

# Gesture and Voice Controlled Virtual Mouse

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## ABSTRACT

The mouse is the one of the important part for the computer. A Bluetooth mouse or wireless mouse uses devices a dongle is needed to connect the mouse to PC and battery is needed for power to connect the mouse to PC. This research paper proposes the gesture controlled mouse that enables Human-computer-interaction using hand gestures and voice commands. We need the camera for the hand gestures and the microphone for the voice commands. It will perform actions like right clicking, left clicking using verity of hand motions. Additionally you have choice to Dragging and dropping, shrinking and enlarging window and a number of other things. This system constructed using the python language(3.8.10).This system has the additional python packages like OpenCV, MediaPipe, etc. The research uses the advanced computer vision to recognize the hand gestures and voice instructions.

keywords: MediaPipe, OpenCV, Gesture Recognition, Virtual Mouse, Voice Commands.

## I. INTRODUCTION

The idea of gesture recognition is to create a technology that can recognize human gestures and use them to send information. In gesture recognition, the camera displays human movements and sends data to the computer, which uses the movements as input to control the device or application. The idea of creating gesture recognition is to use gesture recognition to improve interaction between humans and computers and manage important information. The main components of the gesture recognition process are data collection, hand placement, hand recognition, and gesture guidance. Gestures are expressions of physical

or emotional behavior. There are body movements and gestures.

## II. Literature Survey

Gesture Recognition: A Review by Sundus Munir, Shiza Mushtaq, Afrozah Nadeem, SyedaBinish Zahra [1]System capable of performing specific content analysis, isolating human gestures used to convey or manage messages. Techniques discussed include hand detection techniques, RGB color schemes, webcams, real-time tracking methods, hidden Markov models, depth mapping methods, and Kinect cameras.

AI virtual mouse using gesture recognition, author: Abhishek R. Shukla[2] This article explains that the goal of this research is to create an AI-driven virtual mouse system that uses gesture recognition as an alternative to traditional hardware mice. . Problems arising from the need for external devices in products, especially batteries and adapters. This study by Abhishek

R. Shukla highlights the importance of human-computer interaction (HCI) and the limitations of current mouse technology, leading to consensus on an instrument-free AI virtual mouse. The system uses a special machine learning algorithm based on deep learning for manual detection. The algorithm allows users to digitally control their computers, performing tasks such as left-clicking, right-clicking, scrolling and cursor movement based on gestures, eliminating the need for a physical mouse.

Virtual Mouse with Gesture Control using Artificial Intelligence: Rekha BN, G Satish, Sampat Kundanagar, Vikyath Shetty, Yogesh R Bhangigoudra[3] The document explains that the system uses advanced Python packages such as MediaPipe and OpenCV to help control the cursor. Gestures allow users to left-click, drag, and adjust system settings such as brightness and volume. The project uses machine learning and computer vision to recognize hand gestures and speech without the need for additional computers. Additionally, the review could delve into the broader field of AI-focused human-computer interaction by examining advances in computer vision, speech recognition language, and management guidance. This work may include research on gesture recognition in a human-computer context, virtual mouse applications, voice assistant integration, and machine learning such as MediaPipe.

Gesture controlled virtual mouse with voice automation, by Prithvi J, S Shree Lakshmi, Suraj Nair and Sohan R Kumar[4] This research paper presents a motion controlled virtual mouse designed for the same human-computer interaction . gestures and voice commands. The architecture of the system includes

two modules: one focused on hand detection using MediaPipe, and the other module using gloves with matching colors. It uses the most advanced machine learning and computer vision, specifically MediaPipe's CNN, to ensure accurate, reliable and efficient performance of gestures and voice commands. The system combines two modules to meet different customer needs for manual dialing and includes voice automation features to increase convenience and usability.

Automatic feature extraction with memory and gesture recognition using deep learning algorithms Author: Rubén E. Nogales \* and Marco E. Benalcázar[5] Gesture recognition is a problem that attracts the attention of researchers since it is a high-standard recognition problem. The dimensionality problem can be solved by feature selection and feature extraction. In this sense, evaluation models are recommended for manual feature extraction and automatic feature extraction. While manual feature extraction is done using the central preference statistical function, automatic extraction is done by CNN and BiLSTM. These features have also been evaluated in classes such as Softmax, ANN and SVM.

### III. Methodology

#### 1) Introduction:

This article provides necessary libraries like cv2 for computer vision, mediapipe for hand tracking, pyautogui for mouse control, math for math functions, enum and other libraries for custom projects

#### 2) Libraries used:

OpenCV, MediaPipe, PyAutoGUI etc. libraries used in the project.

#### 3) Motion coding:

One of the best methods is to code motions based on their angle and position. joints in the human body. Gesture recognition systems can also access movements by analyzing the movement of specific items or objects over time. This may include tracking hand movement

#### 4) Hand Recognition:

Many gesture recognition systems use computer vision, such as MediaPipe, to control and monitor cell signals. Vital signs are specific points on the hand, such as the fingertips, knuckles, and palm.

#### 5) Control operation:

The operating system moves the cursor based on the detection of hand movements. The position of the hand in the camera frame can be used to determine movement, and movements can trigger mouse events such as clicks and scrolls.

#### 6) Gesture Controller:

We create methods such as changing system brightness, changing system volume, Vertical scrolling and horizontal scrolling to realize special functions such as adjusting the brightness of the screen, volume and scrolling. Call `handle_controls` method to handle different pointers and execute commands.

### 4. System Architecture

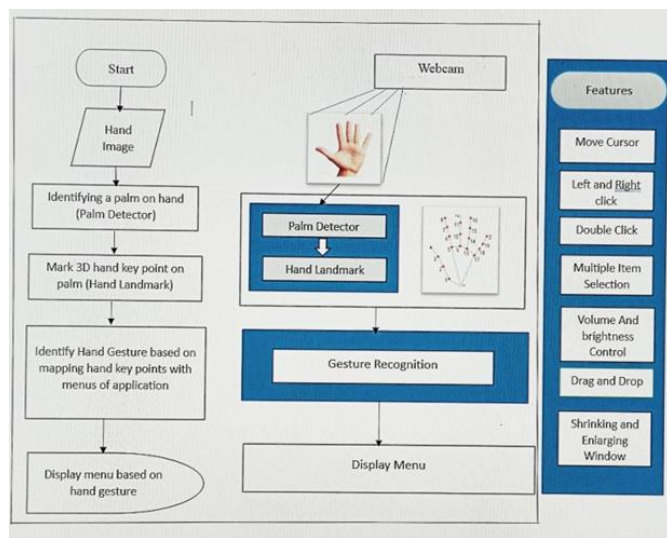


Figure : System Architecture

### IV. CONCLUSION

Gesture and voice control virtual machines allow users to interact with computers or handheld devices and voice commands rather than using a physical mouse. The system transforms gestures and audio feedback into on-screen actions using cameras and microphones, providing a hands-free and intuitive way to navigate,

click and manage apps. This new approach promotes easy access and provides an alternative method of counseling that is particularly useful when traditional counseling tools are unavailable or difficult to use.

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