TOUCHSCREEN BASED ORDERING SYSTEM USING AVR

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ABSTRACT

This paper presents restaurant management in an efficient way. Traditional paper menu cards are overall expensive, monotonous, difficult to maintain and over the period of time they lose their 'worthy appearance'. It is tedious to update paper menus with new prices, dishes and ingredients. Therefore to challenge all such obstacles and to enhance restaurant's guest experience and exquisiteness of the establishment, Touchscreen based ordering system is proposed. The other dimensions to propose this new system is to eliminate excess time spent on giving manual order through waiter.

The main focus is to increase the usability and user friendliness of menu card with its simple navigation using GLCD and touch screen interfaced with ATmega32 microcontroller. The order can be placed by simply touching the available food menus. The placed order will be transmitted to receiver PC using the Bluetooth technology and UART is used for serial communication.

The orders will be directly sent to the kitchen and users do not have to wait for the waiter. And at the same time GLCD will display the total bill amount directly to the user. Microcontroller based order placement unit is provided on each table. The unit shall have a touch screen to browse through the menu. The menu items and their cost will be displayed on the touch screen.

Keywords – ATmega32, GLCD, Bluetooth module HC05, UART

I. INTRODUCTION

Now a day, the food industries have good prospects; especially the restaurants play an important role. Thus a simplified digital ordering system places an important role. It is one of the solutions to avoid the time delay. This paper dictates the method of low cost, efficient and easy to access the system for digital menu ordering system for restaurants. Due to advancement in technology we can achieve the automation and digitization of the system effectively.

Traditionally in restaurants menu cards are available on each table, we can choose and place our order to waiter. There is a delay while ordering the food. To overcome the problems like ordering, waiting for the order and then waiting for billing, this system provides the solution for the ordering the menu in restaurants by using touch screen based ordering system using AVR microcontroller. At the same time it shows the price of the item which is to be selected and processed for the billing [1].

Each table of restaurant is equipped by touch screen, which is powered by ATmega32 microcontroller. A touch screen is a display that can detect the presence and location of a touch within the display area. Therefore it is

very suitable & convenient way to accessible for restaurant. The touchscreen is an assistive technology. This interface can be beneficial because it saves processing time in restaurants [2].

Compared to traditional restaurant system, by using this system customer get faster and better service, restaurant staff co-operates more efficiently with less working. The customer will scroll menu list by a single touch on GLCD screen only. This system consists of Transmitter & Receiver units. The transmitter unit consists of AVR microcontroller atmega32 & Graphic LCD display 128x64 pixels, resistive touch screen and UART for serial communication, which is available on customer table. The orders which are placed by the customer are transmitted to the receiver section using Bluetooth technology.

The receiver unit consists of Bluetooth dongle and PC which is employed at kitchen & managers desk in the restaurants. The data for the menu can be written on an EEPROM connected to each such microcontroller based unit, so that portable data updating is possible. The customer will scroll the menu screen & could order his food or drink just by touching on the GLCD screen. Upon finalizing the order the customer will be able to place it by clicking the select option displayed on the screen. The order placed shall be transmitted to the receiver unit employed at manager desk as well as in the kitchen for further processing.

II. LITERATURE SURVEY

In the paper titled "Electronic menu card for restaurants" by Vikas Mullemwar and Ashwini Awari published in the International Journal of Research in Engineering and Technology, the different menu ordering techniques which are in practice are as follows:

2.1. Paper based menu card:

In this, menu cards are offered to customers in restaurant are made of paper, hard board. Waiters use notepad to write the order of customers. Every time customer visits restaurant, occupy his table and selects his menu from available menu on paper menu card. When waiter arrives, he notes down order of customer in his notepad. As with anything paper based, it is so easy for things to get damaged by water due to mishandling, or paper being lost due to fire or accidents or just generally lost. There is wastage of time, money, and paper.

2.2. Self-service food ordering KIOSK technology:

In the paper titled *"What is a retail KIOSK?"*, KIOSK is described as a free standing counter. It displays all menus including food items available and the payment mode [3]. Whenever, customer visits the restaurant he/she would navigate through the menu present on KIOSK display and select the food item available from list and then pays the bill with available payment options. The customer will be given an order number. The order will be automatically routed to kitchen with physical connection.

When the order is completed, order number is announced and displayed on screen, then customers have to pick their food item from respective counter. The disadvantage of this system is, the person will have to wait for his order number to be announced.

2.3. QORDER:

In the paper titled *"The application of wireless food ordering system",* a portable QORDER device is used to take orders from the customers is described [4]. It requires a WI-FI to connect the remote corner. This system

also involves waiter as in case of paper based menu card system. In this, the waiter no longer approaches the table with his notepad instead with the portable device known as QORDER, and then takes the order from customer. He then sends the order to kitchen for further processing. Once the customer finishes, the waiter prints the bill.

2.4. Computerized Ordering System:

This ordering system is somewhat same as KIOSK ordering system in aspect of order placing but differs in aspect of serving. Here food is served by waiters. But order is written on computer by restaurant staff.

When more number of customers enters into the restaurant, it becomes inconvenient to place an order using single system.

The comparison between different ordering system is shown in Table1.

Characteristics \ Technologies	Paper menu card	KIOSK Technology	QORDER system	Touchscreen based menu card (GSM)
Wireless network	No	No	Yes	Yes
Touchscreen	No	Yes	Yes	Yes
Dependency on waiter	High	Less	High	Less
Customized order	No	Yes	No	Yes
Order Processing time	High	High	High	Less
Chance of human error	High	Less	High	Less

Table 1: Comparison between different ordering systems

In the paper titled "Wireless menu ordering system for restaurants" by Madhu Mitha and Kalaivani, PIC microcontroller and Zigbee technology is used. In this paper AVR Atmega32 microcontroller and Bluetooth technology concept were explained to make the system faster and cost effective [5].

In the paper titled, "Touch screen based digital menu ordering system using AVR" by Sagar Soitkar, Ashish Charbe and Vivek Landge, Atmega 16, which has 16KB flash memory and LCD is used at both transmitter and receiver section. In this paper, Atmega32, which has 32KB flash memory and Graphical LCD on the transmitter section and PC on the receiver section are used for the design [6].

III. DESIGN METHODOLOGY

By gathering each benefit from various previous works, this paper aims to implement a restaurant ordering system which enables each customer to wirelessly order his own choice of food straight from the e-menu shown on an embedded touch screen on each customer table without bothering any staff and send the order straight to the kitchen.

Block Diagram:

The transmitter unit consists of ATmega32 microcontroller, GLCD display of 128 x 64 pixels, resistive touch screen and Bluetooth module HC05. The menu items will be displayed on graphical LCD screen. The figure 2 shows the transmitter section of the system.

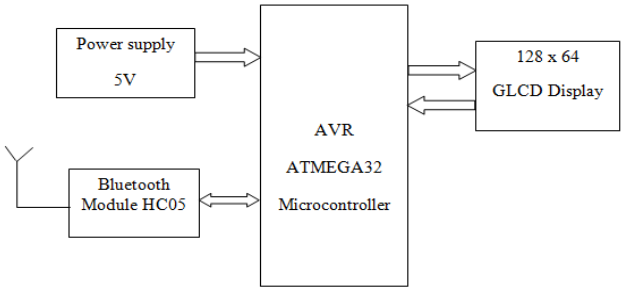

Figure 2: Transmitter unit

The customer selects the desired food item using resistive touchscreen. The touchscreen is a two-dimensional sensing device which senses the pressure variation and sends the voltage value to microcontroller. The Bluetooth module is connected to ATmega32 using UART serial communication. When the selection is complete, the data will be transmitted to kitchen through Bluetooth.

The receiver unit consists of PC and Bluetooth dongle. The Bluetooth dongle waits for the reception of the order. Once the order is received, the PC will display selected items along with total bill amount. The figure 3 shows the receiver section.

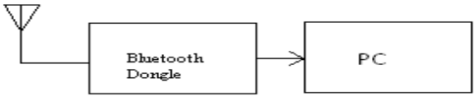

Figure 3: Receiver unit

The hardware components used are as follows:

3.1. ATmega32 Microcontroller:

The ATmega32 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega32 achieves throughputs close to 1MIPS per MHz. This empowers system designer to optimize the device for power consumption versus processing speed. The figure 4 shows ATmega32 microcontroller.

Figure 4: ATmega32

ATmega32 is a 40 pin IC and it consists of 32 I/O ports. The port A acts as ADC, port B, C and D acts as IO pins. Port B and D are connected to GLCD module. The pin 10 and pin 30 (AVCC) are connected to Vcc. Pins 11 and 31 are grounded. Pin 14 and 15 are connected to bluetooth module. This microcontroller operates at 5V. The 12V DC supply from the adapter is regulated to 5V supply using voltage regulator IC LM7805 which also

acts as heat sink. The XTAL1 (Pin 13) acts as input to inverting oscillator whereas XTAL2 (Pin 12) acts as output to the oscillator. The reset pin (Pin 9) is initialized in order to reset the microcontroller.

3.2. GLCD

The graphics_LCDs are preferred over the character LCDs for those applications where both character and graphical representation are required. To interface this LCD with microcontroller, two registers (Input and Output register) are provided in the GLCD. These registers are selected by the combination of RS and RW signals. The figure 5 shows GLCD module.

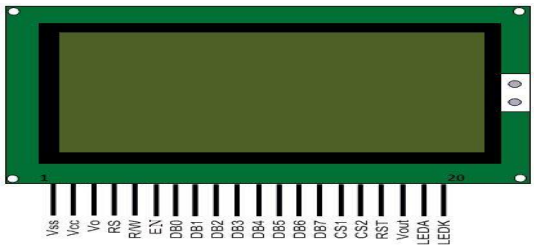

Figure 5: GLCD

The data pins (DB0-DB7) are connected to port B of the microcontroller and the control pins like RS, R/W, CS1 and CS2 are connected to port D. The graphic image of the item is generated by using the bitmap generator.

Input Register is used while giving instructions and writing data to LCD. It holds the data/instruction temporarily before writing to DDRAM (Data Display RAM). When the LCD is in active mode (CS1 and CS2 high), the Input register can be selected by sending bits on RS and RW pins as shown in the following table 1. The data of input register is latched in at the falling edge (from high to low) of EN (Enable) signal and written into DDRAM automatically through internal operation.

Output Register is used to read data from DDRAM and to check status data (busy check). When the LCD is in active mode (CS1 and CS2 high), the Output register can be selected by sending bits on RS and RW pins as shown in the following table. When R/W and RS are high, data is latched into output register and when R/W=H, RS=L, status data (busy check) can be read out.

Resistive touchscreen:

Resistive touch screen monitors rely on touch overlay, which is composed of a flexible top layer and a rigid bottom layer separated by insulating dots, attached to a touch screen controller. The inside surface of each of the two layers is coated with a transparent metal oxide coating of indium tin oxide (ITO) that facilitates a gradient across each layer when voltage is applied. Pressing the flexible top sheet creates electrical contact between the resistive layers, producing a switch closing in the circuit. The control electronics alternate voltage between the layers and pass the resulting x and y touch coordinates to the touch screen controller. The touch screen controller data is then passed on to the computer operating system for processing. Resistive touch screen panels are generally more affordable but offer only 75% clarity and the layer can be damaged by sharp objects.

3.3. Bluetooth module HC05:

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. The figure 6 shows the HC05 Bluetooth module.

Figure 6: Bluetooth module HC05

This module consists of inbuilt antenna, CSR Bluetooth radio, 26MHz XTAL and 8MB flash memory. The pin 2 and pin 3 are connected to RXD (pin 14) and TXD (Pin 15) of ATmega32 respectively.

3.4. UART (Universal Asynchronous receiver transmitter):

The UART provides asynchronous communications commonly referred to as RS-232. The UART component can be configured for Full Duplex, Half Duplex, RX only or TX only versions. All versions provide the same basic functionality differing only in the amount of resources utilized. In this propsed work it is configured by initializing start bit as 1 and none parity for serial communication.

3.5. Buzzer:

The buzzer works on the sound source of a piezoelectric sound component. To interface a buzzer the standard transistor interfacing circuit is used. Transistor BC547 is used to give buzzer indication.

IV. SOFTWARE IMPLEMENTATION

Flowchart

In transmitter section, the touchscreen is initialized and start up message is displayed. Then the customer selects an item in the display. At that instant, voltage is generated in the selected area and the command is sent to microcontroller from GLCD. The flowchart of the transmitter section is as shown in the figure 7.

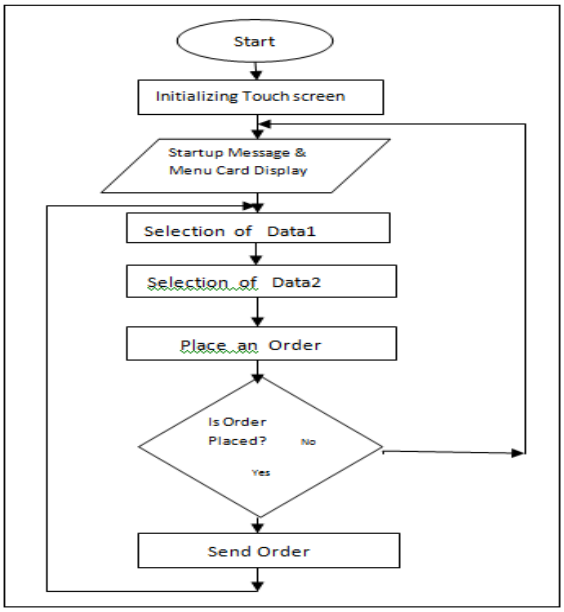

Figure 7: Transmitter section

If the order is placed, that will be sent to the Bluetooth module. After the completion of order the GLCD will display the total amount and returns to the startup menu. If the order is not placed again the menu will be displayed.

At the receiver end, the Bluetooth dongle is paired with bluetooth module and it waits for the order transmission. When the data is received by the dongle it will displayed on the PC along with total bill amount. If the order is not received it waits for the transmission of the order. The flowchart is as shown in the figure 8.

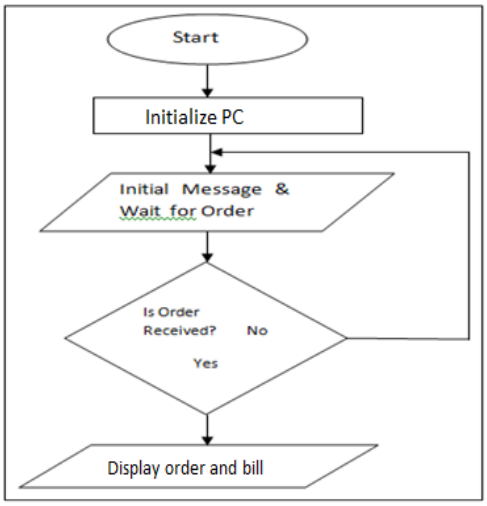

Figure 8: Receiver section

V. RESULTS

This paper provides the designed digital ordering system in which the transmitter section shows the menu items to be selected for placing the order and display on the GLCD. The customer would be able to select the menu by a single touch on the screen. The list of selected items would be transmitted to the personal computer and the bill would be generated automatically on the completion of ordering. The touchscreen based ordering system is as shown in figure 8.

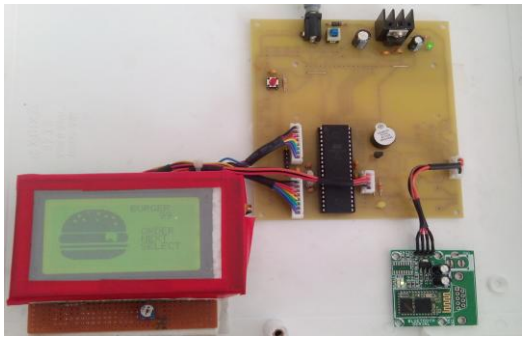

Figure 8: Image of touch screen based ordering system

V. CONCLUSION & FUTURE SCOPE

By using this system at the restaurants, it will be easy and much comfortable to place any kind of order of our choice for both customers' as well as for the management staff. However it will also minimize manual service given by waiters and serving staff, thus eliminating the human mistakes. This system will also help the customers to place right order for any kind of cuisine by simply browsing and survey about the various dishes before placing an order and can come to know about their ingredients, which in turn will help them to have their choice of dish without having any confusion and can enjoy their meals satisfactorily.

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