

INTRODUCTION

- ❖ The AI VIRTUAL MOUSE presents a contactless way to control a computer using hand gestures instead of a physical mouse.
- ❖ A webcam captures real-time video, and the system identifies hand landmarks to detect gestures. These gestures are then mapped to actions like cursor movement, clicking, dragging, and scrolling.
- ❖ The approach improves accessibility, hygiene, and ease of use while demonstrating how computer vision can enable simple and intuitive human-computer interaction.

PROBLEM STATEMENT

- ❖ Physical mouse devices require direct touch, which is unsuitable in hygiene-sensitive places like hospitals, labs, and public systems.
- ❖ They also limit users who need hands-free or more accessible interaction.
- ❖ As modern environments demand more comfortable, contactless ways to operate computers, this project provides an alternative by enabling essential mouse functions through real-time hand gestures.

OBJECTIVES

- To develop a contactless computer interaction system using hand gestures.
- To ensure smooth and accurate cursor control through real-time hand tracking.
- To enable essential mouse actions such as click, drag, and scroll using gesture recognition.
- To provide a more hygienic, modern, and comfortable alternative to physical mouse devices.
- To improve accessibility for users with mobility limitations.

METHODOLOGY

The system captures real-time video using a webcam.

MediaPipe is used to detect the hand and extract 21 key landmarks.

The hand is classified as major/minor and finger states are analyzed.

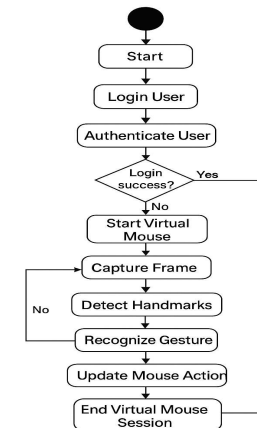
A gesture classifier identifies gestures such as V-sign, fist, index, mid, pinch, etc.

Each gesture is mapped to a specific mouse action (cursor move, click, drag, scroll).

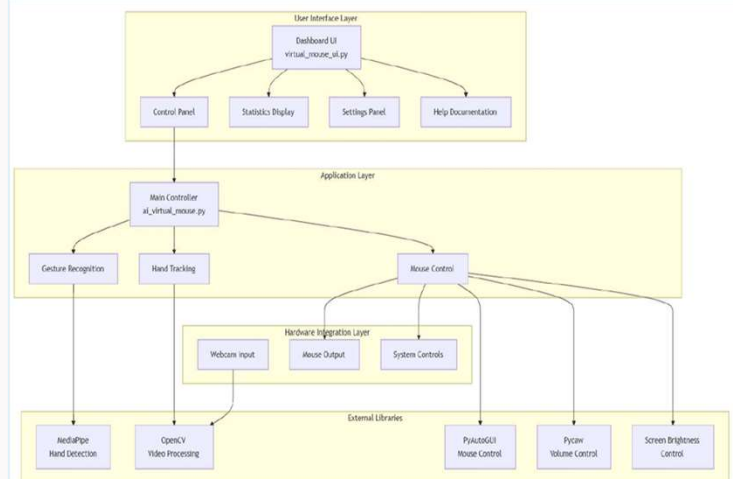
Pinch gestures control scrolling, volume adjustment, and brightness.

The system updates actions continuously for smooth and stable control.

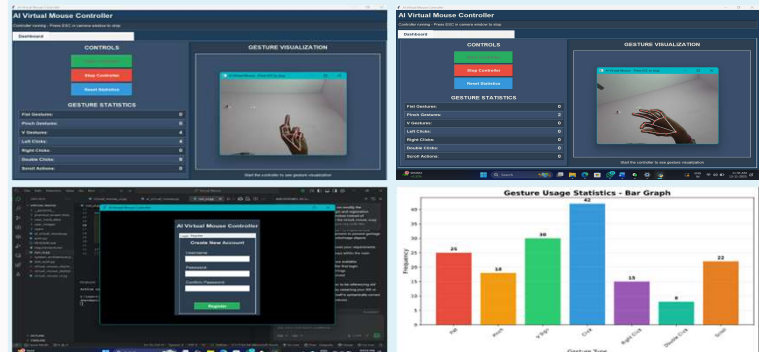
Processing continues until the user presses ENTER to exit.



SYSTEM ARCHITECTURE



RESULTS



CONCLUSION

The AI Virtual Mouse effectively replaces a physical mouse by using real-time hand gesture recognition for smooth and precise control.

With the integration of MediaPipe and OpenCV, the system delivers reliable detection and accurate execution of actions like clicking, dragging, and scrolling.

Overall, the project demonstrates a practical, touchless, and user-friendly approach to modern human-computer interaction.