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RESEARCH ARTICLE

Integration of Touch Technology in Restaurants using Android

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Abstract— *The growing number of restaurants and population of restaurant-goers have emphasized the need to enhance the working of hospitality industry. This research work aims at improving the quality of services and business of the hospitality industry by incorporating technology. A detailed research on the integration and 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 integration of touch technology in restaurants using android. 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— *Touch technology; Automated food-ordering system; Wi-Fi; Dynamic Database; Android Application*

I. INTRODUCTION

The sudden and rapid growth and development of 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 order to effectively run a restaurant, time saving and cost optimizations are essential. Reduction in time by a few seconds for each table can speed up order processing, increase efficiency and boost profits. The biggest obstacle most restaurants face is the migration from a paper-pencil system to a completely automated touch-screen system. The food ordering system, till a few years ago, 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 was simple it required extensive investment in purchase and storage of paper, large manpower and also was 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.

PDA's (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 systems:*

The traditional paper based system is one of the most extensively used systems worldwide. In this system all records are stored on paper. However, this system is plagued with various problems. Some of the problems are highlighted below:

- The most common blunder is waiters making mistakes with customer's orders. At times, a waiter can forget to add a specific item, make a changes because a customer is allergic to certain substance, or forget to give the order to the kitchen.
- Customers have to wait for a waiter to take their order. They must rely on the waiter to remember their order and specific details. Their food may take longer to be prepared and served if the waiter has multiple tables. They may also get wrong bills since they cannot see their bill amount until their meal is complete.
- Impatient customers also call over the waiter/waitress frequently to find out the status of their order several times during their visit, wasting the waiter's service time.
- Waiters need to constantly check with the chefs to determine when food is ready. Conversely, chef needs to make sure waiters know that food is ready. This can cause the food to get cold over time and lead to potential food-poisoning. It may also lead to wrong orders and an unsatisfied customer.
- Keeping track of empty, clean and reserved tables within a restaurant.
- Busboys must always be alert as to which tables need clearing. This means that they must be always checking for tables. Waiters need to usually alert them. This takes extra time from other staff.
- Managers have to analyze hundreds of paper receipts to determine best-selling items, popular hours and customer satisfaction. They also require re-printing of menus when food is not available or a price needs to be changed. This can be costly and time-consuming to a restaurant.

➤ *Computers usage in hospitality industry:*

The emergence of computers pioneered the automation of the food ordering system. A PC connection was established where the waiter after taking the orders would enter the order in the system. The respective orders taken were then displayed at a screen in the kitchen. The kitchen staff prepared the dishes accordingly and on completion notified 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, bill was generated at the cash counter. All the details entered by 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:

A. *QORDER*:

The next improvement in the food industry was the '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 WI-FI 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.

B. *Personal Digital Assistants (PDA's)*:

With new technologies and approaches being introduced to automate the food ordering process, a number of wireless systems like I-menu, FIWOS, WOS were developed. All these systems were PDA- based. The feature of PDA systems was that customers or waiters key in ordering process. Communication between the PDA's and server became feasible and simple due to wireless technology. But this system also had several drawbacks. PDA-based systems surpluses the restaurant 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.



III. PROPOSED WORK

To overcome the limitations of above systems, we propose this integration of touch technology in restaurants based on android technology. It is a wireless food ordering system using android devices. Android devices, in the past few years, have reached the pinnacle of popularity and have revolutionized the use of mobile technology in the automation of routine task in wireless environment. Android is an open-source, Linux based operating system for mobile devices such as smart-phones and tablets. The promising future of Android market makes the concept of writing applications for android beneficial and worthwhile.

As a remedy for the above mentioned systems, we propose a restaurant with a touch technology system. Our system aims at providing the following features:

- Combining of Wireless technology and Android OS to automate food ordering process.
- Allow the restaurant to operate faster (faster seating, faster order preparation, faster turnaround on food).

- Reduce employee error, thereby increasing customer happiness. This also reduces waste as when the wrong item is ordered, the food must be discarded.
- To minimize the flaws in conventional system by atomizing the working of a restaurant.
- To provide a mechanism for obtaining feed-back from the customers and provide the restaurant a means of review of their service.

❖ **THE TOUCH AND ORDER RESTAURANT SYSTEM:**

A. System Architecture:

The system architecture of Touch and Order in restaurants is shown in figure 1^[1]. The architecture attempts at a full coverage of the three main areas of restaurant: the *Serving* area, the *Kitchen*, and the *Cashier counter*. The main components of this system are:

1. The android application on tablets at the tables. The tablets will be provided to customers, at their tables, allowing them to directly view the menu card and order immediately from their respective tablets. The tablets are the property of the establishment and are kept at each table.
2. The server application on the restaurant-owner's laptop/tablet to customize menu and keep track of customer records.
3. The central database for restaurant-owner to store updated menu information, order details and broadcast various offers and promotions.
4. Wireless connectivity between the three main areas of restaurant.

This system, however, is confined within the restaurant vicinity only.

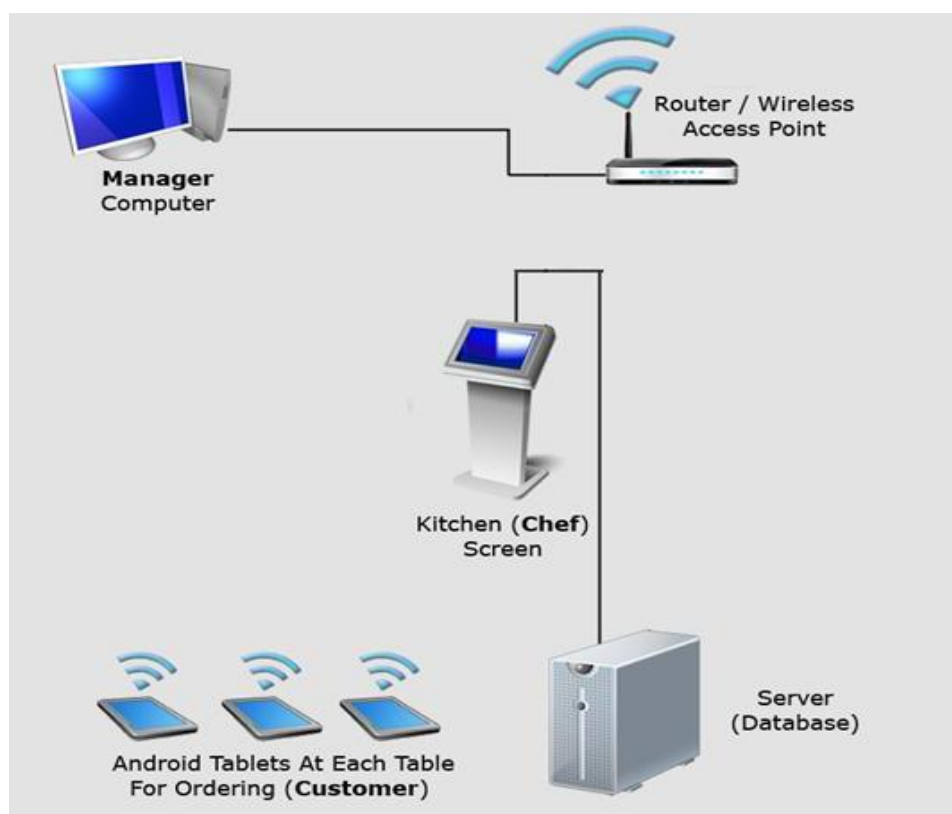


Fig. 1. System Architecture

B. System Design:

In this part we present some of the system sequence diagrams such as use case diagrams, which provide a clear system overview. Figure 2, 3 and 4 depicts the use case diagrams for managing menus, food ordering and bill payment of the touch technology based restaurant system. Firstly the restaurant owner/manager will log into the system and update the menu as per the availability of the dishes. The manager can also promote the various offers of the day. The information and menu choices selected by the customer are sent to the system over wireless network. The kitchen staff and the restaurant owner will receive the lists of items ordered by the respective customers from the system. The restaurant owner can also update the order status into the system. The customer is also able to view the order status. The entire application will be readily installed and kept open on the tablets on the tables. The shutdown option of the application will remain disabled for the customers. The customers won't be able to turn off or minimize the application and do any other work on the tablets. After completion of the meals, the customers can make payment and enter feedback regarding restaurant system and services.

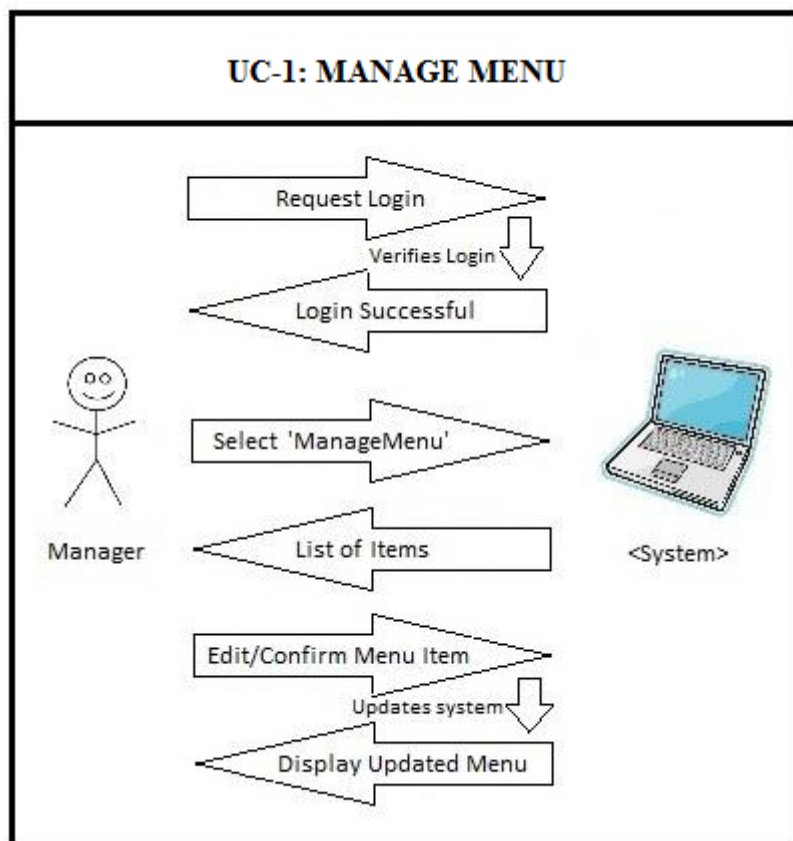


Fig. 2. System Sequence Design for Manage Menu

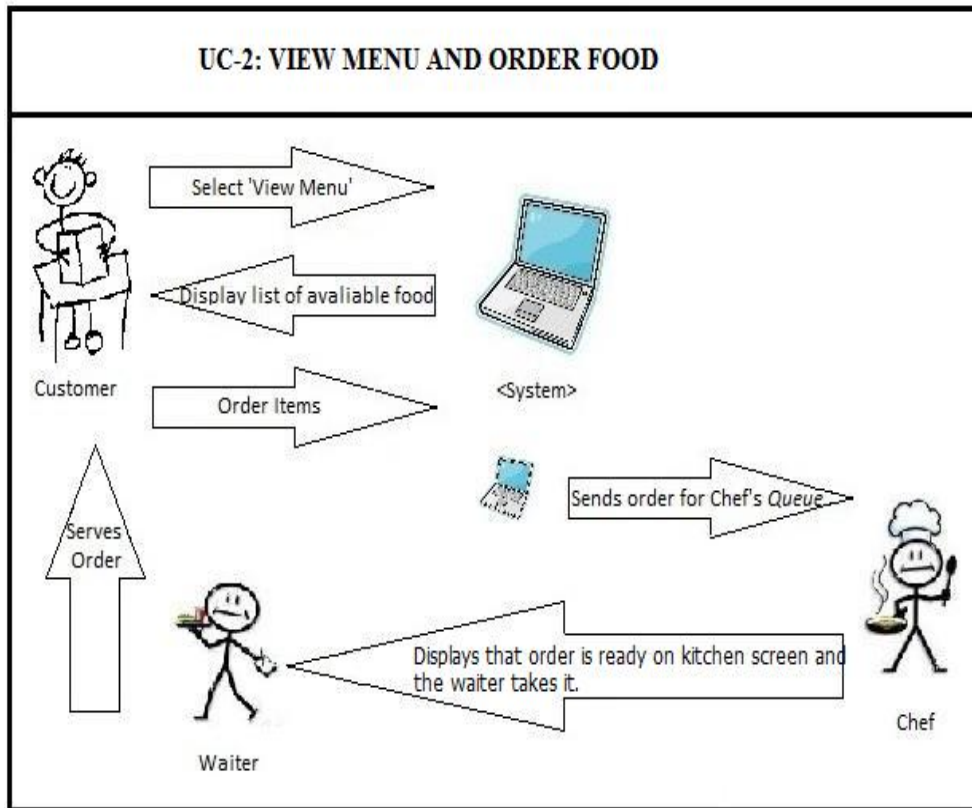


Fig. 3. System Sequence Diagram for Order Food

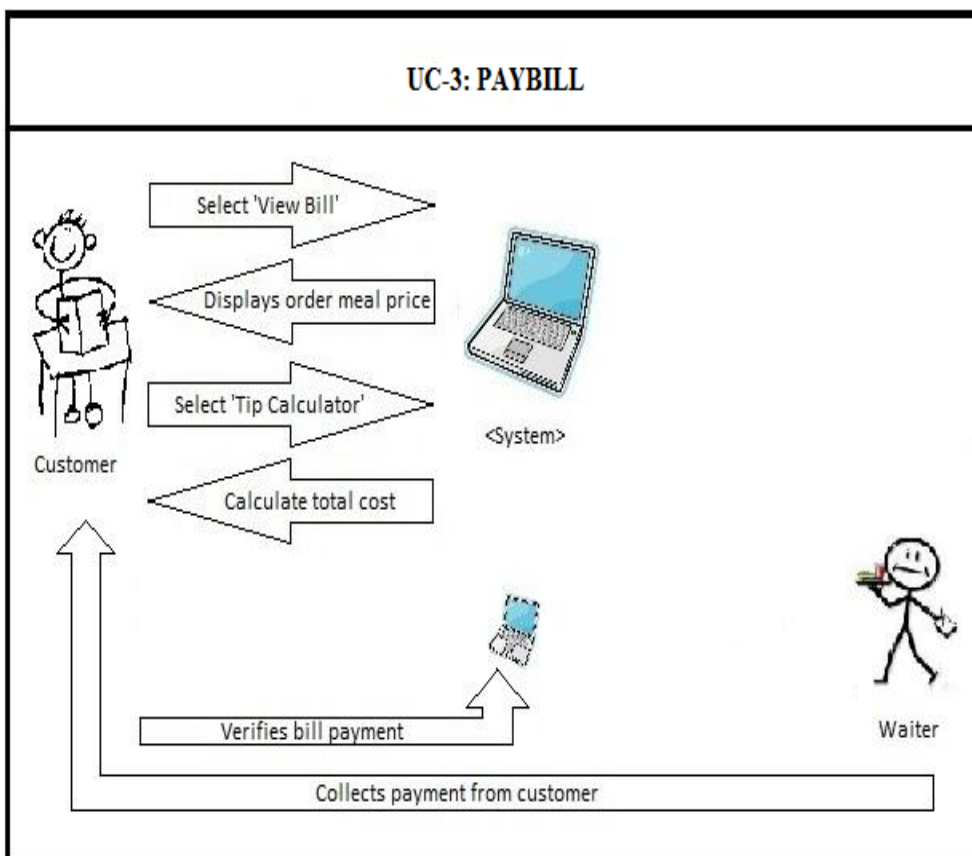


Fig. 4. System Sequence Diagram for Bill Payment

The main modules of this project are as follows:

- ❖ Tablets at the customer's table: (module 1):
 - These tablets are designed for the use of normal users arriving at the restaurant.
 - These tablets display the whole menu of the restaurant. The menu contains text and graphics that describe each item to an average customer. The items in the menu are non editable for these types of the tablets.
 - They will work efficiently by enabling Wi-Fi connectivity.
 - The customer can view the menu of the restaurant and add menu items to cart, see total price, specify quantity and add notes (e.g. "no onions", or "less garlic"). The menu also displays a brief description of the item when selected.
 - Customers can also go through the features of the restaurant, take a look at the facilities provided by the restaurant and check for various offers available.
 - When the desired list of dishes is finally selected, customer can click on 'Confirm Order'. This order is then sent to the chef via the kitchen display and to the cashier's desk as well.
 - The tablet also provides a feature for providing real-time feedback.
- ❖ Manager Desktop/tablet (module 2):
 - These desktops cater to the needs of the restaurant manager.
 - The manager controls the functioning of whole restaurant from a single desktop/tablet.
 - He is authorized to access any tablet and is provided the authority to make changes to the menu.
 - He can perform various updates like changing the price of a particular item or disabling a particular item which is not available at that particular time.
- ❖ Kitchen Display Interfaces (module 3):
 - These displays are set up at the kitchen near chef so that he is able to view the orders requested from customer.
 - All the ordered items along with their table numbers are displayed punctually at the chef's interface.
 - The resolution and font size is sufficiently large to be seen by chef at a reasonable distance.
 - The display allows the chef to update the estimated time of completion of each order once he starts cooking it.
 - The chef's screen displays two-three orders simultaneously which updates the chef about what to expect once the current order is closed.
 - Chef is able to notify and close an order when a particular item is ready.

C. System Specifications:

For implementing this system, we have made use of the technologies mentioned below:

- 1) Android version 2.2 – 4.0 for Tablets is required. Android 4.2 Jellybean is used as the working platform to develop this application.
- 2) Java SE 6 Programming Language is used for software development.
- 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.

IV. CONCLUSION

In this paper, we compare the major automaton tools in Restaurant sector namely, the PDA based System, QORDER system and Android based system. The GUI of Android applications are more attractive and informative than the PDA and QORDER systems. The processing speed of Android system and QORDER system is almost the same whereas the PDA based systems are slower than the other two systems. Therefore, it is clearly visible that Android based systems are 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. This

system also ensures good quality of service and customer satisfaction. Thus, the proposed system has the potential to attract customers and also adds to the efficiency of maintaining the restaurant's ordering and billing sections.

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