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Contactless Menu Ordering System

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GITAM DEEMED TO BE UNIVERSITY

Abstract: Whether the COVID 19 pandemic is the root of the current turmoil or not, we look for alternatives to touch displays to reduce the physical use of common surfaces. Touch kiosks can reduce the risk of the transmission of bacteria, viruses, and other disease-causing agents by eliminating the need to touch shared objects like the kiosk screen.

In this project, we offer a system that uses hand gestures to let people manipulate computer mouse motions. Our system uses the webcam on the computer to recognise hand gesture motions. The programme continuously looks for patterns that resemble a five-finger hand in the camera input. Once a hand is found, the system locks it as an item. A flag is placed into the object to identify it as such. After the object has been identified and found, our system constantly records its movements in terms of X, Y direction movement-based coordinates. These coordinates are then used to create a real-time map that allows the mouse pointer to move in sync with hand movements.

In addition to controlling the cursor with just hand gestures an interface has also been created which lets the user order food without having them touch the screen, and the interface is created with the use of Angular 13 which is a web application framework

1. INTRODUCTION

Over the past ten years, computer technology has advanced significantly and has become an indispensable aspect of daily life. The mouse is the main piece of hardware for Human Computer Interaction (HCI) on computers. In some practical applications of HCI, such as with human-robot interaction, the mouse is not appropriate (HRI). Numerous studies have been done on alternatives to the computer mouse for HCI. The use of hand gestures is the most organic and intuitive HCI technique that can effectively replace the computer mouse. Consequently, this project's objective is to research and create a Computer Control (CC) system that uses hand gestures. Today's laptops come with webcams, which have recently been employed in security software that uses face recognition.

A camera can be used for vision-based CC to its fullest extent, effectively doing away with the requirement for a computer mouse or mouse pad. A sign language database or motion controller are two further HCI applications that can considerably increase the use of a webcam.

2. LITERATURE SURVEY

Title: Virtual Mouse Using Hand Gestures

Roshnee Matlani, Roshan Dadlani, Sharv Dumbre, Shruti Mishra, and Abha Tewari wrote this essay [1]. An open CV will be used to recognise the user's motions. The mapping of the hand's motions to previously defined coordinates will come next. The corresponding cursor movements will then be examined using this mapping. These motions will make it easier to identify and evaluate them. Additionally, the proper action mapping to the user's gestures will be applied. The outcome of this activity is the control of the PC through motions and hand gestures. This method uses various hand actions for various mouse motions, making it challenging for the user to recall those hand actions in the correct sequence.

Title: A Novel Design Of An Intangible Hand Gesture Controlled Computer Mouse Using Vision Based Image Processing

This paper was written by Rokhsana Titlee, Ashfaq Ur Rahman, Hasan U. Zaman, and Hafiz Abdur Rahman [2]. In this paper they have presented the theoretical model and implementation of a real time vision based bare hand gesture controlled mouse system. This works using bare hand and built-in webcam. Mouseless computing is not far from reality anymore. Hand gesture recognition system has its own advantages over other intangible interfacing system like touch and voice controlling computers or other devices in certain scenarios and distance and noise conditions. First hand segmentation is done, followed by contour extraction, region filling, region reduction, calculating centroid of the hand region, morphological operations and blob counting is done to achieve cursor movement with hand gestures. The accuracy of this approach is 97%. It would not work in a dark environment. These are the drawbacks of this paper.

Title:Simulated Mouse Mechanism Using Hand Movement Signals.

This research paper was written by M Kavitha, Kancharla Venkata Umesh, Karthik Velaga, Jayanth anjani naga krishna jallipalli, and Pachipala Yellam. Four steps—frame capture, image processing, region extraction, and feature matching—combine to form the overall process. For every procedure, the minimum angle between figures is 15 degrees. To begin a work, the index and middle fingers are typically bent at 15 degrees angle. Based on the object that the webcam captured, a computer vision algorithm is used to determine the type of operation.

3. PROBLEM IDENTIFICATION AND OBJECTIVES

Existing system:

There is an existing system in this field which is the Samsung touchless kiosk using AIR TOUCH technology. The patented AIR TOUCH® technology delivers exceptional mid-air interaction (5 cm from the screen) and an intuitive user experience. Allowing click, double-click, drag and drop, slide, and zoom interactions – all with a precision of 3 mm – AIR TOUCH® is as easy to use as a conventional touch device.

Samsung touchless kiosks include waving to select an option, pointing to make a selection, or swiping to scroll through a list. All gestures are managed at a distance from 6 to 9 cm from the display. It is a mid-air interactive screen where the user need not touch the screen but has to perform gestures a few centimeters away from the screen.

Depth sensors are used which are used to detect and display your touch point 9 cm before you touch the window and fires the click event 5 cm (2") from the glass.

This already existing system uses a depth sensor to perform the click events and mouse movements, but our proposed system uses cameras to capture the hand gestures and then map it with the mouse movements.

Proposed system:

The proposed system is that we are using webcam and identifying the landmarks on the user's hand and based on the angle formed by the movement of these landmarks various mouse function can be performed without the user actually touching the screen, this system will reduce hardware cost and it will also be user friendly. This system will also reduce the spread of unwanted contagious diseases such as COVID and many more.

4. System Methodology

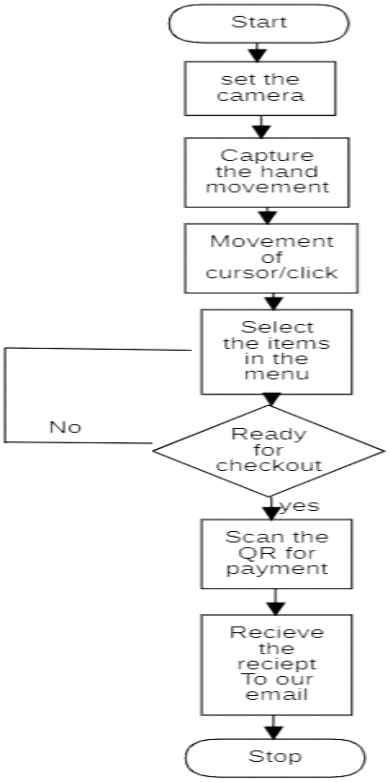


Fig.4.1

In Fig 1.1 Firstly we set the camera, after that hand movement of the user is captured by the use of various landmarks on the hand and based on the angles made by these landmarks basic mouse functionalities like single click, scroll up, scroll down are performed and the corresponding cursor movement is done using Mediapipe, after that the user is asked to select the menu items based on the interface created, if the user has done selecting then the user will pay and checkout and if the user does not want to checkout then it will backtrack to the Interface again so that the user can make changes to his order

5. TECHNOLOGIES USED

Morphological Dilation and Erosion:

Dilation adds pixels to the boundaries of objects in an image, while erosion removes pixels on object boundaries. The number of pixels added or removed from the objects in an image depends on the size and shape of the structuring element used to process the image.

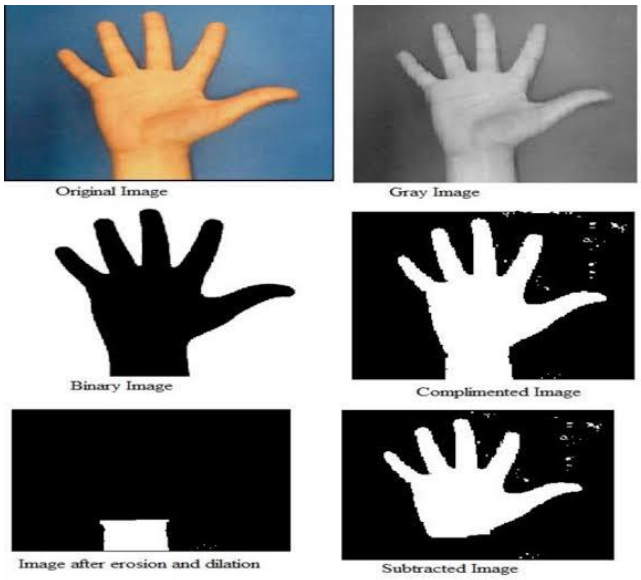


Fig 5.1

Gaussian filter:

To blur specific portions of an image and lessen noise, a low pass filter known as a Gaussian filter is utilised (high frequency components). The filter is built as a symmetric kernel of odd size (DIP version of a matrix) and passed through each pixel in the region of interest to achieve the desired outcome.

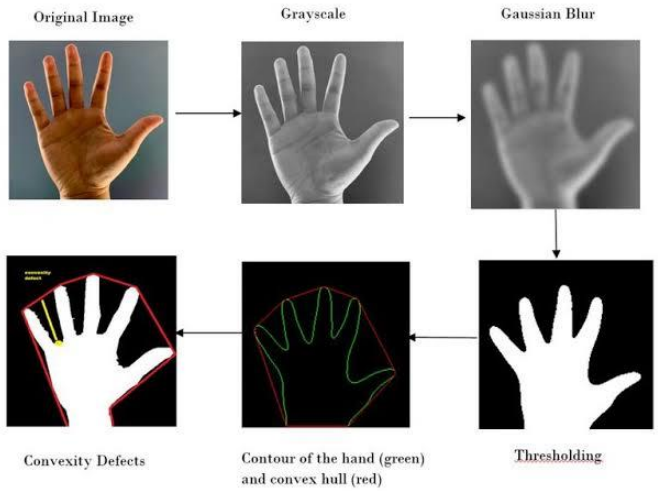


Fig 5.2

Edge detection:

Edge detection is an image processing technique for finding the boundaries of objects within images. It works by detecting discontinuities in brightness. Edge detection is used for image segmentation and data extraction in areas such as image processing, computer vision, and machine vision.

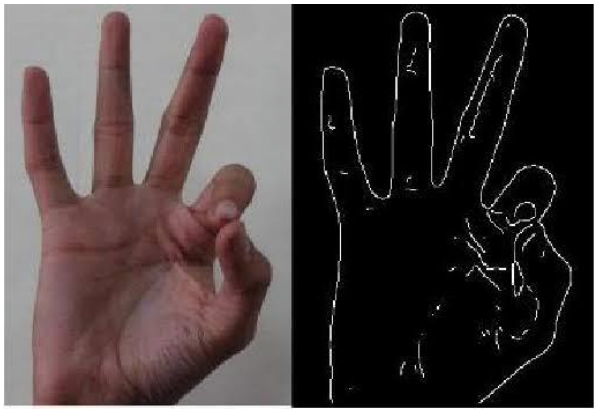


Fig 5.3

Background Subtraction:

A common technique for identifying moving objects in a series of still images from static cameras is background subtraction.The fundamental idea behind this method is to identify moving objects by measuring the change between the current frame and the reference frame, often known as the "background image" or "background model."

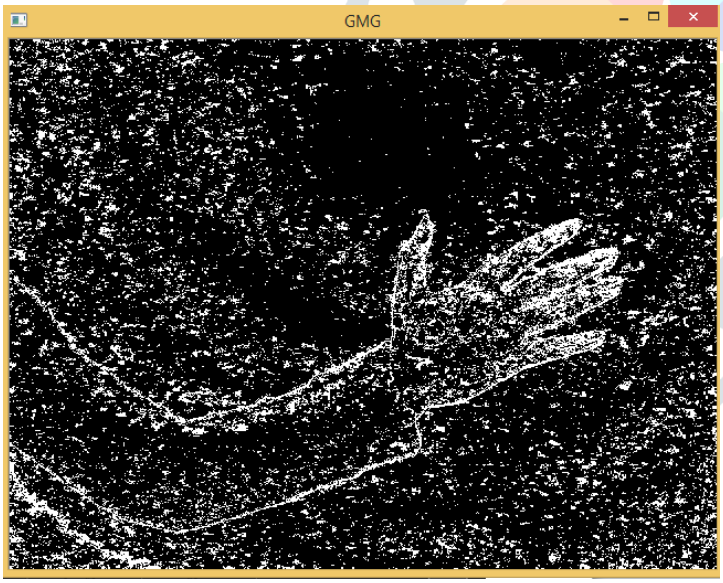
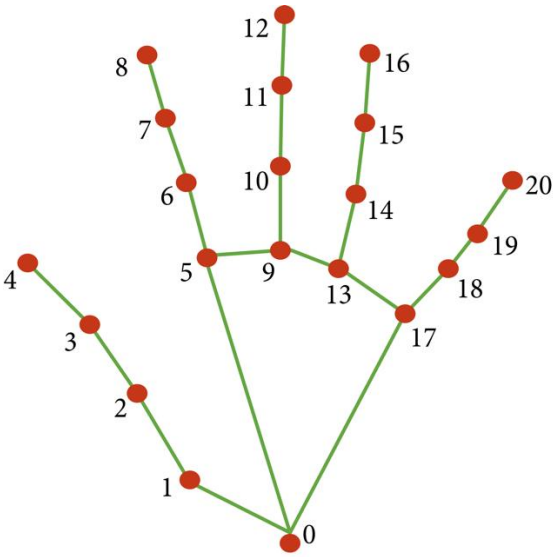


Fig 5.4

6. Implementation

Coding and testing

1. Take the photograph using the camera as a starting point.
2. From the supplied image, the camera then extracts and recognises the human hand.
3. After that, the system stores the position of the human hand using the usual "coordinate-system."



0. WRIST
1. THUMB_CMC
2. THUMB_MCP
3. THUMB_IP
4. THUMB_TIP
5. INDEX_FINGER_MCP
6. INDEX_FINGER_PIP
7. INDEX_FINGER_DIP
8. INDEX_FINGER_TIP
9. MIDDLE_FINGER_MCP
10. MIDDLE_FINGER_PIP
11. MIDDLE_FINGER_DIP
12. MIDDLE_FINGER_TIP
13. RING_FINGER_MCP
14. RING_FINGER_PIP
15. RING_FINGER_DIP
16. RING_FINGER_TIP
17. PINKY_MCP
18. PINKY_PIP
19. PINKY_DIP
20. PINKY_TIP

Fig 6.1

4. After taking the next frame, proceed. The system captures and stores the position of the hand in the second frame.

5. After that, the cursor is positioned in accordance with the comparison of the positions of both hands.

6. The system now measures the angle formed by the finger's two hands and responds with a click if it is less than 10 degrees.

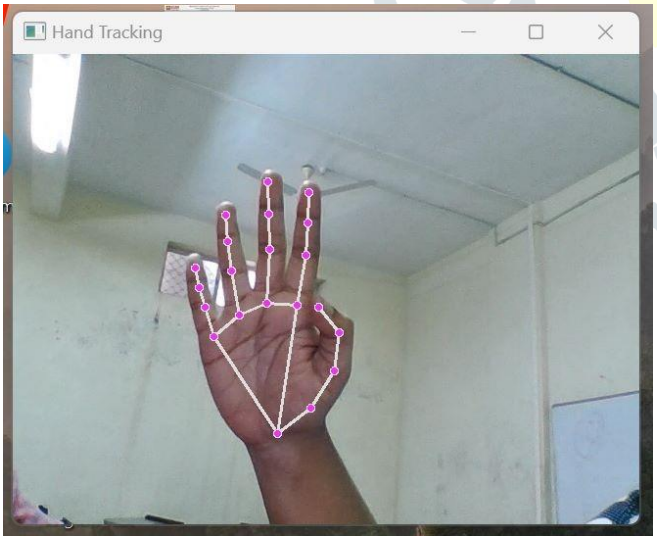
7. Create a website which contains the menu for a hotel and integrate it with the steps mentioned above.

8. Check if the website is responding according to the hand gestures made by the user and make sure user does not face any issues while ordering.

OUTPUT:

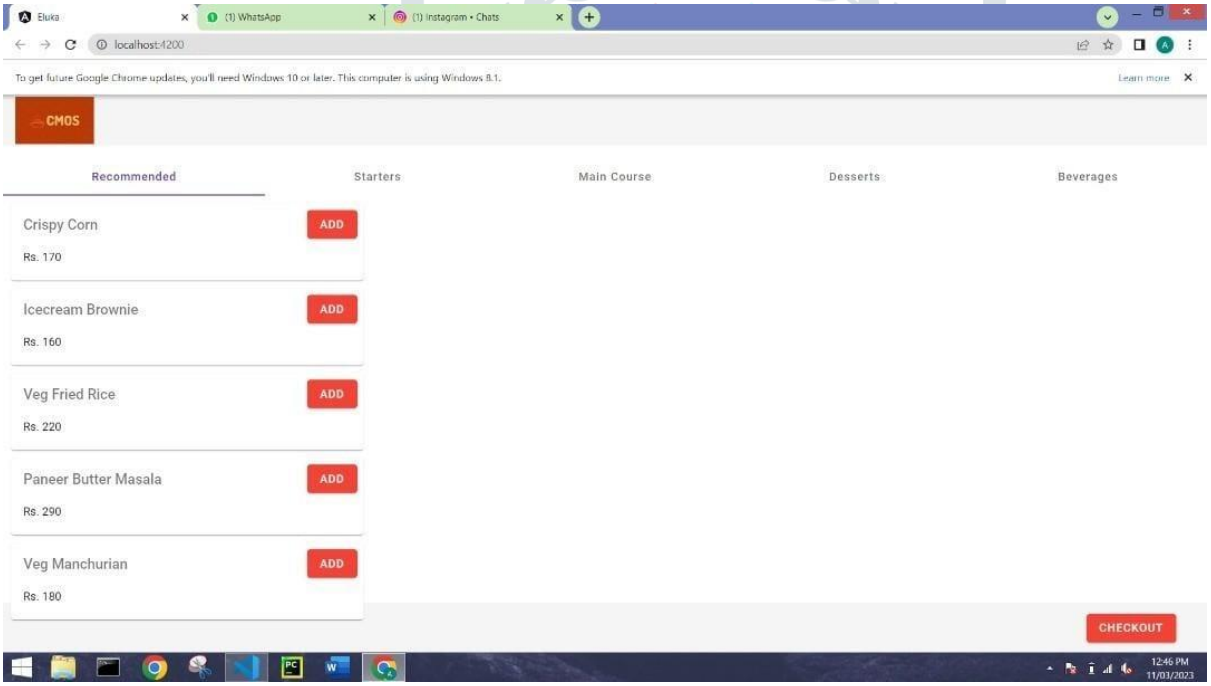
Cursor movement:
The index finger tip coordinates are tracked and the cursor moves accordingly.

Single click:
When the index finger tip and the thumb finger tip, both have an angle less than 10 degrees, single click function is performed.



Scroll Up and Down:
When the index finger and the middle finger have an angle which is less than 10 degrees then scrolling is performed. If the position of the cursor is at the top end of the page when scroll up is performed and if the the position of the cursor is at the bottom of the page then the scroll down function is performed.

Website:
A website is created which contains the menu for a hotel and this is done in such a way that the user can order without the touching the screen and this is done by integrating this website with the technology explained above.



7. RESULTS AND DISCUSSION

This project aimed to improve the machine's receptivity to and engagement with human behaviour. The sole objective of this paper was to create a portable, affordable, and operating system-neutral technology. The suggested system functions to move the mouse pointer in the user's hand's direction by detecting the user's hand and doing so. the device Control fundamental mouse functions like pointer movement, dragging, and left-clicking. The approach recognises a human hand made of skin when the angle between the fingers is less than 10 degrees and continuously monitors it for cursor movement. The method then performs the click action.

8. CONCLUSION

In conclusion we were able to partially achieve cursor movement with the use of hand gestures, Mouse functions such as click, scroll up and down were achieved, changes were made to the click function to make it more user friendly than our previous attempt, An interface was also created and it was integrated with the cursor movement as well, which was aimed to provide customer satisfaction as the customer will have no need of using hands, and reduce the spread of contagious diseases by reducing contact.

9. FUTURE SCOPE

We intend to improve the software's functionality, particularly hand tracking in the near future . In order to fully replace our traditional mouse, we also want to speed up the software's response time for pointer movement. Mouse operations like dragging, zoom in, zoom out, right click, left click are to be implemented.

We also plan to design an interface where can implement this project in real life applications. The interface includes a user who intends to place an order using a kiosk. The user can select a number of items and place an order. A total bill is calculated at the end and a final receipt is displayed. The whole process would be contactless which is very useful in situations like covid.

10. REFERENCES

[1] Matlani, Roshnee, et al. "Virtual Mouse using Hand Gestures." 2021 International Conference on Technological Advancements and Innovations (ICTAI). IEEE, 2021.

[2] Titlee, Rokhsana, et al. "A novel design of an intangible hand gesture controlled computer mouse using vision based image processing." 2017 3rd International Conference on Electrical Information and Communication Technology (EICT). IEEE, 2017.

[3] Kavitha, M., et al. "Simulated Mouse Mechanism using Hand Movement Signals." 2022 International Conference on Applied Artificial Intelligence and Computing (ICAAIC). IEEE, 2022.

[4] Pawar, Akshay Ishwar, et al. "Mouse Control using a Web Camera and Hand Gestures with Colour Tapes." International Journal of Science Technology & Engineering 2.11 (2016).

[5] Ranawat, Manav, et al. "Hand Gesture Recognition Based Virtual Mouse Events." 2021 2nd International Conference for Emerging Technology (INCET). IEEE, 2021.

[6] Shibly, Kabid Hassan, et al. "Design and development of hand gesture based virtual mouse." 2019 1st International Conference on Advances in Science, Engineering and Robotics Technology (ICASERT). IEEE, 2019.

[7] Salian, S., P. Ganorkar, and D. Serai. "Hand Gesture Recognition and Cursor Control." ResearchGate, Mumbai (2015).

[8] Ranawat, Manav, et al. "Hand Gesture Recognition Based Virtual Mouse Events." 2021 2nd International Conference for Emerging Technology (INCET). IEEE, 2021.