving the food, the waiter used to generate the bill at the cash counter. All the details of the customer were fed into the system which the management had full access to.

With the advancement in the computer and communication technology, various systems were launched in market for the purpose of automation of the food ordering system. Some of the existing systems are mentioned below:

▪ QORDER:

The next improvement in restaurant industry was 'QORDER'. The waiters now no longer took the orders on paper; instead all the orders were taken on a handheld device called the 'QORDER'. It was a portable android device where the waiter enters order information on the touch screen and then sends it to the kitchen in for processing. Simultaneously, the POS system receives the sales information for later billing. QORDER utilizes WIFI to easily reach to the most remote corner spot in your restaurant. Once the guests are done, the waiter prints the receipt out and processes payment with the handheld unit.

▪ PERSONAL DIGITAL ASISTANTS(PDA'S):

When new technologies and approaches being introduced to automate the food ordering process a number of wireless systems like WOS, i-menu, FIWOS were developed. All these systems were PDA- based. The feature of PDA systems was that customers or waiters key in ordering process. There was easy communication between the PDA's and server due to wireless technology.

But this system also had several drawbacks. PDA-based system increased the restaurants expenditures as many PDA's were required during peak hours. PDA systems also did not provide any real time feedback from customers. Menu cards in the PDA's were unattractive and uninformative as it did not support images.

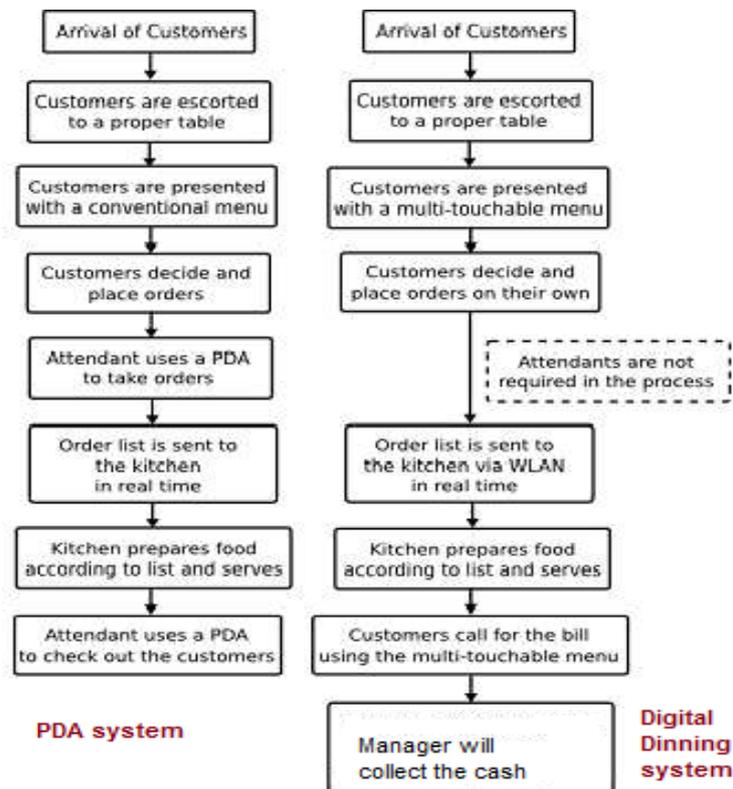


Fig. 1 Comparison between PDA and Digital Dining System

▪ MULTITOUCH TECHNOLOGY:

Multi-touch technology is an enhancement to the existing touch technology where users are allowed to control and perform operations simultaneously on the electronic visual displays using multiple fingers or gesture inputs. Large displays such as from the tabletop and the wall-screen are deemed to be essentials when dealing with multiple users sharing the same display for information visualization purposes. It is reported that the social interaction is highly improved among users using a shared display and input. But the multi-touchable restaurant management systems also have certain limitations. Touch screens available in the market are of capacitive, resistive or SAW (Surface Acoustic Wave) types which are very costly. Limitations of capacitive touch screen are not operating able with stylus until it is of conductive material. One more disadvantage of capacitive touch screen is it is expensive, offers less durability hence short life is another drawback. The drawbacks of resistive touch screens include its inability to support multi-touch gestures, its poor visibility in direct sunlight and its lesser durability. A drawback of SAW is the technology cannot be sealed; it can be adversely affected by surface contaminants and water, making it unsuitable for many industrial or commercial applications. Due to the way the technology works it can also be susceptible to data-noise, can be affected by large amounts of dirt, dust in the environment.

III. PROPOSED WORK

To overcome the limitations of above system, we proposed this digital dining system based on android technology. It is a wireless food ordering system using android devices. Android devices have gained immense popularity and have revolutionized the use of mobile technology in the automation of routine task in wireless environment. Android is a Linux based operating system for mobile devices such as smart-phones and tablets. Considering the promising future of Android market, it is beneficial and worth to write applications for android that target masses of people.

The Objectives of our proposed system are:

- To combine Wireless technology and Android OS to automate food ordering process.
- To minimize the flaws in conventional system by atomizing the working of a restaurant.

- To make provisions for obtaining feed-back from the customers and provide the restaurant a means of review of their service.

IV. THE DIGITAL DINING SYSTEM

A. SYSTEM ARCHITECTURE

The system architecture of Digital Dining in restaurants is shown in figure 1^[1]. The architecture covers the three main areas of restaurant: the *Serving* area, the *Kitchen*, and the *Cashier counter*. Conceptually this system is built using four main components:

- The android application on tablets at the tables to make orders.
- The server application on the restaurant-owner's laptop/tablet to customize menu and keep track of customer records.
- The central database for restaurant-owner to store updated menu information and order details.
- Wireless connectivity between the three main areas of restaurant.

This architecture is restricted only to the restaurant vicinity.

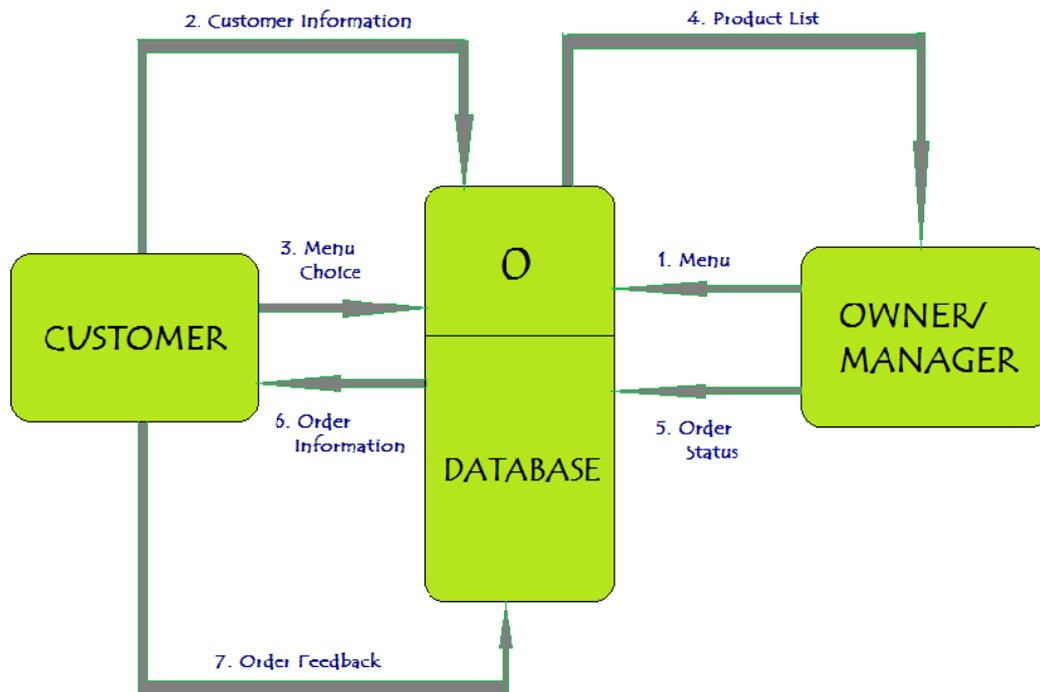


Fig. 2 System Architecture

B. SYSTEM DESIGN

In this part we present some of the system diagrams such as context diagram (CD), which provides a clear system overview. Figure 2 depicts the CD of the digital dining system. Firstly the restaurant owner/manager will log into the system and update the menu as per the availability of the dishes. The manager will also advertise the various offers of the day. The information and menu choices selected by the customer are sent to the system over wireless network. The restaurant owner and the kitchen staff will receive the ordered lists from the system. The restaurant owner can update the order status into the system. The customer can also view the order status. The entire application will already be installed and kept open on the tablets on the tables. The shutdown option of the application will remain disabled for the customers i.e. the customers won't be able to turn off the

application and do any other work on the tablets. After having the food customer can make payment and enter feedback regarding restaurant system and services.

This project consists of 3 main modules as follows:

❖ USER TABLET(module 1)

- This type of the tablets is especially for the use of normal users coming in the restaurant.
- These tablets will consist of the whole menu of the restaurant. The items in the menu are non editable for these types of the tablets.
- They will be enabled with the Wi-Fi connectivity.
- Customer from any layer of the society should be able to handle and operate all the functions easily.

❖ MANAGER'S TABLET(module 2)

- These desktops are especially for the use of the restaurant manager.
- The manager should be able to control the function of whole restaurant from a single desktop/tablet.
- He can access any tablet and should be able to make changes to the menu.
- Also he can change price of particular item or disable particular item which is not available at that particular time.

❖ KITCHEN DISPLAY(module 3)

- These are present at the kitchen near chef so that he should be able to see what a particular has ordered.
- All the ordered items are displayed on the screen giving the table number below.
- They should be sufficiently large to be seen by chef at a reasonable distance.
- Chef should be able to notify when a particular item is ready.

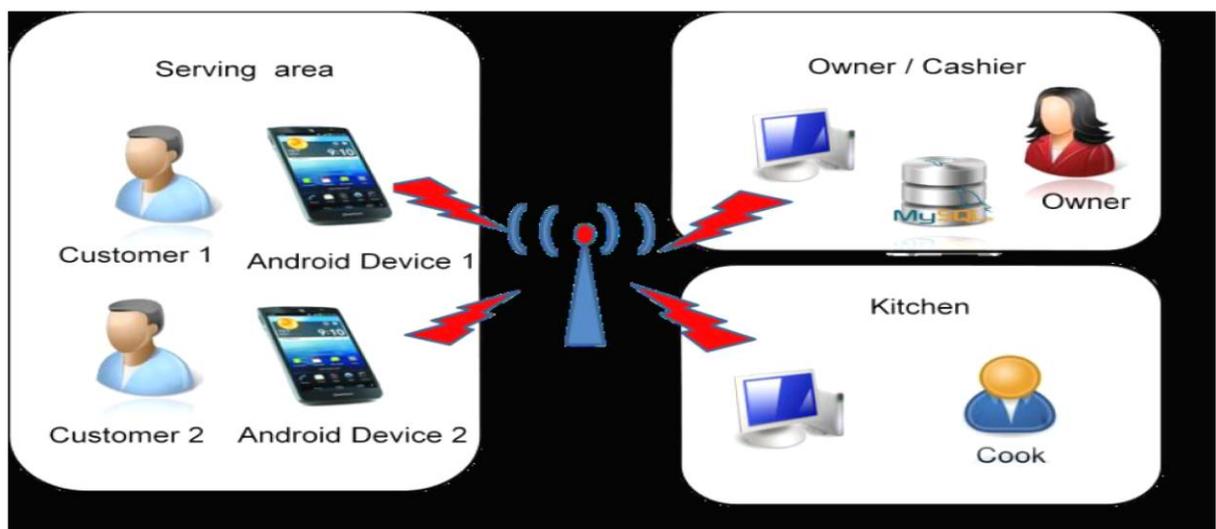


Fig. 3 Modules

C. SYSTEM SPECIFICATION

The technologies which are used to implement the system are:

1. Android version 2.2 – 4.0 for Tablets is required. We have used Android 4.2 Jellybean as the working platform to develop this application.

2. Java SE 6 Programming Language is used to develop the software.
3. Eclipse Indigo is used as a Rapid Application Development Tool (RAD) or as an Integrated Development Environment (IDE) for coding the software.
4. JSP/SERVLET is used for Remote Database Access from the main system of the restaurant.
5. SQLite is a light weight Database which is going to be used for database access from the tablet.

V. CONCLUSION

In this paper, we compare the 3 major automaton tools in Restaurant sector namely, the PDA based System, multi-touch restaurant system and Android based system. The user interface of Android based system is more attractive and informative than the PDA and Multi-touch systems. The processing speed of Android system and Multi-touch system is almost the same whereas the PDA based systems are slower than the other two systems. Thus, Android based system is the cheapest automation solution for the restaurant owners.

Thus, we present an automated food ordering system with features of feedback and wireless communication. This system is convenient, effective and easy thereby improving the performance of restaurant's staff. It will also provide quality of service and customer satisfaction. Thus, the proposed system would attract customers and also adds to the efficiency of maintaining the restaurant's ordering and billing sections.

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