

# Virtual Mouse Operations Using Webcam

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## ABSTRACT

With new changes seen in computer technology day by day, it has become quite essential for us to find specific new ways of interaction with computer systems as its need is increasing in society every day. Today, every device is making the use of touch screen technology on its systems, which isn't affordable to be used in all applications. A specific interactive module like a virtual mouse that makes use of Hand Tracking and Gestures that will help us to interact can be an alternative way for the traditional touch screen and the physical mouse. The objective is to create a Hand Tracking application that interacts with the system. This system proposed is a Computer Vision-based mouse cursor control system, which uses hand gestures that are being captured from a webcam through a Hand detection technique. This system allows the user to navigate the system cursor using their hand gestures that the computer webcam tracks and perform mouse operations like left- click, right-click, and double click using different hand gestures. Python and OpenCV library are used for real- time computer vision to implement the system. The camera output is displayed on the monitor.

**Keywords :** Virtual mouse, Hand tracking, Webcam, OpenCV, Python, Gestures.

## I. INTRODUCTION

A mouse, in calculating terms, is a pointing device that detects two- dimensional movements relative to a surface. This movement is converted into the movement of a pointer on a display that allows you to control the Graphical User Interface (GUI) on a computer platform. There are a lot of different types of mice that have formerly been in modern day technology. There's the mechanical mouse that determines the movements with a hard rubber ball

that rolls around as the mouse is moved. Times latterly, the optical mouse was introduced, which replaced the hard rubber ball with an LED detector to descry tabletop movement and also shoot the information to the computer for processing. In 2004, the ray mouse was also introduced to meliorate the delicacy of movement with the smallest hand movements and overcome the limitations of the optical mouse, which were the difficulties in tracking grandly- buffed surfaces. Still, no matter how accurate it can be, there are still limitations within the mouse itself in both

physical and specialised terms. For illustration, a computer mouse is a consumable tackle device as it requires replacement in the long run. Either the mouse buttons are degraded, causing unhappy clicks, or the whole mouse is no longer detected by the computer itself. therefore, a virtual mortal computer commerce device that replaces the physical mouse by using a webcam or any other image- capturing device can be a necessary way to use the touch screen.

This device, which is the webcam, will be constantly employed by software that monitors the gestures given by the user to exercise them and translate the motion of a pointer, like a physical mouse. thus, a virtual mortal- computer commerce device that replaces the physical mouse by using a webcam or any other image-capturing device can be an alternative to the touch screen. This device, which is the webcam, will be constantly utilised by software that monitors the gestures given by the user. to reuse it and restate it into the motion of a pointer, like a physical mouse.

With new changes seen in computer technology day by day, it has become relatively essential for us to find specific new ways of interaction with computer systems as its need is adding in society every day. moment, every device is making the use of touch screen technology on its systems, which is not affordable to be used in all operations. A specific interactive module like a virtual mouse that makes use of Hand Tracking and Gestures that will help us to interact can be an indispensable way for the traditional touch screen and the physical mouse. The ideal is to produce a Hand Tracking operation that interacts with the system. This system proposed is a Computer Vision- grounded mouse cursor control system, which uses hand gestures that are being captured from a webcam through a Hand detection technique.

This system allows the user to navigate the system cursor using their hand gestures that the computer webcam tracks and perform mouse operations like left-click, right- click, and double click using different hand gestures. Python and OpenCV library are used

for real- time computer vision to apply the system. The camera output is displayed on the monitor.

## II. METHODS

In the Methodology, the procedure of each part is being explained step by step and their working.

### A. Webcam

The first important functioning tackle is a good working web camera. To capture the object used to instruct the mouse and replace the working of it with the object. So that formerly if the object is captured in our frames using OpenCV also it can be used as our mouse to make the performing easier. The purpose of the Webcam is landing the hand gesture and movements generated by humans and store its image in memory.

### B. Hand Tracking.

The movement of the pointer was controlled by the tip of the finger. so as to spot the tip of the finger, the centre of the palm should first be set up. the strategy used for locating the hand centre was espoused from and it has the advantage of being straightforward and easy to apply. The shortest distance between every point inside the inscribed circle to the contour was measured and the point with the largest distance was recorded as the centre. the space between the centre of hand and the hand contour was taken as the compass of the hand. The hand centre was calculated for every successive frame and using the hand centre, the tip of the finger would be known and used for hand tracking. The strategy used for relating the indicator and also the different fingers are described.

### C. Gesture Recognition

The system is trained with hand gestures to fete different gestures. Once the gesture is honoured, it's restated into a corresponding mouse movement, which is also executed on the virtual screen. The system is designed to be scalable and adaptable to different types of surroundings and devices.

There are two main ways for gesture recognition:

1. Fingertip identification
2. Number of fingers.

D. Cursor Control

Once the hand gestures are honoured, it will be an easy matter of mapping completely different hand gestures to specific mouse functions. It seems that controlling the Personal Computer cursor, operations are performed. The different operations that can be performed are Right Click, Left Click, Double Click, Real- Time Operation, Pause/ Play any videotape.

### III. RESULTS

The virtual mouse system is to develop an alternative to the regular and traditional mouse system to perform and control the mouse functions. The OpenCV library has been used to track the hands that help to operate on this system using the webcam or a built-in camera. By using OpenCV, the mouse and its basic operations like mouse pointing, selection, clicking and deselection can be controlled.

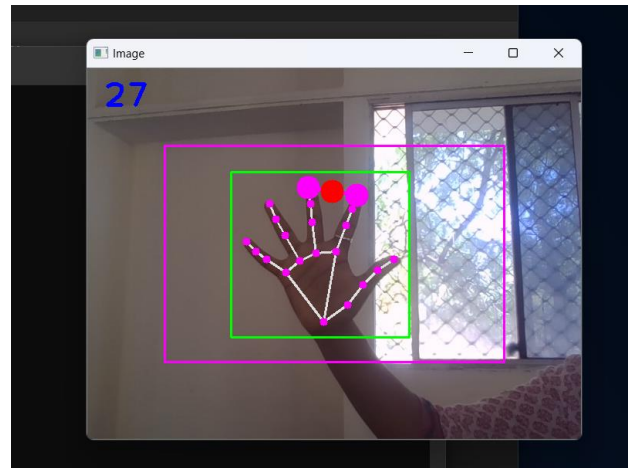


Figure 2: Hand detected

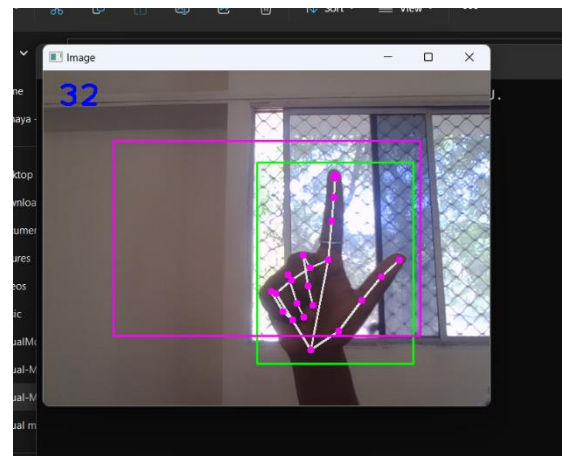


Figure 3: Scrolling Gesture

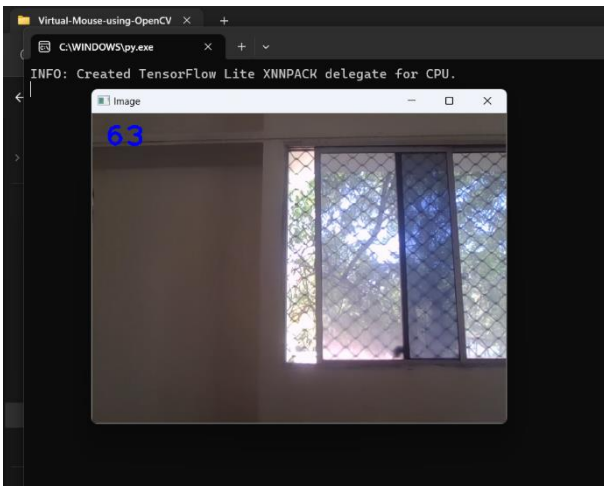


Figure 1: No hand detected

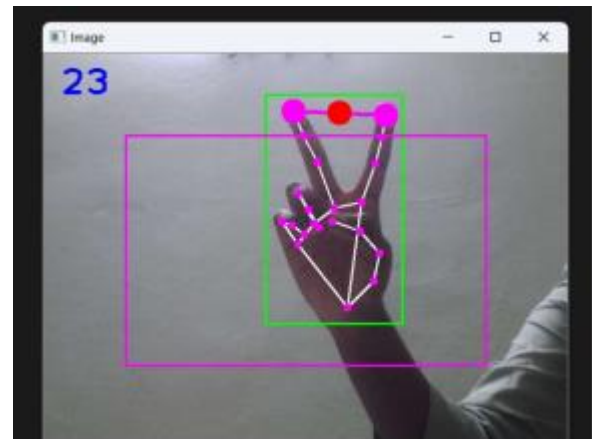


Figure 4: Clicking operation not performed (as distance between fingers is greater than 40)

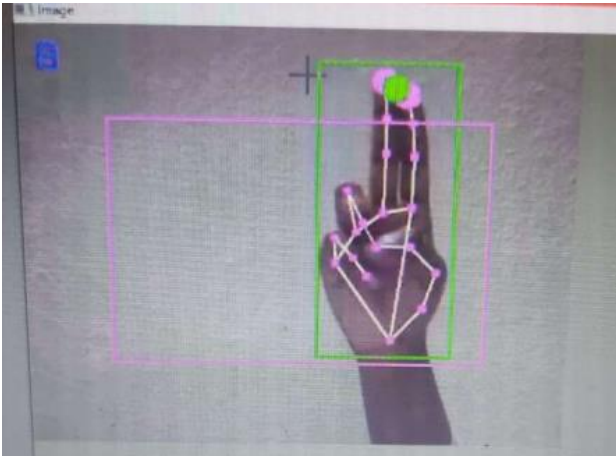


Figure 5: Clicking operation performed (As the distance between fingers is less than 40)

#### IV. CONCLUSION

The system controls the mouse pointer and executes its operation using a real-time camera. This design is to form a system which will allow the hand gestures and control the computer/ laptop in line with those gestures. The system will benefit mobile systems where using pointing devices like the mouse is tough. All the mouse tasks like left and right clicking, double clicking and beginning the operations using gestures like tablet, maquila, command prompt etc. Before factual enforcing gesture comparison algorithms, skin discovery and hand segmentation from kept frames need to be done. The system is also developed in such a way that the user new to the system can simply have to install the set up and not run the full system.

#### V. REFERENCES

- [1]. Monali Shetty, Christina A. Daniel, Manthan K.Bhatkar, Ofrin P. Lopes, "Virtual Mouse Using Object Tracking", IEEE Conference Record # 48766, ISBN: 978-1-7281-5371-1, 2020.
- [2]. Vantukala VishnuTeja Reddy, Thumma Dhyanchand, Galla Vamsi Krishna, Satish Maheshwaram, "Virtual Mouse Control Using Colored Finger Tips and Hand Gesture

Recognition" IEEE Xplore Journal HYD-CON, 2020.

- [3]. Onkar Yadav, Sagar Makwana, Pandhari Yadav, Prof. Leena Raut, "Cursor Movement By Hand Gesture", International Journal Of Engineering Sciences & Research Technology, ISSN: 2277-9655, 2017.
- [4]. D. A. Barhate and K. P. Rane, "A Survey of Fingertip Character Identification in Open-Air Using Image Processing and HCI," 3rd International Conference for Convergence in Technology (I2CT) , pp. 1-4, 2018.
- [5]. Mahajan J.R and C. S. Rawat, "Object Detection and Tracking using Cognitive Approach," 2017 International Journal of Scientific Research in Network Security and Communication (IJSRNSC), Vol.5, Issue.3, pp. 136-140, 2017.
- [6]. Abhik Banerjee, Abhirup Ghosh, Koustuvmoni Bharadwaj, "Mouse Control using a Web Camera based on Color Detection", IJCTT, vol.9, 2014.
- [7]. A. Erdem, E. Yardimci, Y. Atalay, V. Cetin, "Computer vision-based mouse", Acoustics, Speech, and Signal Processing, Proceedings. (ICASS). IEEE International Conference.

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