

## Mouse Cursor Control Using Hand Gestures

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**Abstract** - Using hand gestures is a natural method of interaction between humans and computers. We use gestures to express meaning and thoughts in our everyday conversations. Gesture-based interfaces are used in many applications in a variety of fields, such as smartphones, televisions (TVs), video gaming, and so on. With advancements in technology, hand gesture recognition is becoming an increasingly promising and attractive technique in human-computer interaction. Gesture recognition allows humans to communicate with the machine directly without any external devices. Our system will allow the user to navigate the computer cursor using their bare hands. The proposed system will only require a webcam as an input device. The result of the camera will be displayed on the system's screen so that it can be future calibrated by the user. This system could be a very comfortable method to control the mouse. It also has the potential of being a viable replacement for the computer mouse.

**Key Words:** : 1] Human-Computer Interaction. 2]Pattern Recognition. 3]Virtual Mouse. 4]Hand gestures.

### 1. INTRODUCTION

We all are living in a digital world in which we are dealing with different technologies. The most important inventions are computers, laptops, and mobiles, etc. which have become part and parcel of our life. We complete all our tasks with the help of these technologies. Because of this, our life becomes faster, easy and more relaxed. In the present-day scenario, most mobile phones are using touch screen technology to interact with the user. Also, we are using different devices like mouse, joysticks in order to handle laptops, computers. But these are all hardware devices, and these may get damaged over a period of time. We need to handle such devices very carefully in order to overcome such hardware problems. As computer technology continues to develop, people have smaller and smaller electronic devices. Increasingly we are recognizing the importance of human computing interaction (HCI) and in particular vision-based gesture and object recognition. In our project, we propose a novel approach that uses a video device to control the mouse system (Mouse tasks). We employ several image processing algorithms to implement this. For most laptops, the touchpad is not the most comfortable and convenient, so our system has the potential of being a viable replacement for the computer mouse it also reduces the cost of hardware. Our project is user-friendly. Since it mainly focuses on handling simple operations like left-clicking, right-clicking, scrolling, dragging, etc

### 2. Propose System

In the proposed method, when a user performs some gestures in front of a web camera that is present on a laptop, the webcam captures the real-time video at a fixed frame rate and resolution which is determined by the hardware of the camera. We have proposed the following system:

- i) Mouse Cursor Control
- ii) Multimedia player control.
- iii) Virtual paint.

The in-built webcam is used to capture live video and the application is used to extract required frames from the live video. The application uses OpenCV for image processing and object detection. OpenCV detects the hand and uses the HAND\_LANDMARK module to identify the 21 landmark points on the hand. Furthermore, the module draws the connections between the points to create a hand mesh which makes the gesture recognition more efficient and accurate.

OpenCV uses BGR images for processing. In order to convert RGB format to BGR, the application uses the BGR2RGB module and again converts it to RGB format. The system also uses NumPy to work with landmark points. The system also used mathematical functions to perform some mathematical operations such as distance formula for gesture recognition, Fourier transforms for noise correction, and Coordinate system to track the position of hands. the application recognizes the gestures according to the landmark positions and executes the respective command.

The program files will be converted into an executable file(.exe file) that can run on any pc which meets the minimum hardware requirement.

### 3. Results

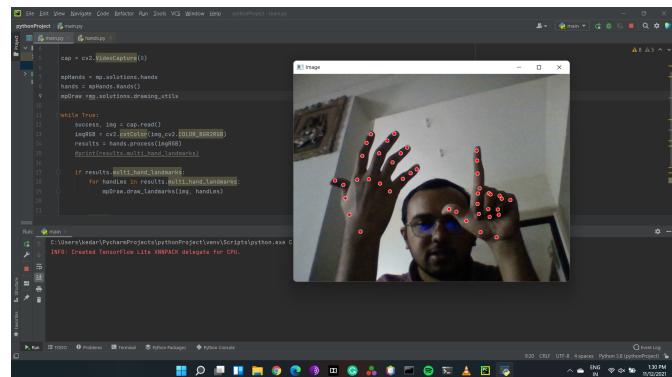
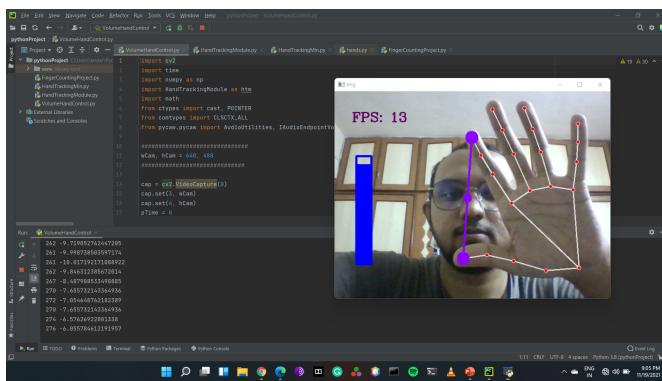
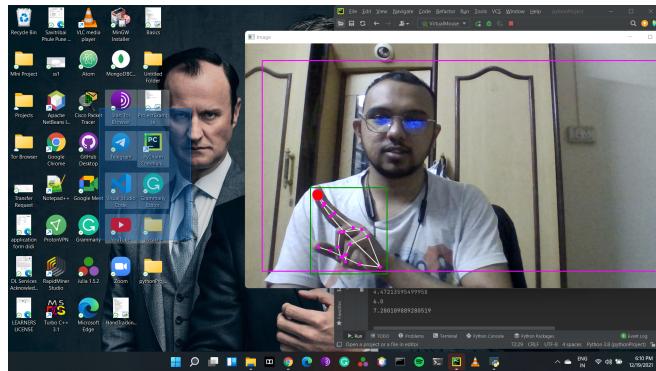


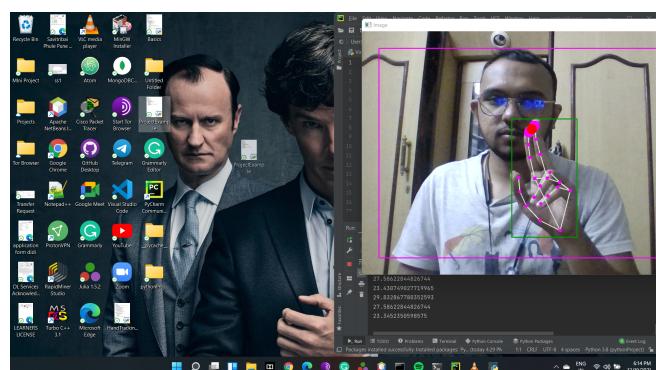
Fig. - 1 : Detection Of Landmar



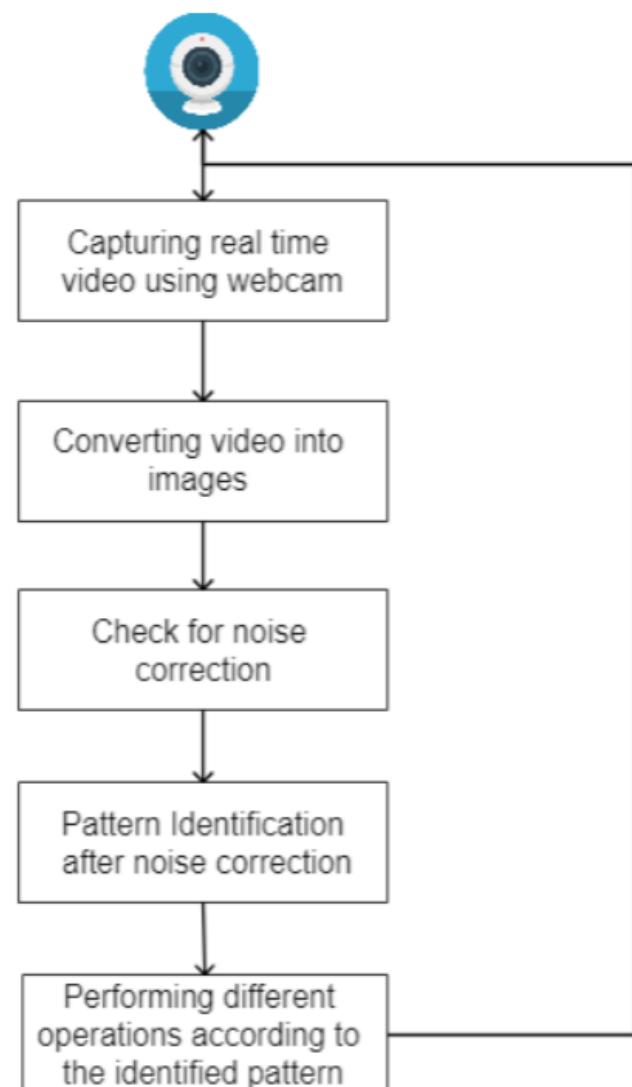
**Fig. - 2 : Performing Volume Control**



**Fig. - 3 : Performing Multiple Select Operation**



**Fig. - 3 : Performing Drag Operation**



**Fig. - 3: Flowchart of Proposed System**

### 3. Applications of Proposed System

This project can be useful for presentations and for reducing the workspace and burden of extra hardware devices. It can help them to interact with computing machines. Critical events like a battlefield, operation theater, mining fields can be controlled by gesture mouse. We can also use Mouse cursor functionalities such as right-click, left-click, scrolling, dragging, etc.

### 4. Literature Survey

1] Dipankar Gupta has published An Interactive computer system with gesture-based mouse and keyboard paper in which they have proposed a system that helps paralyzed people by providing a virtual mouse and a keyboard to ease their work instead of a physical mouse and keyboard. This system uses OpenCV for object detection and image processing along with the built-in function of the Image processing Toolbox in MATLAB and a mouse driver, written in java. They used color tapes to recognize the user's fingers

and this system achieved 78%-90% accuracy but it did not work efficiently in a rough and complex background.

2] Kanya Krishi published a Hand gesture recognition using Machine Learning Algorithms paper in which the proposed system uses OpenCV and TensorFlow object detector for capturing and processing hand gestures. It describes how hand images can be interpreted as gestures to perform operations like switching pages and scrolling up and down the page.

3] Vijay Kumar proposed a system in their virtual mouse control using hand class gestures that detect the hand gestures in which if the angle between any two fingers is less than 15 degrees then left-click is performed. they have used python dependencies such as NumPy, math, wx to develop the system along with the kernel function which identifies the skin colour using RGB parameters.

4] Kamlesh Patil and Atharv Kasodekar published a Virtual mouse application paper that proposed an executable application of virtual mouse which was developed with the help of OpenCV and Tkinter package.

## 5. CONCLUSION

Gesture recognition gives the best interaction between human and machine. Gesture recognition is also important for developing alternative human computer interaction modalities. It enables human to interface with machine in a more natural way. Gesture recognition can be used for many applications like sign language recognition for deaf and dumb people, robot control etc. The system was able to control the movement of a Cursor by tracking the user's hand. Cursor functions were performed by using different hand gestures. The system has the potential of being a viable replacement for the computer mouse.

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## 7. REFERENCES

- [1] Shweta S. Shinde, Rajesh M. Autee, Vitthal K. Bhosale, "Real time two-way communication approaches for hearing impaired and dumb person based on image processing" ,2016.
- [2] Boon Giin Lee, Su Min Lee, "Smart Wearable Hand Device for Sign Language Interpretation System with Sensors Fusion" ,2017.
- [3] N. Sriram, M. Nithiyanandham, "A Hand Gesture Recognition Based Communication System for Silent Speakers" ,2013.
- [4] Tom'as Mantec'on, Carlos R. del-Blanco, Fernando Jaureguizar, NarcisoGarcí'a, "Areal-time gesture recognition system using near-infrared imagery",2019.
- [5] Wei Fang, Yewen Ding, Feihong Zhang and Jack Sheng, "Gesture Recognition Based on CNN and DCGAN for Calculation and Text Output", 2019
- [6] P. Sai Prasanth, A swathy Gopalakrishnan, Oviya Sivakumar, A. Aruna, "Enhancing User Experience Using Hand - Gesture Control", 2019.
- [7] Jay Prakash, Uma Kant Gautam, "Hand Gesture Recognition", 2019.