TOUCH SCREEN BASED MENU ORDERING & DISPLAYING SYSTEM FOR RESTAURANTS

Prof. Snehal S. Dambhare¹ Prof. Mangesh A. Parjane² Prof. Dhananjay M. Deore³
¹,³ Amruthvahini College of Engineering, Sangamner, M.S., India
² S.N.D. College of Engineering & Research Center, Yeola, M.S., India
¹ snehal.dambhare@gmail.com
² mparjane@gmail.com
³ deoredhananjay@gmail.com

ABSTRACT

In today’s world we have automation in all areas; there is one field where technology not entered yet. It is the menu display & ordering system & so far there is no initiative to taken to introduce technology in this area.

Touch-screen based advanced menu display is the method by which anyone will select any items by their choice which are in menu display & that order will be transferred to the manager personal computer using zigbee module & that ordered item will be given to that customer.

Keywords: PIC microcontroller, zigbee models touch screen, Graphic LCD, MAX2, Bluetooth.

I. INTRODUCTION

Touch screens as a popular user interface are more and more common. Applications span from public information systems to Customer self-service terminals. Thus, as a Logical step, more and more devices today Feature this kind of user interface, e.g. Bank Automatic teller machines (ATMs), personal Digital assistants (PADs), mobile phones and displays.

A touch screen is a display that can detect the presence and location of a touch within the display area.

Let one do so without requiring any intermediate device, again, such as a stylus that needs to be held in the hand. Such displays can be attached to computers or, as terminals, to it networks. Therefore it is very suitable for restaurant & time saving.
It enables one to interact with what is displayed directly on the screen, where it is displayed, rather than indirectly call the waiter & ordered the menu. These devices also allow multiple users to interact with the touch screen simultaneously.

Touch based interfaces have been around for a long time in consumer electronic devices, and even longer in research labs, but it has only been recently that the wider public has taken a keen interest in this mode of human-computer interaction.

The touch screen is an assistive technology. This interface can be beneficial because it is time saving. The purpose of this project is to introduce a wireless zigbee based ordering systems for restaurants. Compared to traditional restaurant system, by using this system customer get faster and better service, restaurant staff co-operates more efficiently with less working mistakes and enterprise owner thus receives more business profit.

II. PIC MICROCONTROLLER

This unit is the heart of the complete system. It is actually responsible for all process being executed. It will monitor & control all the peripheral devices or components connected in this unit. The controller here we use will be PIC16F877A family. The code will be written in Visual Basic. This unit require +5VDC for its proper operation.

Features of PIC16f877:
- High performance CPU.
- Only 35 single word instruction to learn.
- Operating frequency is about 20MHZ.
- 8K*14 words of program flash memory.
- 368 Bytes of data RAM.
- 256 Bytes of EEPROM data memory.
- There are total 14 interrupts are present.
- There are total 5 ports called A, B, C, D and E.
- It is having 10 bit ADC for 8 input channels.
III. TOUCH SCREEN

A touch screen is an electronic visual display that can detect the Presence and location of a touch within the display area. The Term generally refers to touching the display of the device with a Finger or hand.

A. Type Of Touch Screen Technology Used In System

The touch panels themselves are based around four basic screens Technologies: resistive, capacitive, surface acoustical wave (SAW) and infrared (IR). Each of those designs has distinct Advantages and disadvantages. The detailed study of each is as Follows:

<table>
<thead>
<tr>
<th>Properties</th>
<th>4-wire resistive</th>
<th>Surface acoustic Wave</th>
<th>Capacitive</th>
<th>Infrared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Surface Technique(electrical)</td>
<td>Surface Technique(acoustic)</td>
<td>Surface Technique(electrical)</td>
<td>Edge Technique(optical)</td>
</tr>
<tr>
<td>Durability</td>
<td>3 year</td>
<td>5 year</td>
<td>2 year</td>
<td>5 year</td>
</tr>
<tr>
<td>Transparency</td>
<td>Good</td>
<td>Good</td>
<td>Normal</td>
<td>Good</td>
</tr>
<tr>
<td>Stability</td>
<td>High</td>
<td>Higher</td>
<td>Normal</td>
<td>High</td>
</tr>
<tr>
<td>Touch</td>
<td>Anything</td>
<td>Finger/pen</td>
<td>Conductive</td>
<td>Finger/pen</td>
</tr>
<tr>
<td>Response Time</td>
<td>&lt;10ms</td>
<td>10ms</td>
<td>&lt;15ms</td>
<td>&lt;20ms</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>Very sensitive to Scratch</td>
<td>Sensitive to scratch</td>
<td>Sensitive to dirt</td>
<td>Ambient light</td>
</tr>
</tbody>
</table>

A.1 Resistive Touch Screen

Resistive LCD 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. Resistive touch screen panels are not affected by outside elements such as dust or water. Resistive touch screens are used in food-service; retail point-of-sale (pos), medical monitoring devices, portable and handheld products, industrial process control and instrumentation. Resistive technology is divided into two broad categories [3].
A.1.1 Four-Wire Resistive Touch Screen Technology

Four-wire resistive technology is the simplest to understand and manufacture. It uses both the upper and lower layers in the touch screen "sandwich" to determine the x and y coordinates. Typically constructed with uniform resistive coatings of it on the inner sides of the layers and silver buss bars along the combination sets up lines of equal potential in both x and y.

In the illustration below, the controller first applies 5v to the back layer. Upon touch, it probes the analog voltage with the coversheet, reading 2.5v, which represents a left-right position or x axis.

![Fig 2 A simple 4-wire touch screen](image)

It then flips the process, applying 5v to the coversheet, and probes from the back layer to calculate an up-down position or y axis. At any time, only three of the four wires are in use.

![Fig 3 Working of 4-wire touch screen](image)

The primary drawback of four-wire technology is that one Coordinate axis (usually the y axis), uses the outer layer, the flexible coversheet, as a uniform voltage gradient. The constant flexing that occurs on the outer coversheet with use will eventually cause microscopic cracks in its coating, changing its electrical characteristics (resistance), degrading the linearity and accuracy of the axis.
IV. GRAPHIC LCD

This is smaller version of our serial graphic LCD backpack is solder to the 128*64 pixels graphic LCD & provides the user a simple serial interface to full range of control.

Besides writing text, this serial graphic LCD allows the user to draw this circle & boxes, sector reset, individual pixel, erase specific blocks of display control the back light & adjust the baud rate. There specification as follows:

Voltage: 6v-7v dc
Current: 220ma
I/p : 0-5v, 8 data bits, 1 stop bit, no parity

V. ZIGBEE MODULE

The past several years have witnessed a rapid development in the wireless network area. So far wireless networking has been focused on high-speed and long range applications. However, there are many wireless monitoring and control applications for industrial and home environments which require longer battery life, lower data rates and less complexity than those from existing standards. What the market need is a globally denied standard that meets the requirement for reliability, security, low power and low Cost.

For such wireless applications a new standard called ZigBee has been developed By the ZigBee alliance based upon the IEEE 802.15.4 standard.
Specifications:
RF data rate: 250 kbps
Indoor/urban range: 133 ft (40 m)
Outdoor/rf line-of-sight range: 400 ft (120 m)
Transmit power: 1.25 mw (+1 dbm)
Receiver sensitivity (1% per): 97 dbm
Serial data interface: 3.3v cmos uart
Configuration method: API or at commands, local or over-the-air
Frequency band: 2.4 Ghz
Interference immunity: DSSS (direct sequence spread spectrum)
Serial data rate: 1200 bps - 1 mbps
ADC inputs: (4) 10-bit ADC inputs (4)
Digital i/o: 10

VI. BLOCK DIAGRAM

Fig 6 Block Diagram of Transmitter

A. Working details
Zigbee is a new global standard for wireless Connectivity, focusing on standardizing and Enabling interoperability of products. Zigbee is a Communications standard that provides a short range
Cost effective networking capability. It has been developed with the emphasis on low-cost Battery powered applications. Zigbee has been introduced by IEEE with IEEE 802.15.4 standard and the zigbee alliance to provide the first general standard for these.

B. Applications of ZigBee

The zigbee alliance includes such Companies as Invensys, Honeywell, Mitsubishi Electric, Motorola, and Philips. Zigbee is built on the robust radio (physical) and Medium attachment control (MAC) communication Layers defined by the IEEE 802.15.4 standard.

Above this zigbee defines mesh, star and cluster Tree network topologies with data security features and interoperable application profiles. There are a multitude of standards Like Bluetooth and Wi-Fi that address mid to high Data rates for voice, PC LANs, video, etc. However, up till now there hasn't been a wireless Network standard that meets the unique needs of Sensors and control devices. Sensors and controls don't need high bandwidth But they do need low latency and very low energy Consumption for long battery lives and for large Device arrays.

Zigbee looks rather like Bluetooth but is Simpler, has a lower data rate and spends most of its Time snoozing. It is now widely recognized that Standards such as Bluetooth and WLAN are not Suited for low power applications, which is due to 'These standards' high node costs as well as complex And power demanding RF-ICs and protocols. The 4-wire resistive touch screen is a common type of touch screen. Here, two resistive sheets are separated a small distance. Electrodes are located along the top and bottom of one sheet and along the left and right of the other. To detect the vertical coordinate, a voltage is applied to the top electrode and the bottom electrode is grounded, and voltage is measured at either the left or right electrode. A touch shorts the two sheets together; the resistance in the vertical direction forms a voltage divider, and the voltage is read out through the resistance of the other sheet.

Graphic LCD allows the user to draw this circle & boxes, sector reset, individual pixel, erase specific blocks of display control the back light & adjust the baud rate.

MAX 232 section will be used to convert TTL logic into RS 232 logic and vice versa. In TTL “logic1” is 5v and “logic0” is 0v. In RS 232 logic1 is -10v and logic 0 is +10v. This unit will provide interface that is required to communicate microcontroller with RS 232 based devices using serial communication link. The MAX 232 IC is dedicated for logic conversion. This unit is also called as logic convertor or level convertor. This unit requires 5v dc for its proper operation.
Table II Wireless standard comparisons

<table>
<thead>
<tr>
<th>STANDARD</th>
<th>ZIG-BEE</th>
<th>BLUETOOTH</th>
<th>GSM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>Monitoring &amp; control</td>
<td>Cable replacement</td>
<td>Wan</td>
</tr>
<tr>
<td>System</td>
<td>4 kb-32 kb</td>
<td>250 kb+</td>
<td>16mb+</td>
</tr>
<tr>
<td>resource</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery</td>
<td>100-1000+</td>
<td>1-7</td>
<td>1-7</td>
</tr>
<tr>
<td>life(days)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bandwidth</td>
<td>20-250</td>
<td>720</td>
<td>64-120</td>
</tr>
<tr>
<td>(kbps)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>1-75+</td>
<td>1-10+</td>
<td>1000+</td>
</tr>
<tr>
<td>(in m)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nodes per</td>
<td>256/65k+</td>
<td>7</td>
<td>1000</td>
</tr>
<tr>
<td>network</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Key attributes</td>
<td>Reliable, cost</td>
<td>Cost, convenience</td>
<td>Reach, quality</td>
</tr>
<tr>
<td></td>
<td>effective</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Advantages:**
1. Fast response
2. Error free input
3. Easy to install
4. Use finger, fingernail, gloved hand, stylus or any soft tip pointer to operate.
5. Easy to clean & maintain.
6. Make computing easy, powerful and fun.
7. Compatible with window, Macintosh and Linux.

**Disadvantages:**
1. Stress on human finger when used for more than a few minutes at a time
2. Fingerprints:
   1) Touch screen can suffer from the problem of fingerprints on the display.
   2) User has to sit closer to the screen as compared to external keyboard.
   3) The screen may be covered or by using hand.
3. Problem to handle for illiterate people.

**Application:**
1. Time saving:
   Time is money, especially in a fast paced retail or restaurant environment. In retail or restaurant environment, touch screen systems are easy to use so employees can get work done faster and also training time can be reduced for new employees. As input is present right on the screen, valuable counter space can be saved.
2. Computer based training:
The touch screen interface is more user-friendly than other input devices so overall training time for computer novices and therefore training expense can be reduced. It can also more useful to make learning more fun and interactive.

Fig. Transmitting circuit diagram of the system

VII. SOFTWARE DEVELOPMENT
In this section we developed the software part of the system. The following point gives the brief idea about algorithm of various parts and their flow chart for software design.

4.1 Algorithms.

1. Initialization of peripheral devices like graphical LCD & touch-screen.
2. Initialization of serial port UART of microcontroller at 9600 bit/sec.
3. Calibration of touch screen & graphic LCD.
4. Logical division of touch screen into 9 sectors.
5. Wait for user tapping.
6. Get tapping coordinate X, Y & resolve the sector we have tapped.
7. Generate a command code based upon sector & send to serial port.
8. Repeat above step from 1-6.
4.2 Flowcharts

VIII. RESULTS

![Image of a touch screen with menu options]
• The touch screen interface is easier to use than other input devices. It is useful to make information more easily accessible by allowing user to navigate by simply touching the display screen.
• The future of touch surface is touch screen video projectors, in a restaurant, for e.g., you can place your order using the surface of the table as the touch interface, instead of using a touch screen laptop. The ability to transform any surface in a touch screen means lower costs, making the technology more cost effective.

IX. CONCLUSION

• Today, a larger share of population is pc literate, yet the touch screen has become adopted by computer users of all abilities because it is simple, fast, and innovative.
• By the realization of the above proposed system one can learn many aspects of digital electronics circuit. This will give complete knowledge of designing microcontroller based system & developing embedded system.

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