A Smart Menu Using Video Processing for Restaurants

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Abstract: Restaurants worldwide are trying different techniques to gain customers. It could be with creative advertising or by providing high-tech interactions with the customers. Several restaurants have adopted table that include touchscreen (table - sized) with which one can place order and use the same as table. By keeping this in mind a tabletop based eco- friendly touch sensing system is proposed in this project. This screen is simply a paper placed on the glass table. The touch sensing based advanced menu ordering is the method by which anyone will select any items by their choice which are in menu. Here video processing is performed using MATLAB and Simulink to get the finger blob, help of camera placed under the table. The list of selected items and total amount is spoken to the user for their confirmation, after confirmation the same order will be sent to chef. With the proposed technique, we propose an e - wasteless, cost - effective eco - friendly touch sensing system.

Keywords: Touchscreen; Cost-effective; Video Processing

I. INTRODUCTION

Touch sensors can provide a more direct way for humans to interact with computer interfaces. A touch panel is usually layered over a visual display of an information processing system. A user can input or control information using simple or multitouch gestures by touching the screen with a special stylus or one or more fingers. We propose to develop a touch-sensing system which detects the item selected by the customer by performing video processing on the shadow cast due by the finger.

Electronic Touch Panels can be Resistive touch, Infrared touch, Optical Imaging Touch, or Projected Capacitive Touch. In project, we are developing a cost-effective touch screen-based table to streamline restaurant operations and improve customer experience.

II. OBJECTIVES

- The main objective of this work is to streamline the operation of a restaurant and improve customer experience by developing a cost-effective touch sensing-based table.
- To create the table-based touch sensing setup by developing an algorithm to identifying the touch on paper and list the items which are present in the setup under that touch.
- Develop the necessary audio setup for user's references to cross check the listed items and send the menu to their respective department in kitchen.

III. PROPOSED SYSTEM

The menu card will be stuck on the semi-transparent glass / plastic plate / sheet. The camera must be placed such that it can see the entire menu card, under the table. Once the user touches a particular item on the menu, the video processor that houses a real-time algorithm, identifies the finger touch by nullifying the background and the noise. The location of the finger blob must be estimated, based on which the selected item can be enlisted. With the help of audio confirmation to cross check the listed items through audio, which is for the user references. Once the menu selection is complete, a confirmation must be given by the user by touching "OK" and "SUBMIT" text on the paper, the order is placed and must be sent to the kitchen, if user touches the

"CANCEL" before "SUBMIT" button the entire thing will be reset for taking the new order.

IV. METHODOLOGY

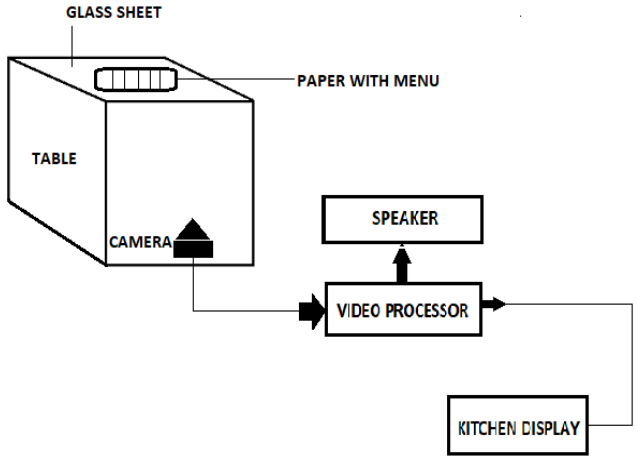

Fig 1. Block diagram of Smart menu system.

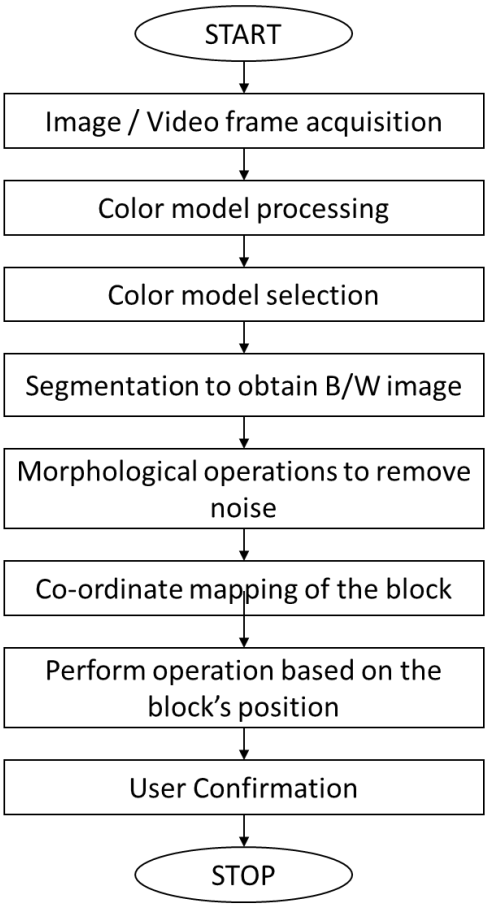

Fig 2. Flowchart of Smart menu system

By, reading the image from the camera and converts that image into different colour models. It selects the colour model that finger slot is recognizable. Calculate the threshold of the blob to make it white and rest of the background black. After segmentation process, it performs morphological operations to remove noisy pixels. Identify the coordinate of the blob, based on which corresponding operations to be performed.

V. IMPLEMENTATION

Step 1. Video Acquisition that is taking the video as input for the further processing from the web cam and we will convert it to y colour of YCbCr colour model.

Step 2. Identifying the finger range According to light intensity.

Step 3. After finding the range we will remove noise using erosion. which will result in the shrinking of the frame.

Step 4. Now, to get back the original image from eroded image which was shrunk in the erosion we use Dilation. Which basically expand the frame.

Step 5. Identifying the finger blob and finding the location of that finger blob that is by taking the rows and column of that location.

Step 6. Mapping it with the real value which is present in that area with the finger blob location.

Step 7. Since we are doing video processing and our web cam will give 30fps which we store it in an array and filter the values in array with the junk values present in it.

Step 8. Depending upon the user confirmation we process it further, that is,

- Reset - which cancel the current orders, and we can reorder according to user.
- Ok - The Audio list of order will be played for conformation.
- Submit - Order list will be sent to respective domain.

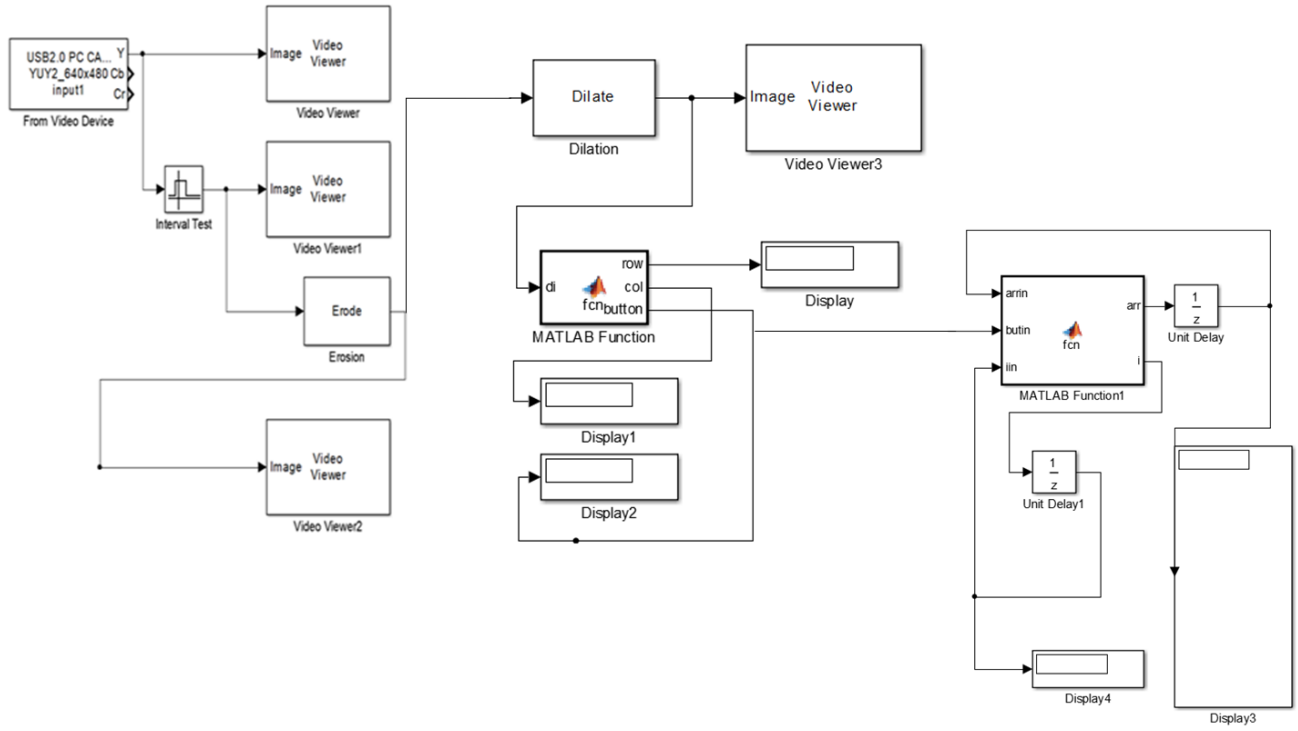

Fig 3. Working Flow chart of the Implementation

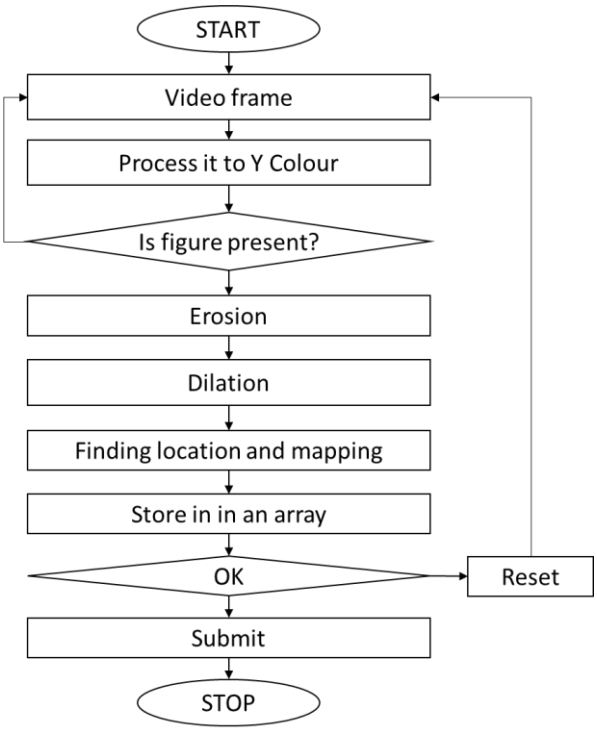

Fig 4. Implementation of Smart Menu system

VI. RESULT AND DISCUSSION

Fig 5. Setup

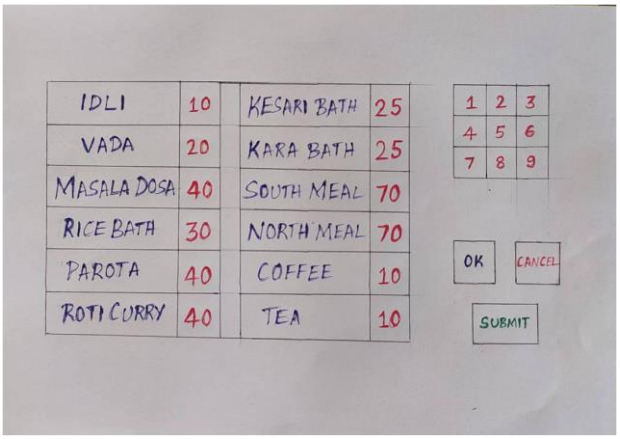

Fig 6. Menu

VII. CONCLUSION AND FUTURE SCOPE

This proposed method for building a cost-effective touch sensing system for restaurants is built. For restaurants, the proposed touch sensing system is a beautiful, hassle-free, and environmentally friendly option. The user experience will be enhanced by this technology.

We can connect multiple touch sensing devices to a single system which can act as master system to gain the access for the master control. This project takes the order from the customer and lets him pay the bill without any human intervention and to get the feedback of items availability.

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