E-Restaurant Android Application Using Near Field Communication

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Abstract: There are several inventions that have been made using near field communication technology which suggest that NFC technology is about to have a major breakthrough in the market. In this paper, we explore the near field communication technology further by implementing with food ordering system and providing a feasibility to the restaurant industry. The prototype of this system tells that data is sent from server to NFC and NFC to server uses peer-to-peer communication. This application consists of three applications within itself. First is for the customer who can book tables and place orders. Second is for the kitchen unit in a restaurant, which enables the staff to view current orders. Third is for the manager of that restaurant in order to keep track of all the transactions. We have made use of a recommendation engine that suggests menu to a customer while placing order. Our research says that implementing NFC technology in the food ordering system will resolve the issue of existing system. We have chosen android and web based platform because it is most widely used today.

1. Introduction

Mobile communication systems continue to grow in popularity and have become an integral part for communication in both personal and business purpose [5]. With the advancement in information and communication as it takes lot of time & technology (ITC) business transactions has greatly influenced. The adoption of wireless technology & emergence of mobile devices has led to automation in the restaurant industry. Business in restaurant industry can be improved with the combination of wireless and mobile technologies. The competition in restaurant business has increased with the advancements in food ordering techniques [20]. 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 [17].

The Major Objective is to help restaurants solve these problems by implementing a low-cost solution to increasing customer and restaurant staff satisfaction. The idea is creating a menu using NFC technology. NFC tags will be affixed to the restaurant menu with a specifically-designed NFC reader hard-wired to the menu. Customers can use the reader to select menu items by hovering over the appropriate NFC tags on their menus. Since NFC-tags are so low profile (almost as small as a sticker!), restaurants can keep the current design/layout of their menus and integrate our new technology with low switching costs.

The menu will contain an RF module that will send the order directly to the kitchen, reducing the work that waiters need to do. This will allow the restaurant to and hire less waiters and will also improve any miscommunication between server and patron. Imagine if you are in a foreign country where you do not speak the native language. Our solution will allow you to intuitively point and select the items you want, keeping difficult communication between server and guest minimal.

Some restaurants thrive through the friendly service that their staff brings to the table. Our product is designed for fast-casual type restaurants where you are solely interested in getting your food and eating.
2. PROPOSED WORK

2.1 ARCHITECTURE

Once authentication details are verified, client gets the menu card on his/her mobile phone. The system consists of following components: The backend which is made up of web server and database, and the frontend that include both the user and the administration. The most important component of this system is the database and the frontend and the android application. Every table is attached with NFC tags. These tags hold a unique number. These tags are scan by android smart phone to establish a connection (NFC reader/writer). These tags are synchronized with the database running on centralized server. When connection is established the menu card is retrieve from the server and display to the user. This will allow faster access to the menu. When the order is placed the NFC tag ID is stored in the database. The server holds all the information regarding the product and offer costing. The smart phone and the server communicate with each other. The user then browse the menu however they want to, sorting the item etc. The user also click through to view more information about any item nutritional information, ingredients, trivia and any other content that the restaurant administration may feel like including.

While browsing through the menu, the customer may add items to his/her order. This process is commonly known as “building the order”. After the order is built and read, the user may go ahead and place the order. The user will automatically and almost instantly be notified about the new order so that they can act on it.

2.1.1 INTERFACE

Application user interface is everything that the user can see and interact with. Android provides a variety of pre-build UI components such as structured layout objects and UI controls that allow building the graphical user interface for application. Android also provides other UI modules for special interface such as dialogs, notifications and menus [14].

2.1.2 INFORMATION PROCESSING

The centralized server provides four main services. These include database creation, creation of user App, interfacing between Clients App and NFC and android application module [14].

2.2 MODULES

Basically there are three modules in this application first is the user another is admin module and third is kitchen module.

2.2.1 USER MODULE

This module is used by the customer to order there product. User can select item or browse item from the menu card, once the order get selected user can place the order and get a SMS about the order instantly. Notifying the user about their order confirmation will help the user to know where there order is placed successfully or not. User can also see the recipe of the product like what is the ingredient in that product etc. User need to pay bill manually or pay the bill through online payment.
2.2.2 ADMINISTRATION MODULE

In this module, administrator make changes about the product information add new product to the menu update the database or add new restaurant etc. Payment procedure has been done by the administration via online payment or by manually. Administrator act as a mediator between kitchen department and customer.

2.2.3 KITCHEN MODULE

After the order is successfully placed, the order information is forward to the kitchen department. In kitchen department, when the order is ready then the message in convey to the user that the order is ready you can collect the order from the counter. Conveying the message regarding the order is the better option instead of paper bill.

3. METHODOLOGIES

3.1 NFC TECHNOLOGY

NFC is a short-range wireless communication technology that is based on approved and mature standards in the field of RFID and smart cards. RFID, which has already been introduced in the 1970s, realizes automatic identification and data transfer via electromagnetic radio signals typically my means of an active reader that is connected to a source of energy and a passive electronic tag that is a transponder receiving its power from the reader by magnetic induction. Thus, NFC supports in overall three operating modes [13].

3.1.1 READER MODE

This allows the phone to read passive RFID tags on posters, stickers, and other stationary objects that contain certain types of information on them. For instance, you could tap your phone on the reader tag in a movie poster and it would begin playing the movie trailer, provide theater times, locations, and so on[12].

3.1.2 PEER-TO-PEER MODE

P2P offers interaction between two active NFC-equipped devices such as phones. Using this mode, one could make payments to another individual or business just by tapping the two phones together. P2P could also go a long way in creating an enhanced multiplayer gaming experience [12].

3.1.3 CARD EMULATION MODE

This mode emulates a traditional smart card (such as MasterCard or Visa) and makes this mode convenient because of the already existing setup for the contactless payments by these smartcards companies. Thus NFC enabled mobile phones becomes a credit card [12].

4. IMPLEMENTATION

1. Welcome screen

This is the home page of the web application where user register and login to the website and add the information about the tables, menu etc. There is also a feedback tab which show about the feedback of the restaurant given by customer.

2. Menu addition page

In this page, admin can add the menu product the like the product information, product recipe etc. Here admin can insert the product one by one or just by uploading the menu by clicking the select menu and upload it.
3. Restaurant addition page

In this admin can add various restaurant in the database so that various restaurant can access there menu card through the NFC technology.

Here every restaurant has also a unique ID for authentication purpose.

![Restaurant addition page](image1)

3. Restaurant Menu Page

One NFC tag is attach with every table in the restaurant. When user establish a connection with this tag then then this menu will be appear on the screen.

![Menu Card](image2)

4. Select the number of plates

By click the order button select the number of plates and click on the “+” button to order the dishes.

![Select the Number of dishes](image3)

6. Bill Generation

After selecting the number of dishes user need to click on the button which is located at left most bottom of the application. After click the button the bill is shown to the user with total amount. User need to pay the bill manually, the bill record is shown to the owner of the restaurant until the user pay the bill. Once the user paid the bill the status of the payment updated to pay and the table is free for another customer.
5. CONCLUSION

NFC (near-field communication) is a technology that delivers on the pledge of connecting the physical and virtual environments. It is a highly stable wireless connectivity technology that provides simple and safe two-way interactions between electronic devices. Mobile device-based service unit enables instant transmission of customer orders via NFC tags and internet. Taking advantage of mobile technology, we have delivered an advanced and feature rich solution to the Restaurant industry. The diverse features along with the ability to function faster is what will make android Apps popular in coming years.

6. REFERENCES


Göteborg, Sweden, June 2012.

