

Multi-Touch Interface for Hotel Menu on Tabletop

Rutuja K. Deshmukh

P.G. Student,
Department of Computer Science &
Engineering, SGBAU, Sipna COET, Amravati,
Maharashtra, India.

Prof. H. R. Vyawahare

Assistant Professor,
Department of Computer Science &
Engineering, Sipna COET, Amravati,
Maharashtra, India

ABSTRACT

The present information with surface has received more attention in recent. This technology arise like as never before, As we seen in movies as the island, quantum of solace and avatar are best at the thought of managing information with our fingers and treating to know keyboard, the mouse computation. Multi-touch surface having phones, tablets, info kiosks, GPS devices, monitors, e-book readers around the consumer world. Where it senses touch more than one position and provides unique possibilities which are affordable aspects of sustainability.

Due to recent innovations touch technology has become affordable. Unlike interaction on a desktop computer touch allows users to interact with the same device. To demonstrate the vast possibilities of touch technologies an '*Interactive Dining Table*' can be constructed which can be utilised in a hotel. The other dimension to propose this new system is to reduce need of excess manpower and to eliminate excess time spend on giving manual order through waiter. The touch table constructed is a camera and Projector based multi-touch device. The order can be placed by simply touching the available food menus. This automated menu card system gains many advantages over traditional menu ordering system.

Keywords: Table, Glass sheet, Mirror, Projector, camera, Touch.

1. INTRODUCTION

1.1 Human Computer Interaction

Information technology has advanced tremendously over few decades before especially on Human Computer Interaction (HCI). The aim of this advancement is power of digital devices and communication system to people in ways and forms that are both accessible and useful in their lives. Now a day, the development of human computer interaction technology expanding rapidly in various area such as entertainment industries, robotics, medical field and also in day to day human life.

1.2 Touch Technology

Touch has been implemented in several different ways, depending on the size and type of interface, to apply on which object. The most popular form is mobile devices, tablets, touch tables and walls this all can be used as touch surface. Both touch tables and touch walls project an image

through acrylic or glass, and then back-light the image with LEDs. Touch surfaces can also be made pressure-sensitive by the addition of a pressure-sensitive coating that flexes differently depending on how firmly it is pressed, altering the reflection after pressing on it. Handheld technologies used panel that carries an electrical charge. When a finger touches on the screen, the touch disrupts the panel's electrical field and create current. The disruption is registered as a computer event (gesture) and may be sent to the software, which may then initiate a response to the gesture event. This touch technology can be very useful in interactive dining table.

1.3 Objective

This project's objective is to use by touching or air touching on the hotel menu table screen. Finger touch detection is used as the main interaction tool between customer and the surface on which we want to order favourite dish. The main focus of this work is to detect touch on surface to order. OpenCV a library of Python bindings designed to solve computer vision problems. It enables the programmer to express ideas how customer get more comfort.

2. LITERATURE REVIEW

2.1 Paper Based Menu Card

Ashutosh Bhargave, Niranjana Jadhav, Apurva Joshi, Prachi Oke, Prof. S.R. Lahane, "Digital Ordering System For Restaurant Using Android" presents existing system is paper based. This system is used mostly in restaurants. In this, menu cards offered to customers in restaurant are made of Paper, hard board. Waiters use notepad to write the order of customers. The records are stored on paper. The working approach of this system is simple. 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 [1].

2.2 Self Service Food Ordering KIOSK Technology

Shweta S. Tanpure, Priyanka R. Shidankar, Madhura M. Joshi, "Automated Food Ordering System With Real-Time Customer Feedback", In this technology, kiosk is free standing counter which is similar to self check out. It displays all menus including food items available and the payment mode. Whenever, customer visits the restaurant he/she would navigate through the menu present on KIOSK display and select the food item available from list then pays the bill with available payment options. The customer will be given an order number. This system is mainly useful in fast-food restaurants as it saves time. [3].

2.3 QORDER

Other Advancement in menu ordering in hospitality industry is QORDER which is a portable ordering system. It is a portable handheld device that runs the complete QMP POS software on android device. It requires a WIFI 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

Snehal S. Dambhare, Mangesh A. Parjane, Dhananjay M. Deore," Touch Screen based menu ordering and displaying system for restaurants" 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 customer enters the restaurant, he has to orally tell his required food items from available menus to counter where staff member notes down his order. At the same time name of customer is also noted. [6].

2.5 Touch Screen Technology:

This paper presents using touch screen technology which helps to improve from last many years and also it gets more advance technology. This touch screen technology should be very useful. With the help of this human can directly interact with devices. A touch screen is nothing but an input device, where top surface of an electronic visual display of an information processing system. In this touch screen technology where the invention of Elograph by geographic Inc 1971[7]. This company should be very useful to produce Graphical Data Digitizers for use in various industrial applications also in research. This touch screen technology can be dividing into two parts which are explained below.

2.6 Single Touch

This single touch technology can be limited in operation. This touch screen can react when only one finger can touch at a time. In single touch it cannot allow to touch more than one finger on the screen. Using this single touch screens we are performing basic operations such as opening and closing program also help for moving folders. Touch can be detected by the touch controller and also used X, Y co-ordinates for finding the exact location where we touch on the touch screen. In single touch screen we can take example of ATM machines.

2.7 Multi-Touch Technology

In multi touch screens we can touch minimum 3 touch points. This multi touch screens are very useful in Smartphone. This multi touch screens can detect more than one finger at the same time. It should also maintain speed and efficiency. Multi touch screen interfaces are wider, comprehensive, and capability than single touch devices. A variety of touch screen technologies have been used for touch.



Figure 1: ATM Machine

In this project we are using resistive and webcam base touch screen, but webcam based touch screens are less accurate because of this one advantage over conventional touch screens. Webcam based touch screen can be used for mouse motion and the finger detection. Optical touch-screen technologies more robust and customizable multi-touch devices are become increasingly sustainable, provides greater accuracy and more features to improve the quality of life. Natural User Interface is described with the interactive media and multi touch interactions. Natural user interface creates a machine sensing environment which will be applicable in various applications. Operation should perform on their superior user interface.



Figure 2: Smartphone

3. ANALYSIS OF PROBLEM

As above related work concerned with interactive touch table, this highlights the drawbacks in the traditional menu ordering system compared to the proposed Touch-screen based menu card system.

- Traditional system of catering is a very time consuming and is prone to mismatch of orders due to human errors.
- Customers using the touchable e-restaurant system can directly touch the dining table surface to access the digitalized menu.
- One of the solutions will be using a touch screen to eliminate the needs of mouse and keyboard.

Table 3: Comparison to existing systems

	Paper menu card	KIOSK Technology	QORDER system	Touch-screen based menu card (GSM)
Wireless network	No	No	Yes	Yes
Touch-screen	No	Yes	Yes	Yes
Dependency on waiter	High	Less	High	Less
Customized order	No	Yes	No	Yes
Order processing time	High	High	High	Less



Figure 3: Physical Setup of Proposed System

4. SYSTEM DESIGN

4.1 Colour Tracking Concept

Colours are everywhere in every single object. Being able to handle coloured objects to control hotel menu through the camera is very appealing. For that reason, tracking is implemented a colour tracking algorithm that resulted in a real-time frame rate through a simple and intuitive API. It offers several significant advantages over geometric cues such as computational simplicity, robustness.

Colour tracking is the ability to take an image, isolate a particular colour and extract information about the location of a region of that image that contains just that colour. As an example, assume that you are given a photograph that contains a red ball sitting on a dirt road. If someone were to ask you to draw a box around anything that was the colour red in the image, you would quite easily draw a rectangle around the ball. This is the basic idea behind colour tracking. You did not need to know that the object was a ball. You only needed to have a concept of the colour red in order to isolate the object in the picture [5].

4.2 Design of the framework for touch table

In general, the design of the touch table could be classified into three approaches, consisting of front projection, rear projection and touch panel. Due to the separation of the projector, camera, and table, front projection requires more precise computation for projector locations and demands more efforts for image acquisitions. If touch panels are used directly on the tables with touch sensing, the implementation is not appropriate for a dining table.

4.2.1 Color-tracking Algorithm

```
im2, contours, hierarchy = cv2.findContours(thresh, cv2.RETR_TREE, cv2.CHAIN_APPROX_SIMPLE)
```

- To draw all the contours in an image:
`cv2.drawContours(img, contours, -1, (0,255,0), 3)`
- To draw an individual contour, say 4th contour:
`cv2.drawContours(img, contours, 3, (0,255,0), 3)`

5. IMPLEMENTATION

This project demonstrates that touchable dining table in a restaurant environment to enrich customer's dining experience. The proposed dining system is incorporated with a digitalized meal ordering menu that allows customers to order food directly on the table surface using fingers.

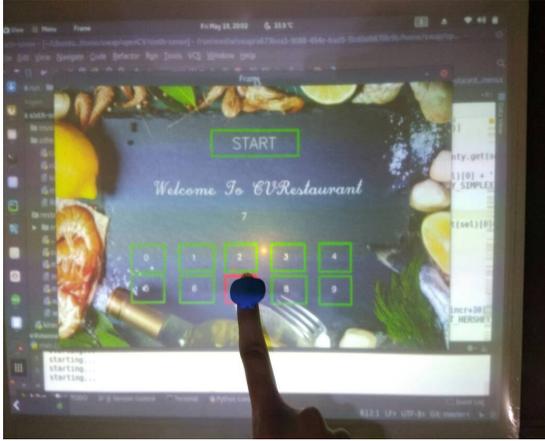
Multi-touch refers to the ability of a touch-sensing surface (usually a touch screen or a track pad) to detect or sense input from two or more points of contact simultaneously. Touch consists of a touch screen (screen, table, wall, etc.) or touchpad, as well as software that recognize touch points, as opposed to the standard touch screen. Touch displays are interactive graphics devices that combine camera and tactile technologies for direct on-screen manipulation. It is a method of interacting with touch screens using fingers instead of using the traditional mouse and keyboard [11].

The proposed dining consists of a tempered glass on the top of the table, a rear film under the glass, a short focus projector under the table, and an IR camera fixed on the table. The projector and the IR camera are connected to a personal computer. As a video signal transmitted from the computer, the projector will recover the image on the rear film of the table. The IR camera on the table will capture the user's finger tips using color code. In other case due to human error the wrong order is taken by customer and served to consumer. With this our goal is to develop a user friendly touch screen based menu card which will be placed on every table at the user side. Now the user will need to select the menu items by pressing on items displayed on table.

Multi-Touch Interface for Hotel Menu on Tabletop

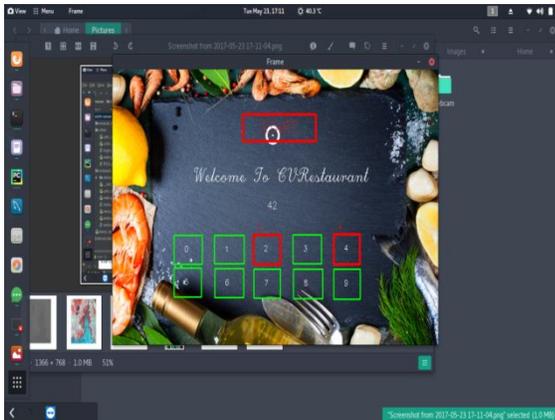
This research project investigates the deployment of the touchable dining table in a restaurant environment to enrich customers' dining experience. [9].

SCREENSHOTS



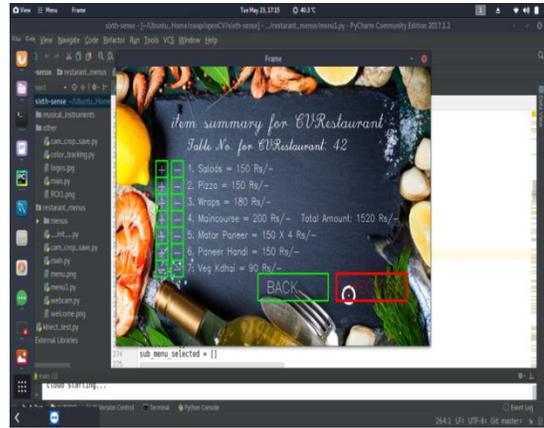
Screenshot 1: Welcome to e-menu

When customer visits table it shows welcome to the restaurant on table surface. There are keys given for the purpose of table no selection. Customer has to select their table no for giving order.



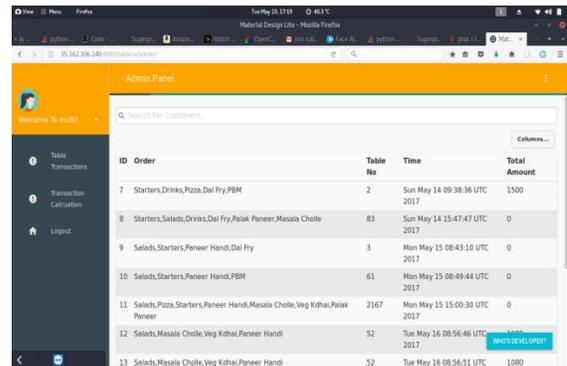
Screenshot 2: Table no Selection Process

Here customer select table no 42. At a time only one box select by customer. Selected box will be in red color and green color used as default. When user touches on particular region it gets selected. After selection of table no touch to start option, then it goes to the next page.



Screenshot 6: Checkout Menu Order

It shows list of menu order from which table no and also one of option given to select the quantity of selected item along with their price it depends on the customer choice. Then click on checkout button for further process.



Screenshot 9: Transaction Calculation

When admin log in, it shows table number with their selected menu item and total amount. At a time it shows 10 recent entries on the page. It also show time, day and date when customer enters on the restaurants.

6. RESULT ANALYSIS

As we compared our algorithm against algorithm implemented in[7] where they use RGB2YCbCr colour conversion. We can use YCbCr colour when we want to alter the brightness/contrast component of colour image without altering the component of that image. In our proposed algorithm we use RGB2HSV which separates all different variations of one particular colour because here we use colour tracking algorithm so that we have to choose all different variations of red colour which is implemented better if we used RGB2HSV. In this project we are using touch technology for table top surface on hotel menu. Where selection of particular menu we are using colour code blue. Camera can read colour according to touch on particular surface of the table. This process is very easier and fast for the purpose of hotel. It also saves time and avoids mismatch of orders. Our project is actually implemented so no need to analyze it. We have presented a novel e-restaurant system that uses touch tabletop technology to enrich customers dining experience which is very convenient to the customer. The system allows customers to order food by touching on the table surface using finger to

interact with the digitalized, meal ordering menu which is locally connected to the cashier on the WLAN.

7. ADVANTAGES

- This system is mainly useful in fast-food restaurants as it saves time. Customers don't have to wait for waiter to take order.
- Excellent resistance to surface contaminants and liquids (dust, oil, grease, water droplets).
- This emenu dining table system is very sophisticated to enrich customers dining experience.
- Where our new generation can easily acquired knowledge about this vast technology.
- Using touchable dining system we can maintain our standard.

8. CONCLUSION

We have presented a novel e-restaurant system that uses touch tabletop technology to enrich customers dining experience which is very convenient to the customer. The system allows customers to order food by touching on the table surface using finger to interact with the digitalized, meal ordering menu which is locally connected to the cashier on the WLAN. The camera based touchable dining table for restaurant developed on the e-restaurants system. It helps to enhance quality of service as well customers dining experience. The proposed system will help in reducing the number of staffs used in the restaurants. Hence it will help in reducing cost of restaurant management and gives facility to customer. It will also minimize manual service given by waiters and serving staff, thus eliminating the human mistakes. It can also help in reducing child labor problem, which is a huge problem in countries like India. Using this system it avoids the problem like exchange of order.

9. FUTURE WORK

- Mentioning of preparation time of food that will helpful to customers in their busy schedule.
- Entertainment: In entertainment market this project has great scope to make an application related to the game for children. It can be a fun for children and adults as it very easy to handle.
- Security: In terms of security purpose this work gives us the security alert as just like buzzer alarm.
- Multi-Touch Table: Color tracking algorithm with the help of camera and projector it can make the multi-touch table for interaction.
- Touch technology can used in recently shopping malls, jeweler's shops, and medical science field for the purpose of link with recent technology.

REFERENCES

- [1]Shweta S. Tanpure, Priyanka R. Shidankar, Madhura M. Joshi, "Automated Food Ordering System With Real-Time Customer Feedback", International journal of Advanced Research in Computer Science and Software Engineering, Volume 3, Issue 2, February 2013.
- [2]Swapna, M. Firdouse Ali Khan, "Design and Implementation of Ordering System for Restaurants", International Journal of Engineering Research & Technology (IJERT), Vol. 1, Issue 10, December 2012.
- [3]RajatVerma, Preksha Gupta, Prof. C. Malathy: Multi-touch table with RFID technology for hotels. IJERA Vol. 3 Issue 2 pp. 497-503(2013).
- [4]Snehal S. Dambhare, Mangesh A. Parjane, Dhananjay M. Deore, "Touch screen based menu ordering and displaying system for restaurants", International Journal of Computer Engineering and Technology Volume 3, Issue 2, pp.297-30 July-September(2012),.
- [5] G. Saidu, M. Momoh, A. S. Mindaudu, "Temperature monitoring and logging system suitable for use in hospitals, incorporating GSM text messaging", International Journal of Information Science and Techniques (IJIST) Vol.3, No.1, January 2013.
- [6]P. Isenberg, D. Fisher, M. Morris, K. Inkpen, and M. Czerwinski. An exploratory study of co-located collaborative visual analytics around a tabletop display. In Proc. IEEE Visual Analytics Science and Technology (VAST), pages 179-186, 2010.
- [7] Ling-Erl Cheng, Chao-Hsuing Tseng, and Chun-Lin Lu, "Design and implementation of the smart dining table," Consumer electronics, Communications and networks(CECNet), Xianning, China, pp 4887-4889 April 2011.
- [8]Ashutosh Bhargave, Niranjana Jadhav, Apurva Joshi, Prachi Oke, Prof. S.R. Lahane, "Digital Ordering System for Restaurant using android", International Journal of Scientific and Research Publications, VOL. 3, Issue 4, April 2013.
- [9]V. Shridhar, "Image based password authentication for illiterates with touch-screen", International Journal of Science, Engineering and Technology Research (IJSETR) Volume 1, Issue 3, September 2012.
- [10]W. Fikkert, M. Hakvoort, P. Vet, and A. Nijholt, "Experiences with Interactive Multi-touch Tables," in Intelligent Technologies for Interactive Entertainment, pp.193-200 2009.