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Gesture Control Virtual Mouse

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ABSTRACT

In todays technological era, many technology are evolving day by day. One such promising concept is human- system interface. For example, in a stressed out mouse there is no provision to increase restriction. In wi-fi mouse, one must have Bluetooth hardware installed within the laptop and Bluetooth dongle attached. The proposed era will haven't any such boundaries and could alternatively depend on gesture recognition. In this mission, operations like clicking and dragging of objects may be achieved with different hand gestures. The proposed gadget will only require a webcam as an input tool. The software program's that will be required to put into effect the proposed machine are opencv and python. The output of the digital camera may be displayed at the machine's display screen so that it may be in addition calibrated by means of the user. The python dependencies that will be used for implementing this machine are numpy, math, wx and mouse. In this paper, we present a singular approach for human computer interplay (hci) in which cursor motion is controlled using a real-time camera.

A manner to control the Position of the cursor with the bare palms without using Any digital tool. While the operations like clicking And dragging of objects could be accomplished with special Hand gestures. The proposed gadget will handiest require a Webcam as an input tool. The software's that will be Required to put in force the proposed machine are opencv And python. The output of the camera may be displayed on The system's display screen so that it could be similarly calibrated by means of The person. The python dependencies that will be used for Implementing this gadget are numpy, math, wx and Mouse

1. INTRODUCTION

Gesture Recognition has been very interest problem in computer vision community for a long time. Hand gestures are a facet of visual communication which will be conveyed through the middle of the palm, the finger position and therefore the shape constructed by the hand. Hand gestures are often classified into static and dynamic. As its name implies, the static gesture refers to the stable shape of the hand, whereas the dynamic gesture comprises a series of hand movements such as waving [1].

There are a spread of hand movements within a gesture; for instance , a handshake varies from one person to a different and changes consistent with time and place. The main difference between posture and gesture is that posture focuses more on the form of the hand whereas gesture focuses on the hand movement. Computer technology has tremendously grown over the past decade and has become a necessary a part of everyday live. The primary accessory for Human Computer Interaction (HCI) is that the mouse. The mouse isn't suitable for HCI in some real world situations, like with Human Robot Interaction (HRI). There are many researches on alternative methods to the pc mouse for HCI. The most natural and intuitive technique for HCI, that's a viable replacement for the pc mouse is with the utilization of hand gestures. Our vision was to develop a virtual mouse system that uses an internet camera to speak with the device during a more user-friendly way, as an alternate to employing a touch screen. In order to harness the full potential of a webcam, it can be used for vision based CC, which would effectively track the hand gesture predict the the gesture on basis of labels.

Our vision became to broaden a virtual mouse system that makes use of an internet digicam to talk with the device in a more person-friendly way, as an alternative to using a touch display screen. If you want to harness the entire potential of a webcam, it may be used for vision based totally cc, which could efficiently track the hand gesture predict the the gesture on basis of labels.

2. RELATED WORKS

In June 2010 Vision based Gesture recognition for human computer interaction was published Which used Motion detection and recognition algorithm, which was a solid method for gesture detection. Devanshu singh in International Journal for Research in Applied Science and Engineering Technology mentioned a novel method of controlling mouse movement with Real time camera using openCV. Apart from this official documentation of openCV and Media pipe was referred extensively. In 2013 a research paper was published named "Vision-based Multi model Human Computer Interaction using Hand and Head Gestures" which used hand and head to control. Any computer vision based algorithm based_applications.it

recognized gestures based on Pattern of hand and motion of head. In 2015 in a paper "vision based computer mouse control using hand gesture" described camera based technique which used real time video acquisition and implemented lift and right click. It mainly used binary image generation and filtering. Naveen kumar Mahamakli in 2015 published a article On the website "researchGate.net" about" OpenCV for computer Applications which use vision" [6]. The aim was to explain about image processing done by openCV And steps it used along with its different capabilities.

3. PROBLEM DEFINITION

There are generally two approaches for hand gesture recognition, which are hardware based, where the user must wear a device, and the other is vision based which uses image processing techniques with inputs from a camera. The proposed system is vision based, which uses image processing techniques and inputs from a computer webcam. Vision based gesture recognition tracking and gesture recognition. Hand tracking would be used to navigate the computer cursor and hand gestures would be used to perform mouse functions.

4. INDUSTRY BENEFITTED

There are generally two approaches for hand gesture recognition, which are hardware based, where the user must wear a tool , and therefore the other is vision based which uses image processing techniques with inputs from a camera. The proposed system is vision based, which uses image processing techniques and inputs from a computer webcam. Vision based gesture recognition tracking and gesture recognition. Hand tracking would be wont to navigate the pc cursor and hand gestures would be wont to perform mouse functions. The scope of the project would therefore be to design a vision based CC system, which can perform the mouse function previously stated.

5. PROPOSED METHODOLOGY

This project promotes an approach for the human pc interaction (hci) where cursor motion can be managed the usage of a real-time digital camera, it's far an alternative to the present day methods including manual input of buttons or converting the positions of a physical pc mouse. As an alternative, it utilizes a digital camera and computer imaginative and prescient technology to control numerous mouse activities and is able to acting each assignment that the bodily pc mouse can.

We'll first use mediapipe to recognize the hand and the hand key factors. Mediapipe returns a total of 21 key points for each detected hand. Palm detection model and hand landmark version are utilized by mediapipe to discover hand. First palm is detected as it's far an easy procedure with recognize at hand landmark [1].

Fig. 1 Co-ordinates or landmark in hand

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

6. WORKFLOW

6.1 CAMERA

The system works on the frames captured by the webcam on the computer machine or built-in camera on a laptop. By creating the video capture object, the system will capture video using webcam in real-time. In order to use a single camera with this system the device index would be "0". To add additional camera device index would be 1, 2 and soon. This camera will capture frame by frame and will pass it to the system.

6.2. CAPTURING

By using an infinite loop the webcam captures each and every frame till the program termination. The frames from the real-time video are processed from BGR to HSV color space.

6.3. COLOR DETECTION AND MASKING

In this proposed device, color detection is performed with the aid of detecting color pixels of fingertips with colour caps from the frames that were captured through the webcam. This is the preliminary and essential step of the proposed gadget. The outcome of this step may be a grayscale photo, wherein the intensity of the pixels differs the colour cap from the rest of the frame and the color cap location may be highlighted. Then rectangle boundingcap and the coloration cap might be tracked. The gesture will be detected from the monitoring of these color caps.

6.4. GESTURE RECOGNITION

6.4.1. Mouse Movements

At first, calculation of the center of two detected color objects which is done by the coordinates of the center of the detected rectangle. To create a line between two coordinates, the built-in OpenCV function is used and to detect midpoint equation given below is used:
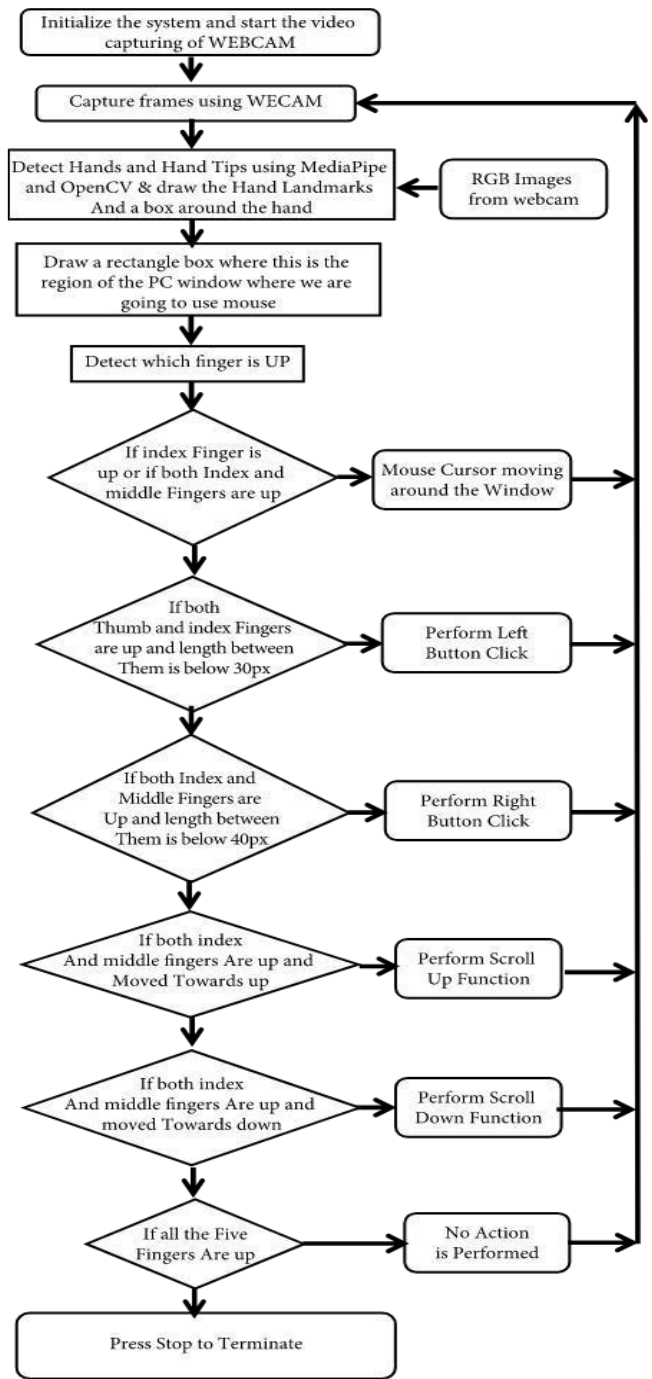
$$M=(Xa+Xb/2, Ya+Yb/2) \quad (1)$$

Fig. 2 Flowchart

This midpoint is the tracker for the mouse pointer and the mouse pointer will track this midpoint. In this system, the coordinates from camera captured frames resolution is converted to screen resolution. A predefined location for the mouse is set, so that when the mouse pointer reaches that position, the mouse started to work and this may be called

open gesture. This allows the user to control the mouse pointer.

6.4.2. Mouse Clicking

The proposed system uses close gestures for clicking events. When the rectangle bounding boxes come closer to another rectangle, bounding box is created with the edge of the tracking bounding boxes. When the newly created bounding box becomes 20% of its creation time size then the system performs left button click and it can be clicked. By holding this position more than 5 seconds, the user can perform a Double click. And for the right button click again the open gesture is used. To perform the right button click, the single finger is good enough. The system will detect one fingertip color cap then it performs a right button click.

6.4.3. Mouse Scrolling

To scroll with this system, user needs to use the open gesture movement with three fingers with color caps. If the users use their three fingers together & changes its position to downwards, it will perform scrolling down.

7. SIMULATED RESULTS AND DISCUSSIONS

In this work, we've used HCI (Human Computer Interaction) and computer vision so as to contribute in future vision based interaction between the machine and human. The proposed paper is on controlling the mouse functions using hand gestures. The main functions are mouse movement, left button click, right button click, double click and scrolling up or down. In this system, the users can pick any color from multiple colors. There are a few color bands defined & the users can pick any color from the colours consistent with the backgrounds and the lighting conditions. This may vary in a different background. for instance , when a user starts the system, it will provide the choice to pick a color from multiple colors (Green, Yellow, Red, Blue & two others). The user will have to pick one color such that, the color wouldn't match with the background alternatively , he has got to choose the colour which can be highlighted in the current background. In this work, we've used HCI (Human Computer Interaction) and computer vision so as to contribute in future vision based interaction between the machine and human. The proposed paper is on controlling the mouse functions using hand gestures. The main functions are mouse movement, left button click, right button click, double click and scrolling up or down. In this system, the users can pick any color from multiple colors. There are a few color bands defined & the users can pick any color from the colours consistent with the backgrounds and the lighting conditions. This may vary in a different background. for instance , when a user starts the system, it will provide the choice to pick a color from multiple colors (Green, Yellow, Red, Blue & two others). The user will have to pick one color such that, the color wouldn't match with the background alternatively , he has got to choose the

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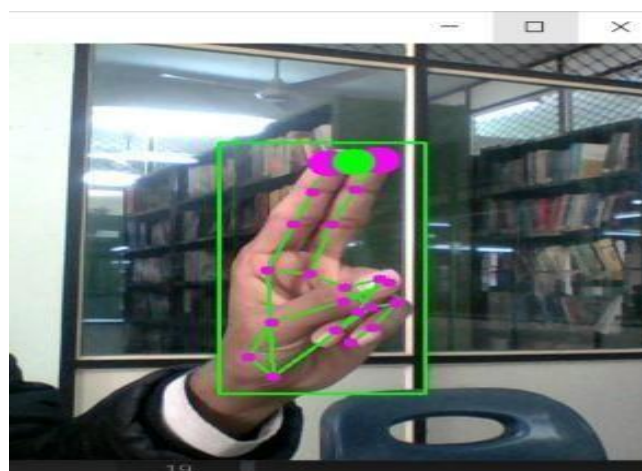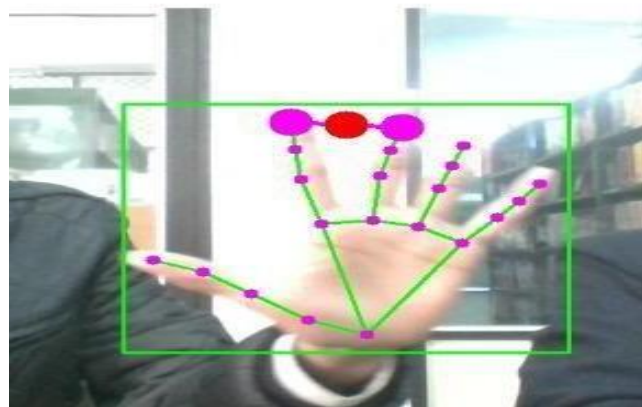

Fig. 3 Snapshot of Click Gesture
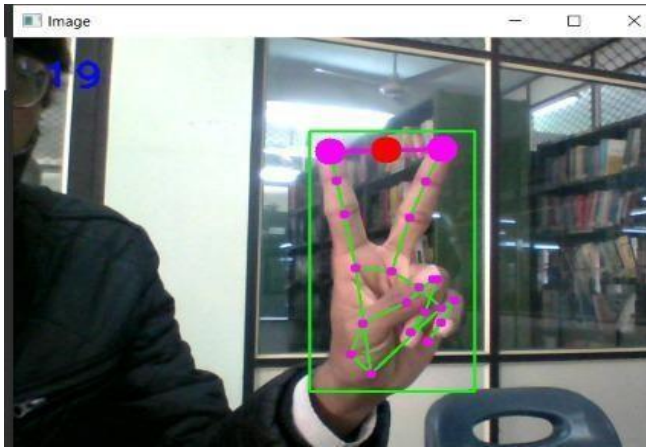

Fig. 4 Snapshot of Neutral Hand Gesture

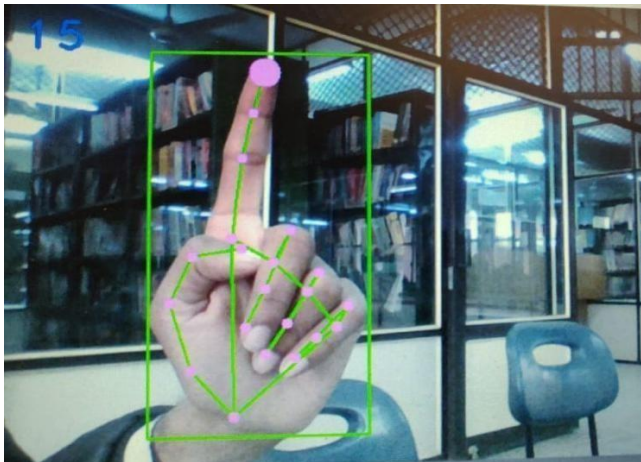Fig. 5 Snapshot of Neutral Click Gesture

Fig. 6 Snapshot of Mouse Cursor Movement

8. APPLICATION

This project are often useful for presentations and for reducing workspace and burden of additional hardware devices. In critical events like battleground, operation theater, this project are going to be ready to withstand itself, because it is wispier than the other contemporary system within the marketplace for computer interaction. Since it removes the burdens of devices, it brings the user and therefore the workspace more closer than before. Major applications: • Robot controlling is one among the main applications of this system. Controlling robots without machines or extra devices are often a superb addition to the present technology. • Digital artist can draw 2D or 3D images using this gesture-based mouse on digital canvases. It will allow more freedom more dynamic more room to artists to make their art. • Critical events sort of a battleground, operation theater, mining fields are often controlled by gesture mouse. • computer game or Augmented Reality based games can be played with none extended or wireless devices with bare hands more comfortably. • For patients with no limb control, this technique are often proved very useful and effective. • This mouse system are often applicable for sign language for the dumb & deaf people

9. CONCLUSION

Virtual gesture control mouse may be a system that profound to guide the mouse cursor and execute its task employing a real-time camera. We implemented mouse navigation, selection of icons and its functions and tasks like left, right, double click and scrolling. this technique is predicated on image comparison and motion detection technology to try to to mouse indicator movements and selection of the icon. Analyzing results, it are often anticipated that if we offer enough light, decent camera, the algorithms can work on any domain. Then our system are going to be more systematized. In future, we would like to merge more features like interaction in multiple windows, enlarging and shrinking windows, closing window, etc. by using the palm and multiple fingers. windows ,enlarging and shrinking windows, closing window, etc. by using the palm and multiple fingers.. Windows ,enlarging and shrinking home windows, remaining window, and many others. By using the use of the palm and more than one arms.

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