

INTRODUCTION

A Computer Mouse is an input device that helps to point and to interact with whatever that is being pointed. No Matter how much the accuracy of the mouse increases but there will always be limitations of the mouse as the mouse is a hardware input device and there can be some problems like mouse click not functioning properly and etc., as the mouse is a hardware device like any other physical object even the mouse will have a durability time within which is functional and after its durability time we have to change the mouse. As the technology increase everything becomes virtualized such as speech recognition. Speech Recognition is used for recognition and translation of the spoken language into text. Thus, Speech Recognition can replace keyboards in the future, Similarly Eye Tracking which is used to control the mouse pointer with the help of our eye. Eye Tracking can replace mouse in the future.

Virtual Mouse

OBJECTIVE:

Hand Gesture Recognition plays a key role in human-computer interactions. As we can see that there are so many new Technological advancements happening such as biometric authentication which we can see frequently in our smart phones, similarly hand gesture recognition is a modern way of humancomputer interaction i.e., we can control our system by showing our hands in front of webcam and hand gesture recognition can be useful for all kinds of people. Based upon this idea this paper is presented. This paper provides a detailed explanation to the algorithms and methodologies for the color detection and virtual mouse

EXISTING SYSTEM:

A Computer Mouse is an input device that helps to point and to interact with whatever that is being pointed. There are so many types of mouse in the current trend, there's the mechanical mouse that consists of a single rubber ball which can rotate in any direction and the movement of the pointer is determined by the motion of that rubber ball. Later the mechanical mouse is replaced by the Optical Mouse. Optical Mouse consists of a led sensor to detect the movement of the pointer. Years Later the laser mouse was introduced to improve the accuracy and to overcome the drawbacks of the Optical Mouse. Later as the Technology has been increased drastically wireless mouse was introduced so as to enable hassle free movement of the mouse and to improve the accuracy. No Matter how much the accuracy of the mouse increases but there will always be limitations of the mouse as the mouse is a hardware input device and there can be some problems like mouse click not functioning properly ad etc., as the mouse is a hardware device like any other physical object even the mouse will have a durability time within which is functional and after its durability time we have to change the mouse.

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PURPOSE:

As the technology increase everything becomes virtualized such as speech recognition. Speech Recognition is used for recognition and translation of the spoken language into text. Thus, Speech Recognition can replace keyboards in the future, Similarly Eye Tracking which is used to control the mouse pointer with the help of our eye. Eye Tracking can replace mouse in the future.

Gestures can be in any form like hand image or pixel image or any human given pose that require less computational difficulty or power for making the devices required for the recognitions to make work. Different techniques are being proposed by the companies for gaining necessary information/data for recognition handmade gestures recognition models. Some models work with special devices such as data glove devices and color caps to develop complex information about gesture provided by the user/human.

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ADVANTAGES AND LIMITATION:

Advantages:

- ❖ Virtual Mouse using Hand gesture recognition allows users to control mouse with the help of hand gestures.
- ❖ System's webcam is used for tracking hand gestures.
- ❖ Computer vision techniques are used for gesture recognition. OpenCV consists of a package called video capture which is used to capture data from a live video.
- ❖ Main thing we need to identify are the applications the model is going to develop so the development of the mouse movement without using the system mouse.

Disadvantages:

- ❖ There will always be limitations of the mouse as the mouse is a hardware input device and there can be some problems like mouse click not functioning properly.
- ❖ the mouse is a hardware device like any other physical object even the mouse will have a durability time within which is functional and
- ❖ after its durability time we have to change the mouse

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MODULES:

- ✓ Collection information,
- ✓ Checking devices (like webcam) working properly or not,
- ✓ Collection tape or finger ribbon, which should be fit to the fingers,
- ✓ Import packages like NumPy, OpenCV, pyautogui.mouse, tkinter,
- ✓ Implement the Open Gesture Operation,
- ✓ Fine Tuning

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Source Code:

```
import cv2

import mediapipe as mp

import pyautogui

cap = cv2.VideoCapture(0)

hand_detector = mp.solutions.hands.Hands()

drawing_utils = mp.solutions.drawing_utils

screen_width, screen_height = pyautogui.size()

index_y = 0

while True:

    _, frame = cap.read()

    frame = cv2.flip(frame, 1)

    frame_height, frame_width, _ = frame.shape

    rgb_frame = cv2.cvtColor(frame, cv2.COLOR_BGR2RGB)

    output = hand_detector.process(rgb_frame)

    hands = output.multi_hand_landmarks

    if hands:

        for hand in hands:

            drawing_utils.draw_landmarks(frame, hand)

            landmarks = hand.landmark

            for id, landmark in enumerate(landmarks):

                x = int(landmark.x*frame_width)

                y = int(landmark.y*frame_height)

                if id == 8:

                    cv2.circle(img=frame, center=(x,y), radius=10, color=(0, 255, 255))

                    index_x = screen_width/frame_width*x

                    index_y = screen_height/frame_height*y
```

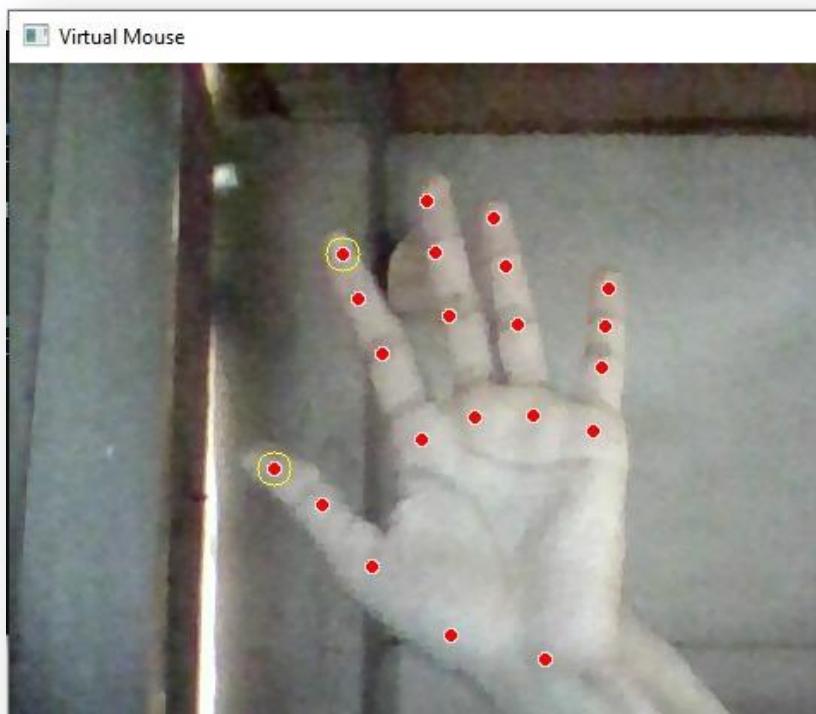
Virtual Mouse

```
if id == 4:  
  
    cv2.circle(img=frame, center=(x,y), radius=10, color=(0, 255, 255))  
  
    thumb_x = screen_width/frame_width*x  
  
    thumb_y = screen_height/frame_height*y  
  
    print('outside', abs(index_y - thumb_y))  
  
    if abs(index_y - thumb_y) < 20:  
  
        pyautogui.click()  
  
        pyautogui.sleep(1)  
  
    elif abs(index_y - thumb_y) < 100:  
  
        pyautogui.moveTo(index_x, index_y)  
  
cv2.imshow('Virtual Mouse', frame)  
  
cv2.waitKey(1)
```

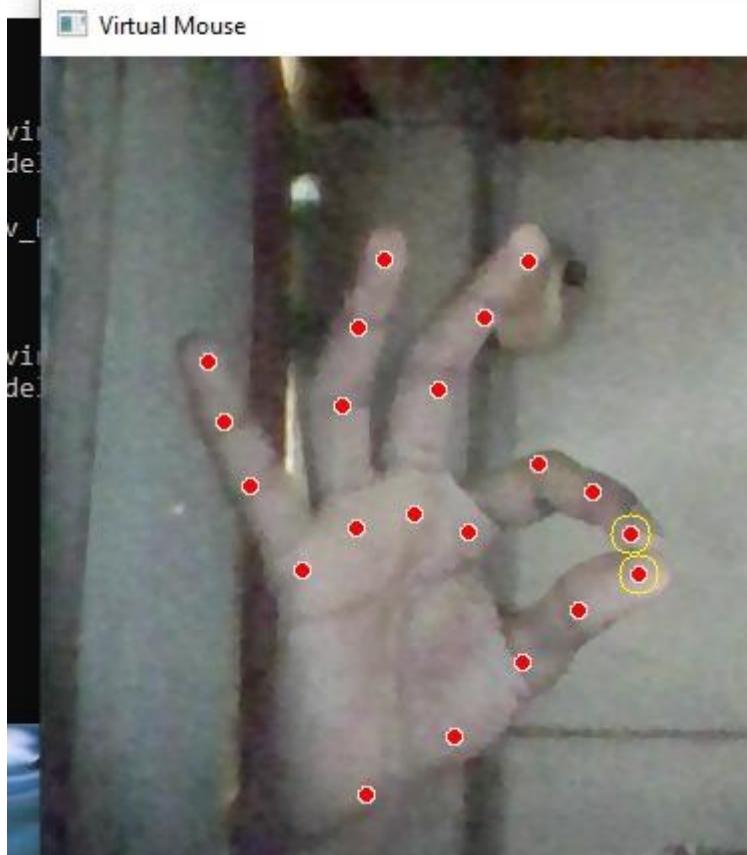
Virtual Mouse

OUTPUT SCREEN SHOTS:

```
C:\Windows\System32\cmd.exe - virtual_Mouse2.py
F:\programs\Python_AI_ML\OpenCv_Basic>virtual_Mouse2.py
INFO: Created TensorFlow Lite XNNPACK delegate for CPU.
outside 518.4
outside 105.59999999999997
outside 108.80000000000007
outside 113.60000000000002
outside 113.60000000000002
outside 113.60000000000002
outside 112.0
outside 112.0
outside 115.20000000000005
outside 113.59999999999997
outside 110.39999999999998
outside 113.60000000000002
outside 112.0
outside 113.60000000000002
outside 112.0
outside 110.39999999999998
outside 107.19999999999999
outside 110.39999999999998
outside 110.39999999999998
outside 108.79999999999995
```



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FUTURE SCOPE:

The development of these techniques and models are really vast. The color detection model can be developed if we want to identify a particular color out of a colored photo. And the mouse movement can be developed in such a way it can act like a real mouse that will help us for using system without even touching the system's keyboard or mouse. The development can be in such a way it can be training on CNN's that will help for a better performed model.

The Models can be developed in different ways by using some latest packages like 'pyautoGUI' that will help us to give commands which will identify an input and perform some function on the system. So if any separate color is detected it can perform special function or if an input from user is detected it will open any specific folder with ease without performing any actions, a simple gesture can do the job

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CONCLUSION:

This model can conclude by using the topics of computer vision like open CV, it can form masks that can variate colors by using color variation techniques and also development of mouse movement by using certain packages like ‘mouse’ which will be used for the movement of mouse by using the coordinates that are linked to the detected color. This can provide ease use of systems and many other applications. So the open CV is helping the users with different accessible forms of models that will make ease life.

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