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GESTURE RECOGNITION BASED VIRTUAL MOUSE AND KEYBOARD

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ABSTRACT

Nowadays, computer vision has progressed to the point where a computer can recognise its user using a basic image processing algorithm. People are using this vision in many parts of daily life at this point of development, such as face recognition, colour detection, automatic cars, and so on. Computer vision is employed in this research to create an optical mouse and keyboard that uses hand motions. The computer's camera will scan the image of various movements made by a person's hand, and the mouse or pointer will move in response to the movement of the gestures, including doing right and left clicks using distinct gestures. Similarly, different gestures can be used to control the keyboard, such as a one-finger gesture to choose an alphabet and a four-figure gesture to swipe left and right. With no wires or other devices, it will function as a virtual mouse and keyboard. The project's only piece of hardware is a webcam, and the coding is done in Python using the Anaconda platform. The Convex hull defects are created first, and then an algorithm is created by mapping the mouse and keyboard functions to the flaws using the defect calculations. If you map ping a couple of them with the mouse and keyboard, the computer will recognise the gesture and respond appropriately.

Keywords: Hand Motion, Webcam, Vision, Finger Recognition, And Gesture Based.

I. INTRODUCTION

A small green box will appear in the centre of the screen when the computer webcam captures the footage of the person sitting in front of the computer. The objects displayed in that green box will be processed by the code and matched with it. If it matches, a red coloured border will appear, indicating that the computer has recognised the item and that the mouse cursor can be moved by moving the object. This will aid not only in computer security but also in the construction of a virtual computational experience. In the place of various objects, hand gestures will be used to move the cursor, a different gesture will be used for right click, and a different gesture will be used for left click, and similarly, a simple gesture can do the keyboard functions virtually that may have been done on a physical keyboard. If the gesture does not match, the box will show simply a green border; however, if the known gesture is detected, the box will show a red border.

Some hardware, such as the mouse, the dongle to connect to the PC, and a battery to power the mouse to function, are utilised when using a wireless or Bluetooth mouse, but in this article, the user uses his or her built-in camera or webcam and uses hand gestures to control the computer mouse operations. The web camera in the suggested system records and analyses the acquired frames, detects the various hand motions and hand tip gestures, and then performs the specific mouse operation.

The AI virtual mouse system was created using the Python programming language, as well as OpenCV, a computer vision library. The model in the proposed AI virtual mouse system makes use of the MediaPipe package for tracking the hands and the tip of the hands, as well as the Pynput, Autopy, and PyAutoGUI packages for moving around the computer's window screen and performing functions like left click, right click, and scrolling. The proposed model's results demonstrated a very high level of accuracy, and the proposed model can function extremely well in real-world applications using only a CPU and no GPU.

II. LITERATURE SURVEY

Paper 1 Because of the rapid advancement of computer vision, there is an increasing demand for human-machine interaction. Hand gesture recognition is frequently employed in robot control, intelligent furniture, and other aspects because hand gestures can represent enhanced information.

Paper 2 Patients with Amyotrophic lateral sclerosis (ALS) or stroke are unable to communicate their basic wants and demands. Because they can still utilise their eyes and move their heads, they can communicate via eye trackers. This research provides new approaches for improving eye tracker software's speed and ease of use.

Paper 3 Text production is one of the most common computer tasks, a seemingly insignificant task that can be limiting for people with severe neuromotor illnesses like Amyotrophic Lateral Sclerosis, which can result in Locked-in syndrome. Because they may only be able to communicate and engage with the outside world through eye movements, these people require augmentative and alternative communication technologies. This project looks into eye movement tracking as a way of interaction and displays a virtual keyboard that uses gaze detection as a text input.

Paper 4 One of the research in human-computer interaction is a virtual mouse with fingertip identification and hand motion tracking based on image in a live video. The use of fingertip identification and hand motion recognition to control a virtual mouse is proposed in this research. Two approaches for tracking the fingers are used in this investigation. One method is to use coloured caps, while the other is to detect hand gestures. Finger recognition utilising colour identification, hand gesture tracking, and implementation on the on-screen cursor are the three primary processes.

III. CONCLUSION

This proposal proposes a system that recognises hand gestures and eliminates the need for a mouse and keyboard. This includes mouse cursor movement, drag and click, and keyboard features such as printing alphabets and other keyboard tasks. To separate the color/image of the hand from its background, the skin segmentation procedure is used. The method of removing an arm efficiently overcomes the problem of capturing the entire body in the camera. In summary, the suggested method can detect and recognise hand gestures in order to control mouse and keyboard functions as well as generate a realistic user interface. 3D printing, architectural renderings, and even medical procedures may all be done from anywhere to anyone. This project is simple to build and has a wide range of applications in medical science where computation is necessary but cannot be fully performed owing to a lack of human-computer Interface.

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