

# Real Time System for Virtual Keyboard and Mouse

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**Abstract:** *These days, PC vision has advanced to where a PC can perceive its client utilizing an essential picture handling calculation. Individuals are involving this vision in many pieces of day-to-day existence as of now of improvement, like face acknowledgment, variety identification, programmed vehicles, etc. PC vision is utilized in this examination to make an optical mouse and console that utilizes hand movements. The PC's camera will filter the picture of different developments made by an individual's hand, and the mouse or pointer will move in light of the development of the motions, including doing well and left clicks utilizing particular signals. Essentially, unique motions can be utilized to control the console, for example, a one-finger signal to pick a letter in order and a four-finger signal to swipe left and right. Without any wires or different gadgets, it will work as a virtual mouse and console. The venture's just piece of equipment is a webcam, and the coding is finished in Python utilizing the Boa constrictor stage. The raised body absconds are made first, and afterward a calculation is made by planning the mouse and console capabilities to the blemishes utilizing the imperfection computations. On the off chance that you map ping several them with the mouse and console, the PC will perceive the motion and answer fittingly. In this project we have created 4 gestures like click, open the folder and close the folder and exit. Also, we have created the virtual keyboard.*

**Keywords:** Computer Vision, Virtual Keyboard, Virtual Mouse

## I. INTRODUCTION

A little green box will show up in the focal point of the screen when the PC webcam catches the recording of the individual sitting before the PC. The items showed in that green box will be handled by the code and coordinated with it. Assuming it coordinates, a red shaded line will show up, demonstrating that the PC has perceived the thing and that the mouse cursor can be moved by moving the article. This will help not just in PC security yet additionally in the development of a virtual computational encounter. In the spot of different objects, hand motions will be utilized to move the cursor, an alternate signal will be utilized for right snap, and a different motion will be utilized for left click, and likewise, a basic signal can do the console capabilities essentially that might have been finished on an actual console. On the off chance that the signal doesn't coordinate, the crate will show just a green line; in any case, in the event that the realized motion is distinguished, the crate will show a red boundary. Some equipment, for example, the mouse, the dongle to interface with the PC, and a battery to drive the mouse to capability, are used while utilizing a remote or Bluetooth mouse, however in this article, the client utilizes their built-in camera or webcam and utilizes hand motions to control the PC mouse tasks. The web camera in the proposed framework records and investigations the obtained outlines, distinguishes the different hand movements and hand tip signals, and afterward plays out the particular mouse activity. The simulated intelligence virtual mouse framework was made utilizing the Python programming language, as well as OpenCV, a PC vision library. The model in the proposed artificial intelligence virtual mouse framework utilizes the MediaPipe bundle for following the hands and the tip of the hands, as well as the Pynput, Autopy, and PyAutoGUI bundles for moving around the PC's window screen and carrying out roles like left click, right snap, and looking over. The proposed model's outcomes exhibited an extremely elevated degree of exactness, and the proposed model can work very well in true applications utilizing just a computer processor.

## II. LITERATURE SURVEY

Chinnam Datta Sai Nikhil et al. [1] expressed that The proposed structure is vision based, which utilizes man-made intelligence strategies and commitments from a PC webcam. Vision based signal affirmation following and movement affirmation In our design, the hand region is isolated from the establishment with the establishment deduction strategy. At that point, fingers are partitioned to recognize and see the fingers. Finally, a standard classifier is applied to expect the names of hand movements. The assessments on the educational file of 1300 pictures show that our procedure performs well and is uncommonly useful. Moreover, our method shows like execution over a state-of-workmanship technique on another educational assortment of hand movements.

Omkar Shinde [2] in this paper, the undertaking's just piece of equipment is a webcam, and the coding is finished in Python utilizing the Boa constrictor stage. The Curved structure abandons are made first, and afterward a calculation is made by planning the mouse and console capabilities to the imperfections utilizing the deformity estimations. In the event that you map ping two or three them with the mouse and console, the PC will perceive the motion and answer fittingly.

Aishwarya Tathe [3] et al. in this endeavor, PC vision is used in making an Optical mouse and control center using hand signals. The camera of the PC will scrutinize the image of different movements performed by a singular's hand and as shown by the improvement of the signs the Mouse or the cursor of the PC will move, even perform right and left clicks using different signs. Additionally, the control center abilities may be used for specific different signs, for example, using one finger movement for letters all together select and four-figure movement to swipe left and right. It will go probably as a virtual mouse and control center with no wire or outside devices. The fundamental hardware some portion of the endeavor is a web-cam and the coding is done on Python using Boa constrictor stage. Here the Bended casing forsakes are first delivered and a while later using the distortion assessments a computation is made and arranging the mouse and control center abilities with the blemishes. Arranging a few them with the mouse and control center, the PC will understand the sign shown by the client and act in this way.

Bindu Verma et al. [4] stated that in this task, PC vision is utilized in making an Optical mouse and console utilizing hand motions. The camera of the PC will peruse the picture of various motions performed by an individual's hand and as per the development of the motions the Mouse or on the other hand the cursor of the PC will move, even perform right and left clicks utilizing various motions. Likewise, the console capabilities might be utilized for certain various motions, such as utilizing one finger motion for letter set select and four-figure signal to swipe left and right. It will go about as a virtual mouse and console with no wire or outside gadgets. The main equipment part of the venture is a web-cam and the coding is finished on Python utilizing Boa constrictor stage. Here the Arched frame surrenders are first produced and afterward utilizing the imperfection estimations a calculation is produced and planning the mouse and console capabilities with the deformities. Planning several them with the mouse and console, the PC will comprehend the signal shown by the client and act appropriately.

Dipankar Gupta et al. [5] expressed that this framework can be valuable to everybody, particularly to the deadened individuals who face troubles to work actual console and mouse. We utilized PC vision with the goal that client can type on virtual keyboard utilizing a yellow-shaded cap on at the tip of his finger, and can likewise explore to mouse controlling framework. When the client is in mouse controlling mode, client can play out all the mouse tasks exclusively by showing different number of fingers. We approved both module of our framework by 52 years of aged deadened individual and accomplished around 80% precision by and large.

## III PROPOSED METHOD AND ALGORITHM

### 3.1 Proposed Methodology

We are going to create virtual keyboard and mouse using OpenCV. The step-by description of the procedure of proposed system is as follows: Start Webcam, Detect Hand, Detect Fingers, Calculate Distance, Create Virtual Mouse and Create Virtual Keyboard.

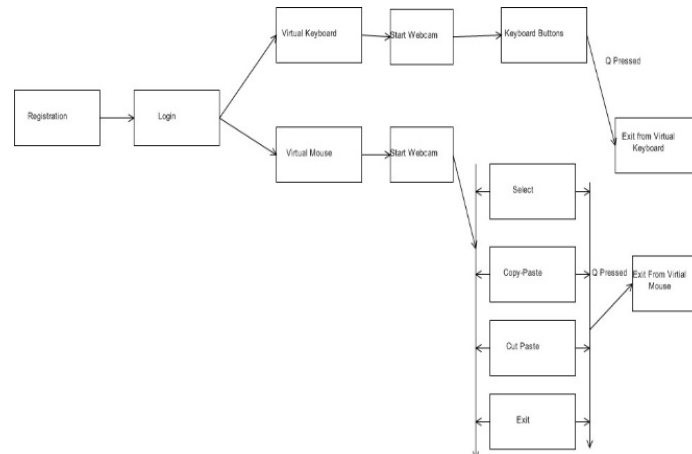


Fig1. Proposed Architecture

**1. Webcam**

The proposed AI virtual mouse system is based on the frames that have been captured by the webcam in a laptop or PC.

**2. Capturing the Video and Processing**

The AI virtual mouse system uses the webcam where each frame is captured till the termination of the program.

**3. Detect Hand**

The AI virtual mouse system makes use of the transformational algorithm, and it converts the Co-ordinates of fingertip from the webcam screen to the computer window full screen for controlling the mouse. When the hands are detected and when we find which finger is up for performing the specific mouse function, a rectangular box is drawn with respect to the computer window in the webcam region where we move throughout the window using the mouse cursor.

**4. Detect Fingers**

Detecting Which Finger Is Up and Performing the Particular Mouse Function. In this stage, we are detecting which finger is up using the tip Id of the respective finger that we found and the respective co-ordinates of the fingers that are up.

**5. Calculate Distance**

The distance between the two fingers is less than 30px it Perform Left Button Click.

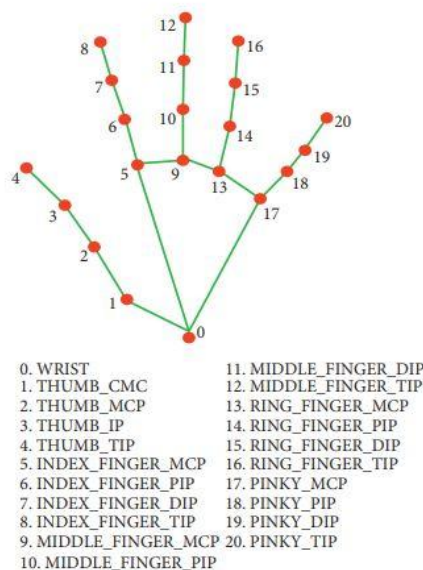


Fig2. Finger Co-ordinates

### 6. In Mouse

After capturing the video, processing it to detect the hand and gestures, and calculating distances in a virtual mouse webcam application, the next steps could involve the following:

1. Mapping gestures to mouse actions: Once the gestures have been detected, you can map them to specific mouse actions.
2. Controlling the cursor: Using the information extracted from the hand detection and gestures, you can control the position of the virtual mouse cursor on the screen. Translate the hand movements into corresponding cursor movements, allowing users to navigate and interact with the computer interface.
3. Implementing mouse clicks: Determine the conditions under which a gesture should be interpreted as a mouse click.
4. Refining and optimizing the system: Test the virtual mouse application thoroughly to ensure accurate hand detection, gesture recognition, and cursor control.
5. Press Q for exit the mouse.

### 7. In Keyboard

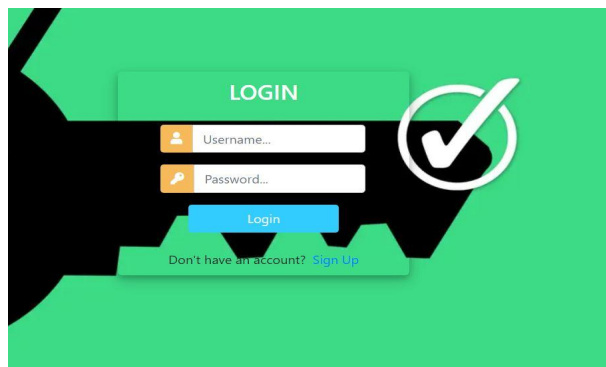
After calculating distances in a virtual keyboard application, the next steps could involve the following:

1. Key mapping: Determine how the detected hand positions and distances correspond to different keys on the virtual keyboard.
2. Generating key events: Once the mapping is established, generate the appropriate key events based on the hand positions and distances.
3. Text input handling: Implement the logic to handle text input based on the generated key events. Capture the key events and concatenate the corresponding characters to form the entered text. Determine the hand gestures or distance thresholds that trigger these special key events.
4. Integrating with the operating system: Similar to the virtual mouse, integrate the virtual keyboard with the operating system by using appropriate APIs or libraries.
5. Press Q, for exit the keyboard.

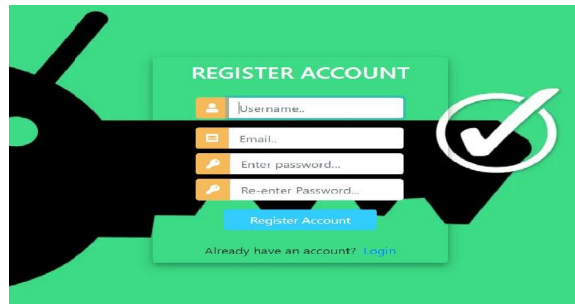
## IV. IMPLEMENTATION

This application is proposing a system to recognize the hand gesture and replace the mouse and keyboard function. That includes the movement of the mouse cursor, the drag and click with the keyboard features like printing alphabets and other keyboard functions.

### 1. Login Page



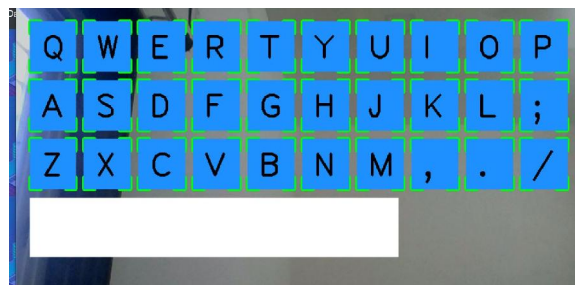
**2. Register Page**



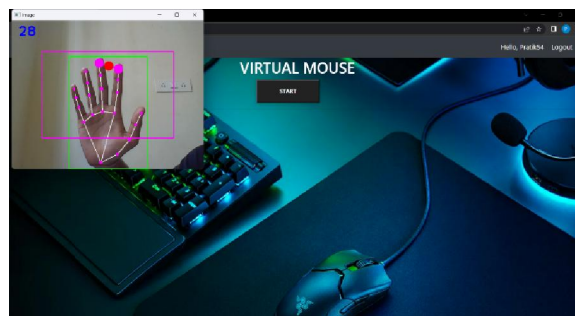
**3. UI of Virtual Keyboard and Mouse**



**4. Virtual Keyboard**



**5. Virtual Mouse**



## 6.Exit Page



## V. RESULTS & DISCUSSION

In our experimental setup we are capturing the hands from webcam. We are detecting the hands through hand tracking module. After detection we are calculating distance of figures based on that we are creating the gestures. In this project we have created 4 gestures like click, open the folder and close the folder and exit. Also, we have created the virtual keyboard.

## VI. CONCLUSION

The propose system that recognizes hand gestures and eliminates the need for a mouse and keyboard. This includes mouse cursor movement, drag and click, and keyboard features such as printing alphabets and other keyboard tasks. In this paper we have created 4 gestures and virtual keyboard using OpenCV. In future work we will create the more gestures.

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