

A  
PROJECT REPORT  
ON  
**“AI VIRTUAL MOUSE”**

Submitted to  
**DEPARTMENT OF COMPUTER SCIENCE &  
RESEARCH SENSITIZATION SCHEME**  
FOR THE PARTIAL FULFILLMENT OF  
RESEARCH SENSITIZATION SCHEME

IN  
**COMPUTER SCIENCE**

BY

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Under the guidance of

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Tal- Gadhinglaj, Dist- Kolhapur

2021-2022



**Vidya Prasarak Mandal's**

**DR.GHALI COLLEGE,GADHINGLAJ**

**Department of Computer Science**

## **CERTIFICATE**

This is to certify that Mr. Shubham A. Patil, Mr. Shubham K. Godse, Miss. Pooja P. Patil, Miss. Shweta V. Sawant class B.Sc. III Computer Science have satisfactorily carried out and completed the project work for the research sensitization scheme. They are submitting the project work entitled “**AI VIRTUAL MOUSE**” in computer science, during the academic year 2021-2022. This project report represents their benefited work.

Date:-

Place:- Gadhinglaj.

Project Guide  
(Mrs. Sonal M. Bagadi)

HOD

Principal

**DR.GHALI COLLEGE, GADHINGLAJ**  
**RESEARCH SENSITISATION SCHEME FOR COLLEGE STUDENTS**

## **Utilization certificate**

Certified that the grant of Rs. 5000/- (Five Thousand Rupees only) received from the Research committee, Dr. Ghali College, Gadhinglaj under the for Research Sensitisation Scheme for College Students Project entitled “**AI Virtual Mouse**” vide letter No.GCG/SS/1196/2021-2022 dated 07/03/2022 has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the Dr. Ghali College, Gadhinglaj.

# DECLARATION

We here by declare that, the project report entitled “**AI VIRTUAL MOUSE**” written and submitted by us to Dr. Ghali College, Gadhinglaj under the guidance of Mrs.Sonal Mahesh Bagadi, department of computer science , to Dr. Ghali College, Gadhinglaj, Is our original work.

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Date:-

Place:- Gadhinglaj.

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We take this oppurtunity to express our sincere thanks to head of the department Mrs. M. B. Devarde and all our assistant professor of the Department Of Computer Science Mrs. R.V. Hulagabali and Mrs. P.S. Kulkarni, who continuously monitored and encouraged me during the progress of the work.

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# INTRODUCTION

The project entitled website of “**Dr. Ghali College Department of Computer Science**” for a software program. With the development technologies in the areas of augmented reality and devices that we use in our daily life, these devices are becoming compact in the form of Bluetooth or wireless technologies.

This project proposes an AI virtual mouse system that makes use of the hand gestures and hand tip detection for performing mouse functions in the computer using computer vision. The main objective of the proposed system is to perform computer mouse cursor functions and scroll function using a web camera or a built-in camera in the computer instead of using a traditional mouse device.

With the use of the AI virtual mouse system, we can track the fingertip of the hand gesture by using a built-in camera or web camera and perform the mouse cursor operations and scrolling function and also move the cursor with it. While using a wireless or a Bluetooth mouse, some devices such as the mouse, the dongle to connect to the PC, and also, a battery to power the mouse to operate are used, but in this paper, the user uses his/her built-in camera or a webcam and uses his/her hand gestures to control the computer mouse operations. In the proposed system, the web camera captures and then processes the frames that have been captured and then recognizes the various hand gestures and hand tip gestures and then performs the particular mouse function.

Python programming language is used for developing the AI virtual mouse system, and also, OpenCV which is the library for computer vision is used in the AI virtual mouse system. In the proposed AI virtual mouse system, the model makes use of the MediaPipe package for the tracking of the hands and for tracking of the tip of the hands, and also, Pynput, Autopy, and PyAutoGUI packages were used for moving around the window screen of the computer for performing functions such as left click, right click, and scrolling functions. The results of the proposed model showed very high accuracy level, and the proposed model can work very well in real-world application with the use of a CPU without the use of a GPU.

# Material and Methods

## System Requirement

### ◆ Hardware Requirement:-

Processor: i3 Processor or above

Hard Disk: 500 GB or above

Monitor: Standard LED Monitor

Input Devices: Keyboard, Webcam

Ram: 4 GB or above

### ◆ Software Requirement:-

Operating system: Windows 7 or above.

Coding Language: Python

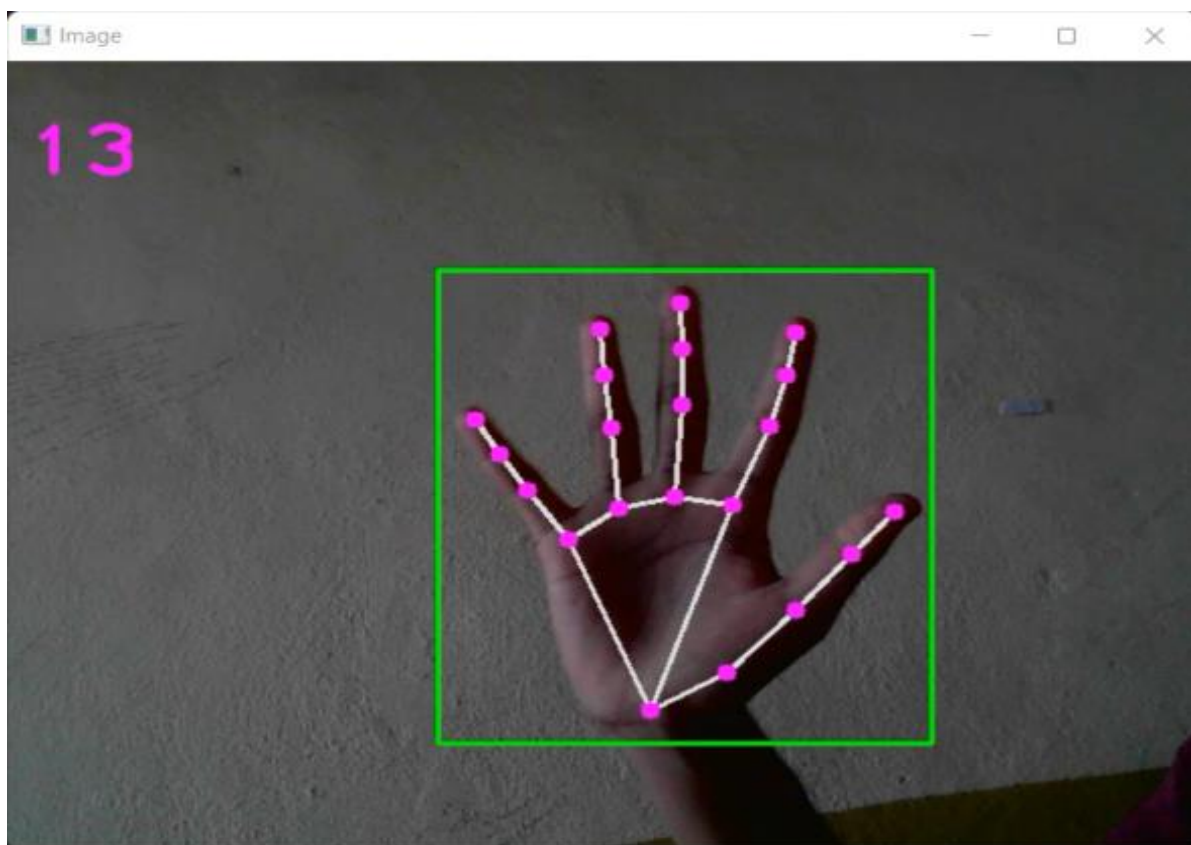
Applications: Python IDE 3.8 & PyCharm



# Method:

## 1. The Camera Used in the AI Virtual Mouse System

The proposed AI virtual mouse system is based on the frames that have been captured by the webcam in a laptop or PC. By using the Python computer vision library OpenCV, the video capture object is created and the web camera will start capturing video. The web camera captures and passes the frames to the AI virtual system.



## 2. Capturing the Video and Processing

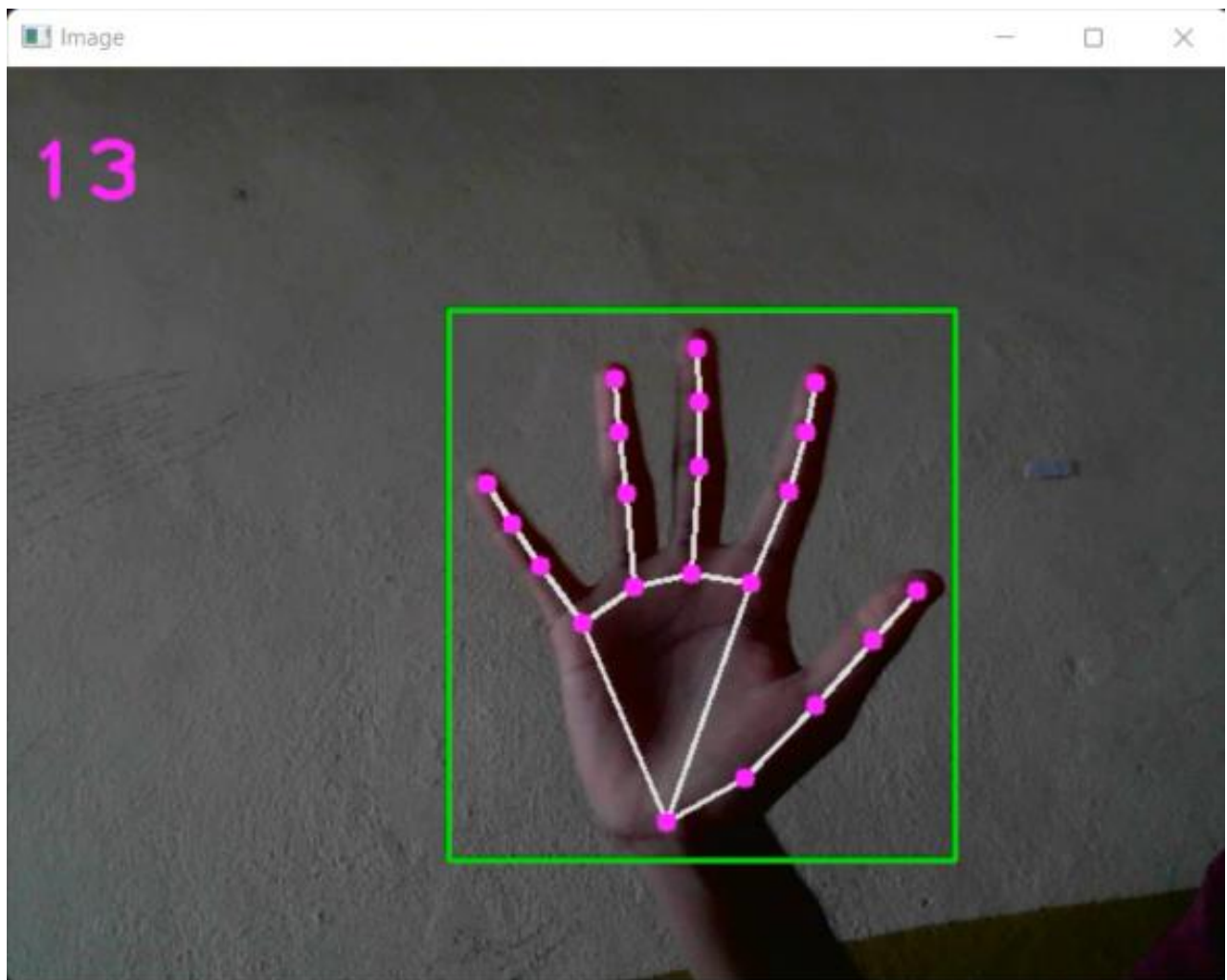
The AI virtual mouse system uses the webcam where each frame is captured till the termination of the program. The video frames are processed from BGR to RGB color space to find the hands in the video frame by frame as shown in the following code:

```
def findHands(self, img, draw = True):
```

```
imgRGB = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
self.results = self.hands.process(imgRGB)
```

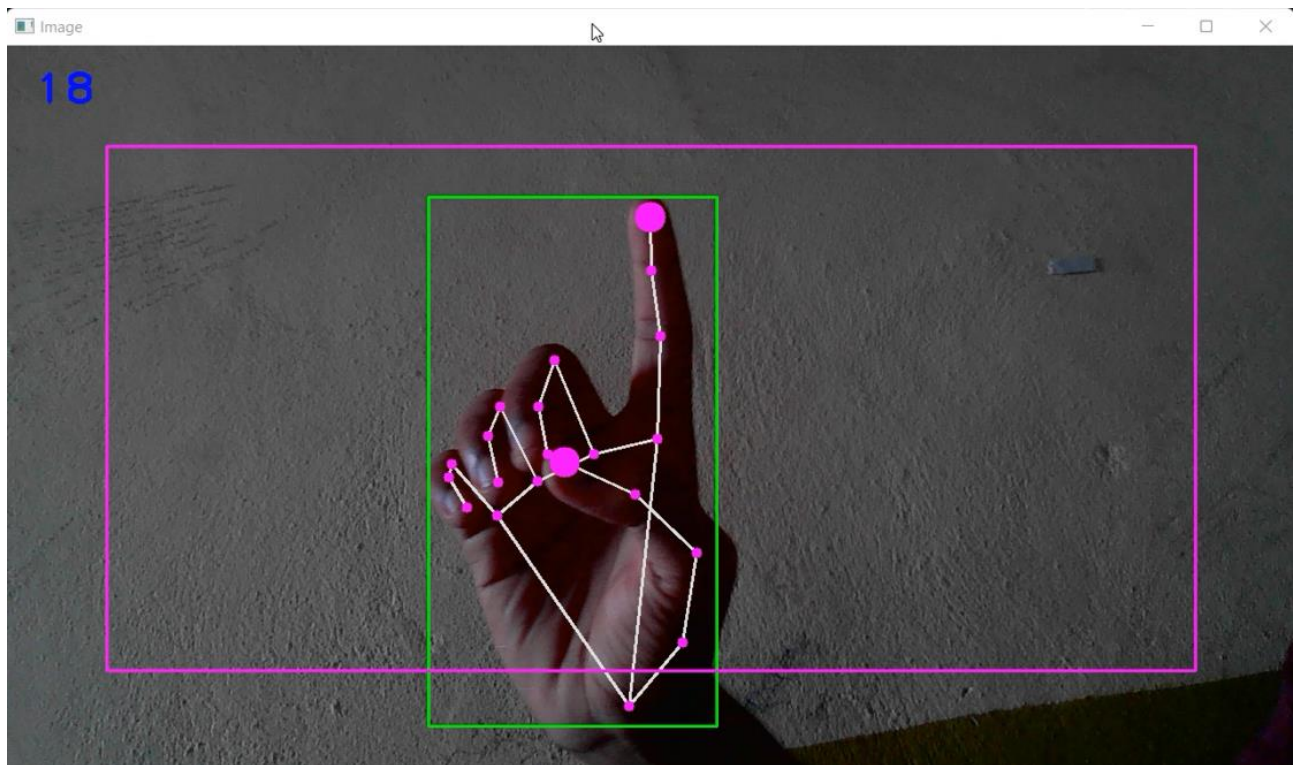
### 3. (Virtual Screen Matching) Rectangular Region for Moving through the Window.

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. Detecting Which Finger Is Up and Performing the Particular Mouse Function.

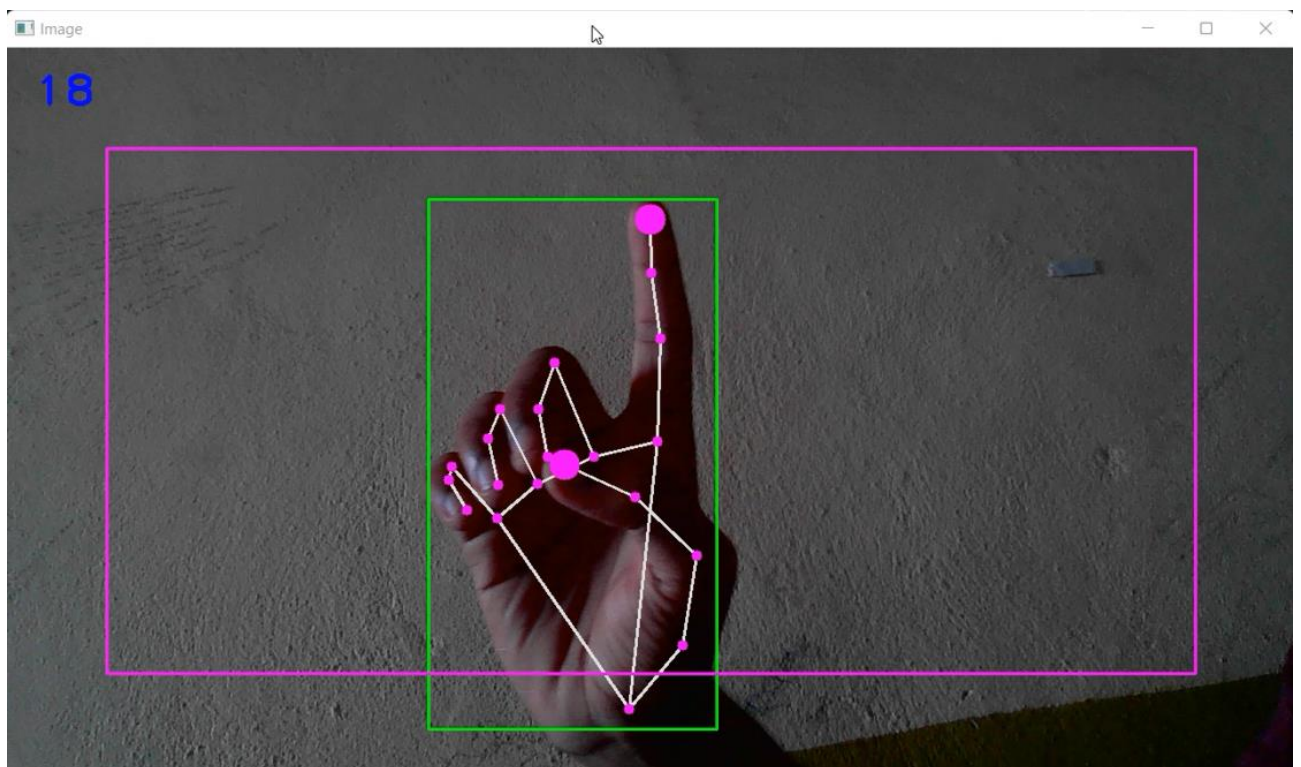
In this stage, we are detecting which finger is up using the tip Id of the respective finger that we found using the MediaPipe and the respective coordinates of the fingers that are up, and according to that, the particular mouse function is performed.



## 5. Mouse Functions Depending on the Hand Gestures and Hand Tip Detection Using Computer Vision.

### 5.1. For the Mouse Cursor Moving around the Computer Window.

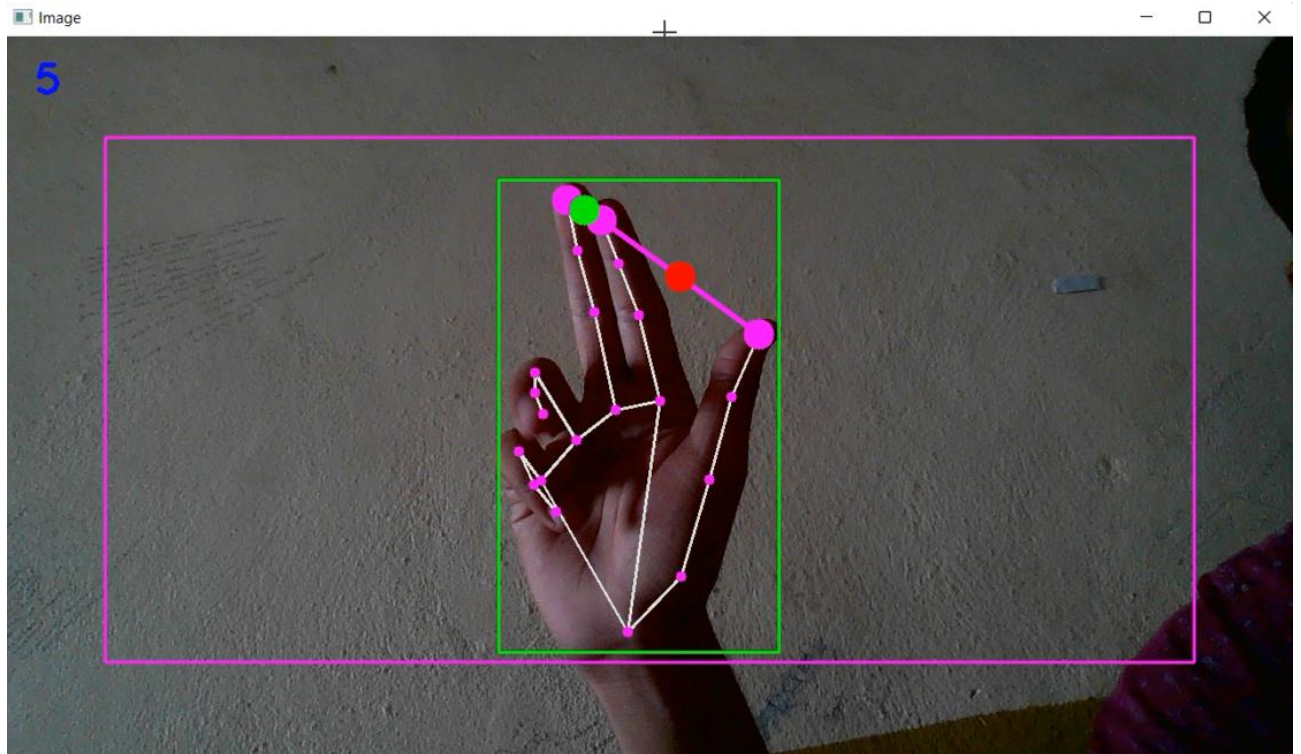
If the index finger is up with tip Id = 1 or both the index finger with tip Id = 1 and the middle finger with tip Id = 2 are up, the mouse cursor is made to move around the window of the computer using the AutoPy package of Python.





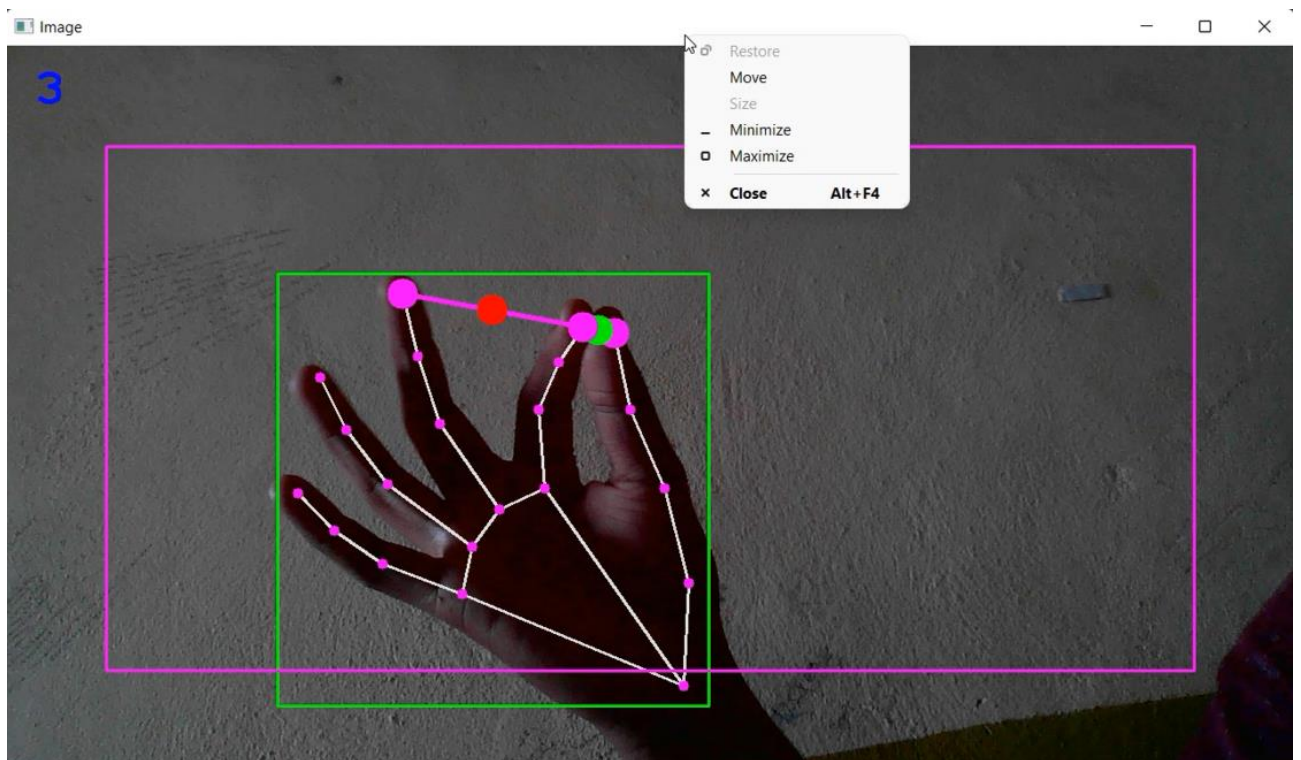
## 5.2. For the Mouse to Perform Left Button Click.

If both the index finger with tip Id = 1 and the thumb finger with tip Id = 0 are up and the distance between the two fingers is lesser than 30px, the computer is made to perform the left mouse button click using the pynput Python package.



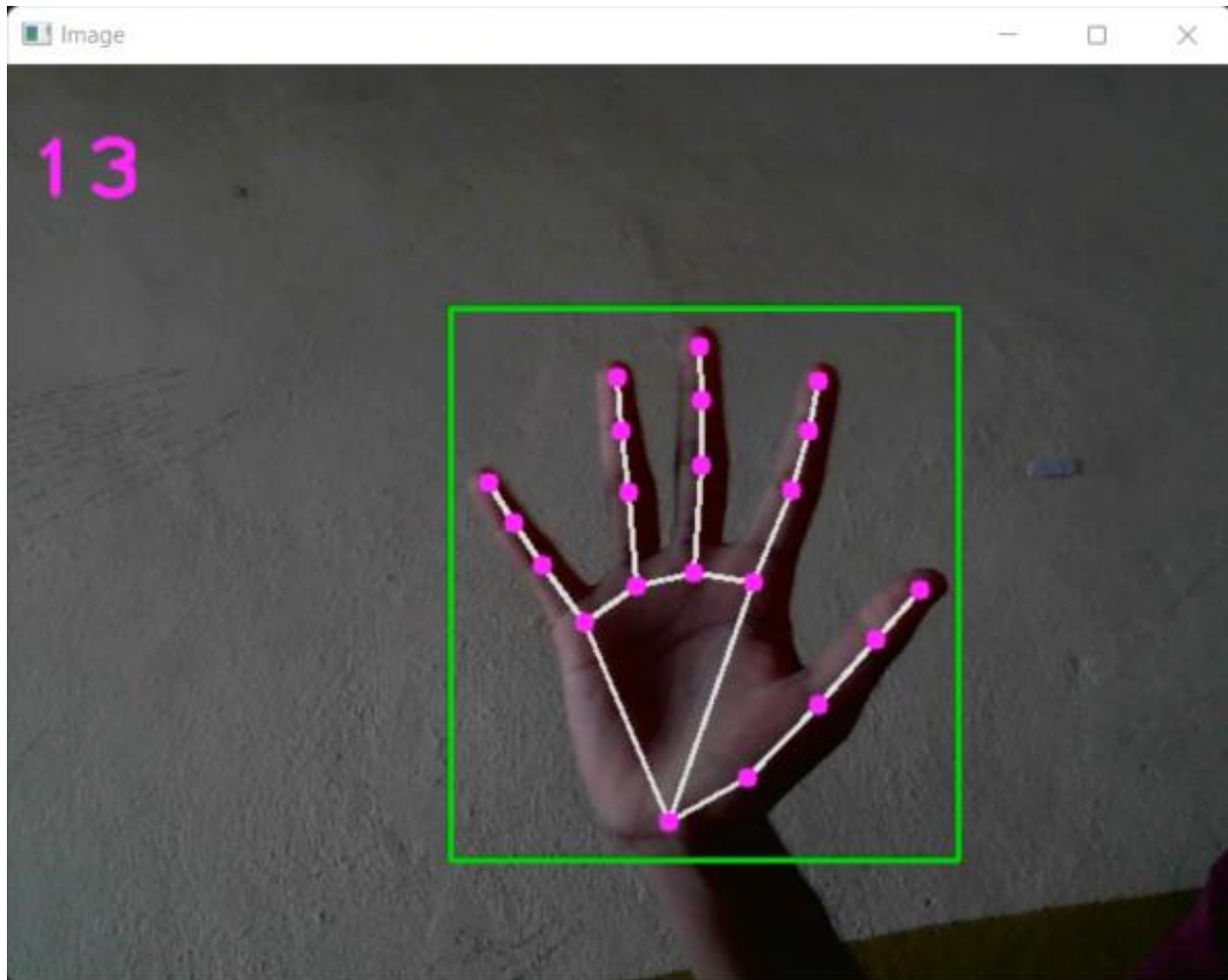
### 5.3. For the Mouse to Perform Right Button Click.

If both the index finger with tip Id = 1 and the middle finger with tip Id = 2 are up and the distance between the two fingers is lesser than 40 px, the computer is made to perform the right mouse button click using the pynput Python package.



#### 5.4. For No Action to be Performed on the Screen.

If all the fingers are up with tip Id = 0, 1, 2, 3, and 4, the computer is made to not perform any mouse events in the screen.



## RESULT AND DISCUSSION

Sr.No	Name	Without using Virtual Mouse	With using Virtual Mouse	Feedback
1	Mrs. Radhika Hulbagadi	We have to carry the physical mouse every time	It's easy to move the cursor. While using this it fun to work with this system.	Excellent
2	Miss. Priyanka Kulkarni	Physical mouse requires power.	It is very to use and amazing concept.	Excellent
3	Mrs. Poonam Desai	Mouse controlling problem in online lecture	It is very useful in online teaching.	Excellent
4	Mrs. Madhuri Devarde	It's easy but every time we have to carry the mouse which take time.	Outstanding.	A+ Excellent
5	Dr. S. A. Masti	Need pad.	Very good to work.	Good
6	Dr. R. M. Patil	It is need manually to change screen.	Very good to work on PPT.	Good



7	Mrs. S. R. Patil	Corona time virus spread using physical mouse	Very good concept.	Excellent
8	Mrs. N. P. Patil	Need extra enery source.	Very good to work for presentation.	Excellent
9	Dr. M. A. Attar	During Covid-19 situation we have faced to much problems to use another's mouse.	Very useful in Covid-19 situation.	Excellent
10	Miss. Shweta A. Patil	Mouse controlling problem in online lecture	Best Concept. Very good work.	Excellent
11	Miss. Swati S. Yadav	We have to carry the physical mouse every time	Very useful in online lectures.	Excellent
12	Dr. Smitesh Desai	Need extra enery source	It is very useful in hospitals.	Excellent
13	Dr. M. R. Patil	During Covid-19 situation we have faced to much problems to use another's mouse.	Research, advanced, re-updated application. Apply for rights which is different from your research.	Excellent

14	Mr. Rahul Panhalkar	Physical mouse required power.	It does not required any other power source.	Excellent
15	Mr. Harsh Desai	We have to always carry a physical mouse.	It energy efficient. So great concept.	Excellent
16	Mr. Anoop Chednke	We have to carry mouse	I like to work with with it.	Excellent
17	Mr. Shubham Kurade	We have to carry mouse.	It is useful for who don't have mouse.	Excellent
18	Mr. Amogh Kowade	Physical mouse required power.	Good concept to work with still needs improvements.	Good
19	Mr. Amol Dangi	Physical mouse required power.	Good concept. I like to work with it. Outstanding.	Excellent
20	Mr. Vasant Sawant	Physical mouse required power.	It useful for who have physical disability with their hands.	Excellent
21	Miss. Shruti Sakhare	Corona time virus spread using physical mouse	It is useful for who have mouse problems.	Excellent
22	Miss. Komal Pujari	It takes more time as compare to virtual mouse.	It saves time. Good concept.	Excellent

# CONCLUSION

The main objective of the AI virtual mouse system is to control the mouse cursor functions by using the hand gestures instead of using a physical mouse. The proposed system can be achieved by using a webcam or a built-in camera which detects the hand gestures and hand tip and processes these frames to perform the particular mouse functions.

From the results of the model, we can come to a conclusion that the proposed AI virtual mouse system has performed very well and has a greater accuracy compared to the existing models and also the model overcomes most of the limitations of the existing systems. Since the proposed model has greater accuracy, the AI virtual mouse can be used for real-world applications, and also, it can be used to reduce the spread of COVID-19, since the proposed mouse system can be used virtually using hand gestures without using the traditional physical mouse.

The model has some limitations such as small decrease in accuracy in right click mouse function and some difficulties in clicking and dragging to select the text. Hence, we will work next to overcome these limitations by improving the fingertip detection algorithm to produce more accurate results

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