# Gesture Controlled Virtual Mouse and Voice Assistant

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**Abstract**: *The Al Virtual Mouse uses computer vision techniques to track hand movements and translates them into cursor movements on the screen. The system is designed user-friendly, allowing users to interact with their computer without the need for a physical mouse. The system is constructed using advanced Python packages like Mediapipe, OpenCV, etc. All i/o activities are physically controlled by a hand motion and a voice assistance. The research uses advanced technologies like machine learning and computer vision techniques, which operates well without the use of any additional computer resources, to recognize hand movements and spoken instruction. The developed system provides an alternative to conventional mouse devices, for individuals with disabilities or those who prefer a more natural way of interacting with their computers.*

**Keywords:** Media pipe, Machine Learning, Gesture Recognition, Virtual Mouse, Voice Assistant

## I. INTRODUCTION

This project is to develop a virtual mouse using hand gesture recognition. The hand gesture are more effortless and natural way of communication. The aim of this project is to perform various operations of cursor using fingers. Instead of using more Expensive sensors a simple webcam can identify the gesture and perform the actions. It helps user to interact with a computer without any physical and hardware device to control mouse operation.The field of Human-Computer Interaction has seen significant advancements with the introduction of innovative technologies.This led to the development of wireless mouse and speech recognition techniques for mouse functions.

The use of hand gestures as a control or communication modality continues to stimulate the scientific community's curiosity. with the goal that we can likewise make work areas as easy to use as cell phones.The Gesture Controlled Virtual Mouse is designed using the latest technology and is capable of recognizing both static and dynamic hand gestures in addition to voice commands, making the interaction more natural and user-friendly. This latest super cool technology has various advantages, including its potential to improve accessibility for people and its ability to provide a more natural and intuitive user experience.The integration of Proton, the voice assistant, adds a layer of sophistication to the system. Users can issue voice commands such as "Proton search" to perform actions, extending the interaction beyond gesture control. This project aims to enhance accessibility, catering to users with diverse needs, and contribute to the ongoing evolution of human-computer interaction.

## II. PROBLEM STATEMENT

With the emergence of ubiquitous computing, traditional methods of user interaction involving the keyboard, mouse are no longer adequate. The limitations of these devices restrict the range of instructions that can be executed. Direct usage of hand gestures and voice commands have the potential to serve as input devices for more natural and intuitive interaction, enabling users to perform everyday tasks with ease. Such methods can offer a more extensive instruction set and eliminate the need for direct physical contact with the computer, further enhancing the user's experience. To design a virtual mouse which detects hand gestures and perform mouse operations only using the fingers. We use detection of finger tips which are captured by webcam. We used different combinations of fingers to perform various operations of the mouse according to which particular operation of finger is recognized. In proposed system users don't have to color their fingers with a specific color and are not required to use any device or specific sensors.

## III. LITERATURE SURVEY

Gesture-based mouse control using computer vision has been a topic of interest for researchers for a long time. This system is implemented in Python programming language using the OpenCV library, Mediapipe, which is a popular computer vision library. The proposed system is a virtual mouse that will work only based on webcam captured frames and tracking fingertips.With the help of a web camera and detection technique, we have manipulated the mouse cursor movement and various click events. It is possible to virtually control all i/o operations using static and dynamic hand gestures, along with the assistance of a voice assistant.

While voice assistants can be completely software based and able to integrate into most devices, some assistants are designed specifically for single device applications, such as the Amazon Alexa Wall Clock. Today, voice assistants are integrated into many of the devices we use on a daily basis, such as cell phones, computers, and smart speakers. Because of their wide array of integrations. There are several voice assistants who offer a very specific feature set, while some choose to be open ended to help with almost any situation at hand.

## IV. PROPOSED METHODOLOGY

**Gesture_Controller:**

This program is a gesture controller that uses the MediaPipe library for hand tracking and recognition. It allows the user to control various actions on the computer using hand gestures captured by the camera. Let's break down the main components of the program:

**Libraries Used:**

**cv2 (OpenCV):**

OpenCV is a computer vision library used for image and video processing. In this program, it's used for capturing video frames and drawing hand landmarks.

**Mediapipe:**

MediaPipe is a library by Google that provides solutions for face and hand tracking. In this program, it's used for detecting and tracking hand landmarks.
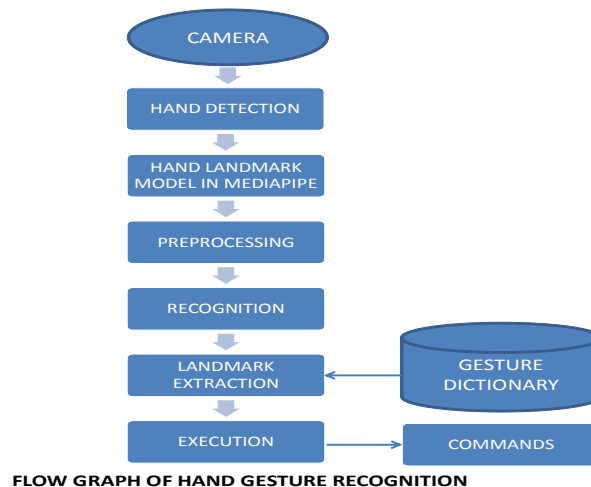
**pyautogui:**

PyAutoGUI is used for simulating mouse and keyboard input. It's employed to control the mouse cursor and perform various actions like clicking and scrolling.

**math**:

The standard Python math library is used for mathematical calculations.

**enum:**

Enum is used to define enumerations for hand gestures and hand labels.



**FLOW GRAPH OF HAND GESTURE RECOGNITION**

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Furthermore, with additional voice assistant support, AI virtual mouse using hand gestures can further enhance the user experience. Voice assistant which is integrated with the virtual mouse system will provide users with even more control over their devices. Users can given voice commands to do a range of tasks, such as opening applications, navigating through menus, and performing web searches, in addition to controlling the cursor on the screen using hand gestures. As technology continues to evolve, we can expect to see even more innovative solutions that enhance the user experience and improve accessibility for all.

## V. SYSTEM ARCHITECTURE



Fig. Architecture Diagram of Proposed System
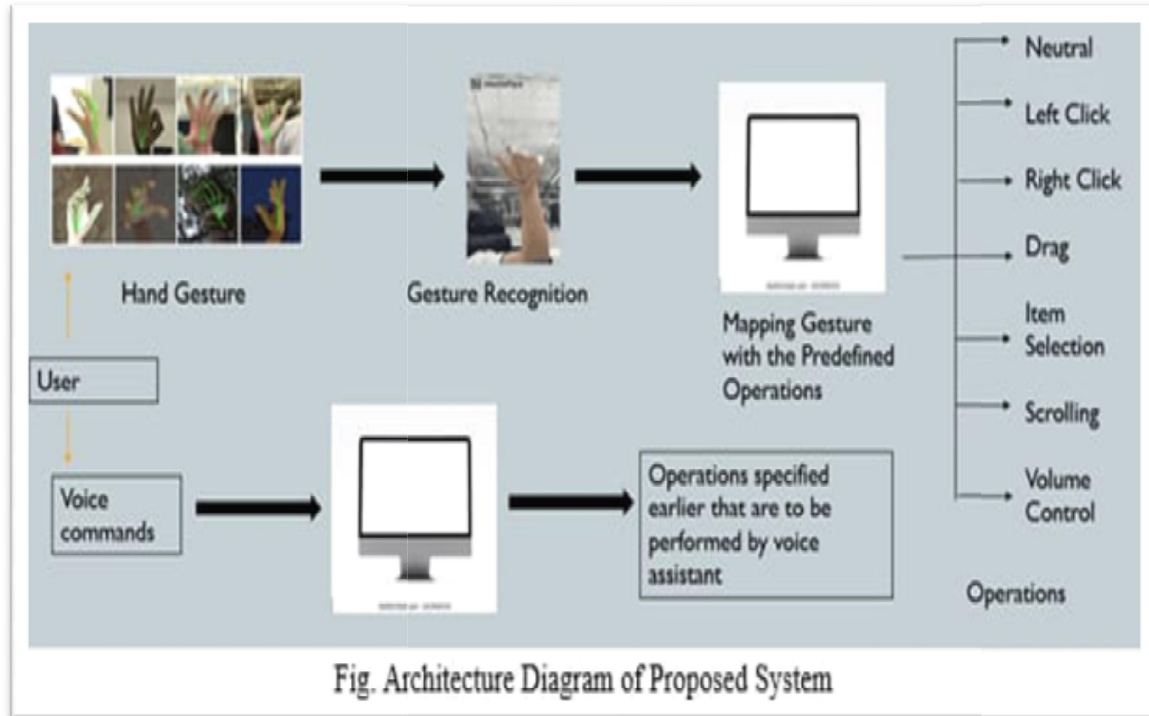
## VI. CONCLUSION

AI virtual mouse using hand gestures is an innovative and exciting technology that has the potential to revolutionize the way we interact with computers. Here with the aid of a real-time camera, we have created a system to manage the mouse pointer and carry out its function. It offers users a more natural, intuitive, and accessible way to control the cursor on the screen, without the need for a traditional input device, a mouse.

## VII. ACKNOWLEDGMENT

## REFERENCES

[1]. Abhilash S S, Lisho Thomas, NWCC (2018) Virtual Mouse Using Hand Gesture. International Research Journal of Engineering and Technology (IRJET)

[2]. Bakar MZA, Samad R, Pebrianti D, et al (2015) Finger application using K-curvature method and Kinect sensor in real-time. In: technology management and emerging technologies (ISTMET)