



---

# CONTROLLING OS THROUGH HAND GESTURES

---

User Manual



## TABLE OF CONTENTS

<b>Introduction .....</b>	<b>2</b>
<b>System Requirements .....</b>	<b>2</b>
<b>Installation &amp; Setup .....</b>	<b>2</b>
<b>Launching the Application .....</b>	<b>3</b>
<b>Modes Overview .....</b>	<b>3</b>
<b>Mouse Mode .....</b>	<b>4</b>
<b>Volume Control Mode .....</b>	<b>4</b>
<b>Painter Mode .....</b>	<b>4</b>
<b>Gesture Controls .....</b>	<b>4</b>
<b>Switching Modes .....</b>	<b>4</b>
<b>Exit Procedure .....</b>	<b>4</b>
<b>Troubleshooting .....</b>	<b>4</b>
<b>Practical Applications &amp; Use Cases .....</b>	<b>5</b>

## **Introduction**

The Hand Gesture Control System is a computer vision-based application that allows users to control various aspects of their computer using only hand gestures. It supports:

- **Mouse control**
- **Volume control**
- **Digital drawing (Painter)**

All interactions are enabled using a webcam and intuitive hand movements.

## **System Requirements**

### **Software Dependencies:**

Install the following Python libraries (automatically handled via requirements.txt):

- opencv-python
- mediapipe
- numpy
- pyautogui
- pycaw
- comtypes
- pyttsx3
- pillow

### **Hardware Requirements:**

- Webcam (integrated or USB)
- Windows OS (volume control uses Windows-specific APIs)
- Screen resolution: Min 1280x720 for optimal Painter mode

## **Installation & Setup**

### 1. **Install Required Libraries:**

```
pip install -r requirements.txt
```

### 2. **Check Webcam Access:**

Make sure your webcam is functioning and not used by other applications.

## Launching the Application

### Run the main program:

```
python main.py
```

The system starts in **Mouse Mode** by default. From there, you can perform gestures to interact or switch to other modes.

## Modes Overview

### Mouse Mode

Control the cursor with your index finger. Perform clicks via gestures:

- **Move Cursor:** Raise index finger
- **Left Click:** Dip middle finger while index remains steady
- **Right Click:** Dip index finger while middle remains steady

### Volume Control Mode

Adjust system volume by pinching gestures:

- **Increase Volume:** Extend distance between thumb and index
- **Decrease Volume:** Bring thumb and index closer
- Visual bar displays current volume level (capped at 70%)

### Painter Mode

Draw freely on a canvas using your index finger:

- **Draw:** Raise only index finger
- **Select Color:** Raise index & middle finger and hover over color boxes
- **Change Brush Size:** Show 1 to 3 fingers
- **Eraser:** Select the white box
- **Clear Canvas:** Raise 4 fingers (index to pinky)
- **Save Drawing:** Press s on the keyboard

## Gesture Controls

Gesture	Description
 Fist	Activates mode switching
 One finger up	Select Mouse Mode
 Two fingers up	Select Volume Mode
 Three fingers up	Select Painter Mode
 Open palm	Not used for switching; resets states

## Switching Modes

Step-by-Step:

1. Hold a Fist () for 5 seconds.
2. System will say: "Mode switch activated. Show 1 for Mouse, 2 for Volume, 3 for Painter."
3. Raise the appropriate number of fingers to switch.

Mode	Finger Count
Mouse	1
Volume	2
Painter	3

## Exit Procedure

In any mode:

- Press **q** on the keyboard to **quit** the application.

## Troubleshooting

Issue	Solution
<b>Camera not opening</b>	Ensure no other app is using the webcam. Check if cv2.VideoCapture(0) works.
<b>Lag or slow response</b>	Reduce resolution in code or increase lighting in your environment.
<b>Mode not switching</b>	Hold the fist steadily for 5+ seconds. Make sure gestures are clear.

<b>Volume control not working</b>	Ensure you are on Windows and not in restricted environments.
<b>Gesture misinterpretation</b>	Keep fingers stable and well-lit; avoid background clutter.

## Practical Applications & Use Cases

The Gesture-Controlled Virtual Interaction System offers a hands-free way to interact with your computer, making it highly useful in many situations:

-  **Accessibility:** Helps users with motor impairments operate a computer without relying on physical peripherals.
-  **Healthcare & Labs:** Enables hygienic interaction in environments where touching surfaces may spread contamination.
-  **Creative Workflows:** Artists and designers can draw digitally with natural gestures, improving fluidity.
-  **Smart Classrooms:** Teachers can interact with content without stepping away from the audience.
-  **AR/VR Interfaces:** Ideal for prototyping natural interaction in immersive environments.
-  **Home Entertainment:** Scroll, click, and control volume from a distance—perfect for touch-free media control.
-  **Touchless Kiosks & Demos:** Use at exhibitions or kiosks to create engaging, futuristic touch-free user experiences.

This system is not only a project—it is a step toward redefining human-computer interaction.

---

End of Document

---