

# Automation In Restaurants

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**Abstract-** Automation is everywhere. It covers applications ranging from a household thermostat controlling a boiler, to a large industrial control system with ten of thousands of input measurements and output control signals. The robotics technology is replacing manual work at fast pace throughout the world. This paper aims to provide an upgrade to services in the field of Restaurants and Hotels as the customers face a lot of problems due to unavailability of waiters. These limitations can be overcome by this design AUTOMATION IN RESTAURANTS. Robots can make the service more efficient and do it more effectively saving time and reducing labor costs. A touch screen display which is simple, easy yet effective user interface menu where customer can order food on their own. By doing this, need of printing multiple copies of menu can be reduced. The order placed by the customer through the display is sent to the kitchen and reception using communication network. The waiter robot then delivers the ordered meal from the kitchen to the customer. The restaurant will have its own application through which users can check availability of table, pre order food, etc. Also, the restaurants will have an automatic door opening system.

**Keywords-** food ordering system, interactive user interface

## I. INTRODUCTION

Restaurants nowadays need to be able to serve food in relatively short time frame to large number of people in busy metropolitan areas in order to survive [1]. In addition, they are also required to serve large numbers of people in high traffic areas in a cost effective manner.

The aim of this research is to develop an Automated Food Ordering System that could solve the problems faced by restaurants in big cities. The use of a computer also tends to provide a means by which inventory control may be maintained and product statistics collected should the restaurant operator be so inclined[2].

## II. REVIEW OF FOOD ORDERING SYSTEMS

The following sections review the current food ordering systems available in the market.

### A. Manual Food Ordering System

Manual Food Ordering System uses waiter to take order from customers. During peak hour, customers may be too many to be served by waiters. The quality of the service may drop thus causing dissatisfaction of customers. However, if there are too many waiters are hired, it may be a waste of resources during non-peak hour.

### B. Waiter Paging System

The Waiter Paging System shown in Figure 2.1 allows customers to call for a waiter. The pager unit notifies the waiter via a vibrator or buzzer that a request has been received and displays the request [3].



Figure 1. Waiter Paging System

### C. Touch Screen Ordering System

Manual Food Ordering System uses waiter to take order from customers. During peak hour, customers may be too many to be served by waiters. The quality of the service may drop thus causing dissatisfaction of customers. However, if there are too many waiters are hired, it may be a waste of resources during non-peak hour.



Figure 2. Sakae Sushi's Patented In-House Computer

#### D. Touch-Pad Projection System

The Touch Pad-Projection System also allows customers to send food orders directly to the kitchen. Each table has its own image projector, projecting the menu on the table allowing customers to make an order by touching the table surface instead of monitor screen [6].

While waiting for food to arrive, a kitchen camera can be clicked to see food being prepared, play different types of computer board games. Even though the ordering experience is pretty much automated, every table does have a waiter that brings over the meal and answers questions about the system [7].



Figure 3. Touch-Pad Projection System

### III. NEW AUTOMATED FOOD ORDERING SYSTEM

The new Automated Food Ordering System consists of a monitor screen to allow customers to choose their desired food via the menu shown on the screen. The choices made will be sent to a kitchen assistant.

Computer screen will be placed on each table for customers to make their orders. Customers will be prompted to choose their desired language and the language can be reselected anytime. The system also allows customers to look at their food preparation process.

An Interactive User Interface is integrated with the system which allows customers to get real time assistant from a kitchen assistant by using video conference system. With this approach, the time needed for customers to get assistance from a kitchen assistant can be reduced greatly.

To confirm their order, customers need to press the confirm order button and the order will be sent to the kitchen assistant.

While ordering, customer can pay the restaurant bill through the ordering system via any mobile payment application. When the kitchen computer (act as a server) received an order, it will send a confirmation message to the customers' computer so that the customers know that their orders are being prepared.

The server will notify the kitchen assistant of customers' order. The kitchen assistant will give the order to the chef to cook. After the food are prepared, the kitchen assistant will place the food on a robot and choose the location the robot needs to deliver. Also, the restaurant will have their own application through which customers can view the number of tables available and can view the food menu. Customers can avoid going to restaurants to know about their favourite dishes instead they can just use the app.

### IV. INTERACTIVE USER INTERFACE

The Interactive Food Ordering System interface was designed using Visual Basic 2008 [10]. The touch screen will be used to replace traditional monitor and mouse. Some commands are restricted to customers, such as restarting the computer, ending the program, etc. Customers can only see the touch screen on the table. The CPU will be hidden at the back to minimize the possible damage caused to the system.

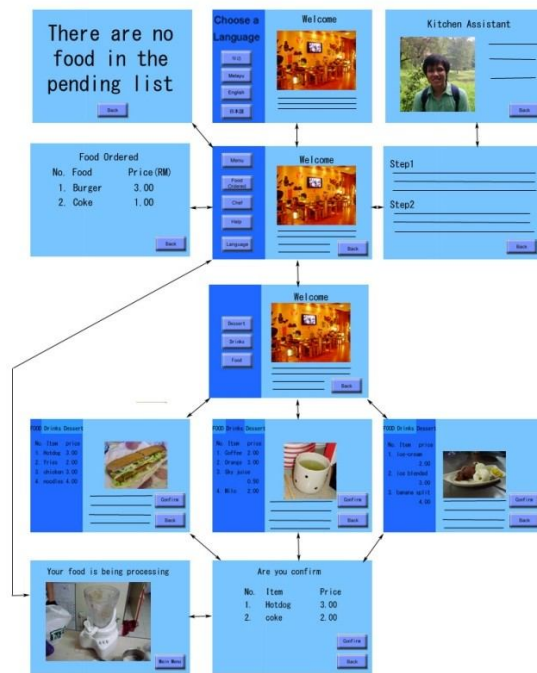


Figure 4. Interactive User Interface

When a customer touches the screen, the welcome page will be displayed; a brief introduction of the restaurant and some photos of the restaurant will also be displayed. Visual type’s customer will be pleased when they can see different type of photos in the menu [8]. History and some interesting facts of the restaurant can be shown on the page to let customers spend their time while waiting for the food.

Customers can choose the language they prefer to make themselves comfortable and the language can be changed anytime. Kinesthetic customer will like to touch and to be touch, in this system they can touch the menu to order. Many misunderstanding will occur when the ordering is by either telling the waiter or write down on a paper. By using touch order, the misunderstanding will be reduced to minimal.

At the main menu there are 5 choices available that is menu, food ordered, chef, help and language. If the menu button is pressed, it will go to the food menu screen, customers can choose the type of food they wanted to order, that is food, dessert and drinks. When a food is clicked, the photos and description of the food will be display. Auditory people like to listen to sound and like to know how others think about it. Customers will be able to choose everything they wanted and press confirm. The confirm screen will come out to repeat what they ordered. They will be required to press the confirm button and the list of the food they ordered will be send to thekitchen.

When the help button is pressed, a step by step user menu will appear to assist customers to use this system. If the

user menu can’t provide enough help, the customer can always speak to the kitchen assistant for any assistant. Customers that needs special care or something that is not available in the menu can also made special order thru this channel.

Customers can always click on the “food ordered” button to view what they ordered. They can repeat the ordering process if they want to add any food. Customer can also see the total amount that they need to pay at the ordering menu. Audio digital people will prefer this system compared to letting the waiter wait for them. As audio digital people will talk to themselves to make decision, they don’t like to be disturbed while making choices. In this system, customers can make their order anytime without being rushed by waiter or their friends [9].

There is a reset button in the ordering interface, the button is protected by a password, and password will be prompted if the customer accidentally presses the reset button. The application will not be able to be terminated by customer, as the password is protecting it and the customer doesn’t have access to the keyboard. By doing so, the possible of error occur will be reduced to the minimum. When a customer paid and leave the restaurant, a reset button will be pressed by the kitchen assistant to reset the whole program. The program will be ready to accept next customer.

**V. FOOD ORDERING SYSTEMARCHITECTURE**

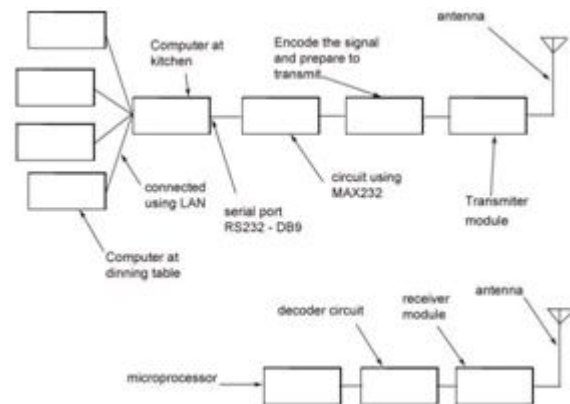


Figure 5. Automated Food Ordering System Architecture

Figure 5.1 shows the system architecture where the computer at the customer table will act as client and let customer place order and send to the kitchen. The computer in the kitchen will act as server, it will collect all the order send by the client, a kitchen assistant will always be there to take order and assist the customer when assistant is being request. Both computers will be connected by LAN (Local Area Network) that can be established by using a Wi-Fi router. Every computer will be connected to the router, then the

computer in the kitchen will act as virtual server others will be client.

The computer at the kitchen will connect to a wireless transmitter to give instruction to a delivering robot as well as switching the delivering robot to manual mode if any error occurs. Serial port was chosen to be the bridge between the computer and the microprocessor, because they provide simple, bit-level, point-to-point communications, and they are widely understood. Most of the computer nowadays doesn't have serial port, so a USB to RS232 converter is used so that the device is widely supported.

The signal will be transmitted to the serial port by using "serial port" function available in Visual Basic 2008. The MAX232 chip will accept the signal and will convert the signal from the serial port to TTL signal. In integrated circuit signal will transmit in 0V ~ +5V. But the signal from serial port has voltage lower between -3V and -25V as logic "1" and voltage between 3V to 25V as logic "0" as shown in Figure 5.2.

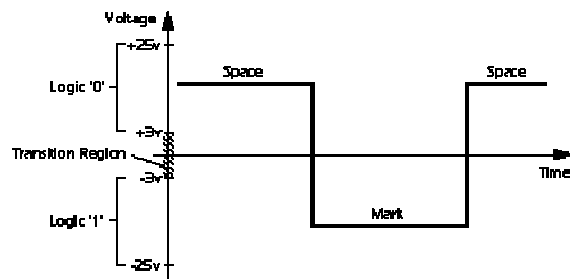


Figure 6. Signal From Serial Port

After the signal was converted to TTL, the signal will be encoded and send thru 315 MHz wireless transmitter. At the robot, there will be a 315 MHz receiver that will receive the signal and decode it back into TTL signal and send it into the microprocessor. The microprocessor will process the signal and gives further instruction to control the robot.

When a computer wanted to be used as the client, the computers need to install the USB to RS232 converter. When the USB is being plucked in to the client computer, the auto com port will be assigned, and it will not change after that. The device will be required to plug in the same USB port after it has been assigned. The IP (internet protocol) of the computer will require configure so that client and server can be distinguish clearly. The server program will need to set the com port to the port of the serial port. The client program will require to set the server IP and the signal that will be sent to indicate where the signal comes from.

## VI. INTERACTIVE ORDERINGSYSTEM

Feedback to customer was available in this ordering system, which makes it unique. This means that while customer ordering things, there will be feedback to let them know they are not facing a computer. There are operators ready to serve them, they are highly valued.

There are operators ready to take special order from the customer when customer desired. This can show the restaurant cares for the customer that required special diet. When customers made an order and faced problem they can request assistance from the operator. If the problem cannot be solved, they can approach the customer to solve it for them. This can solve communication barrier that always occur, during communication with operator.

Customer can check the progress of their food, they can always watch the kitchen camera of their food being prepared by the chef. This can let the customer know the real time progress but not the estimated percentage which is not accurate.

When the customer orders the food, they need to press send when they finish order. The operator at the server computer will click when received order, and send a message to the customer to let them know the food is already being prepared. So customer doesn't need to worry that their order doesn't reach the kitchen.

When customer wanted to cancel food, they can always click and let the kitchen know. When the kitchen assistance knows the food is already prepared, they can go to the customer to let them know that the food cannot be cancel. Otherwise just cancel the order in the kitchen.

## VII. DISCUSSIONS ANDCONCLUSIONS

The wireless transmitting device using the serial port uses the power supply from the battery, further research is required to make the circuit drain power from the PC.

Visual Basic 2008 is chosen as the editing software for the interface of the ordering system. This is because Visual Basic can edit the graphical interface easily and also combine the logics and the graphical interface without much hassle. Currently the cost of touch screen is very high, so it may not be practical to use touch screen in the restaurant, as the amount of touch screen required is a lot.

The kitchen assistant might not be sufficient enough to assist every customer that request for video conference.

Maybe more than one server can be used to handle large amount of customer.

The current design has met the basic requirement of the concept proposed, but there are still many improvements that can be done to enhance the system.

### VIII. DISCUSSIONS AND CONCLUSIONS

In future, the ordering system can also be made to be speech recognize ordering system. The user can just say the thing they wanted and the computer will automatically order for them.

Holographic system can be added, so that they can talk to the operator face to face. So that customer can feel the existence of the operator. Food can be presented in holographic, so that customer can see what they will get but not the menu photos that always cheats.

Additional smell system can be added, so that customer can smell the food before they order the food. Customer will be able to know what they like and what they don't like before ordering the food. But the smell system have to be develop before adding in.

Some animation that describes the progress of preparing the food can be created and placed on the menu. Customer can understand the food better and have a more visual view at the ingredients.

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