Mouse Cursor Control Using Hand Gestures

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Abstract - The traditional mouse and keyboard interface, while effective, can limit interaction in certain environments where touchless control is preferable or necessary. This project presents a novel approach to controlling a computer mouse cursor using hand gestures, leveraging computer vision and real-time image processing. The system uses a standard webcam to capture hand movements, which are then interpreted using OpenCV and Python-based image processing techniques. By detecting and tracking specific hand gestures, the system can move the cursor, perform clicks, and execute other common mouse functions without any physical contact.

- *Key Words***:** Hand Gesture Recognition, Computer Vision, Human-Computer Interaction (HCI), Cursor Control, OpenCV, Python

1.INTRODUCTION

In today's rapidly evolving technological landscape, the way humans interact with computers is continually transforming. Traditional input devices like the mouse and keyboard have long been the standard tools for human-computer interaction. However, with the growing demand for more intuitive, natural, and touchless interaction methods, gesture-based control systems have emerged as a promising alternative.

This project aims to implement a system that allows users to control the computer mouse cursor using hand gestures captured by a standard webcam. By utilizing computer vision techniques and tools such as OpenCV and Python, the system can recognize and interpret specific hand gestures in real-time, enabling cursor movement and click functionalities without physical contact.

The primary motivation behind this project is to enhance accessibility and hygiene, especially in scenarios where touch-based interaction is impractical or undesirable—such as in public kiosks, hospitals, or for individuals with physical disabilities. Moreover, this system offers a cost-effective and software-driven solution that does not require any specialized hardware like infrared sensors or wearable devices

2. Body of Paper

Various methods have been proposed for controlling computer interfaces using hand gestures. Previous research has explored hardware-based solutions using gloves, infrared sensors, or depth cameras. While these methods provide accuracy, they often require expensive or complex setups. In contrast, vision-based systems using standard webcams are more accessible and cost-effective. OpenCV, an open-source computer vision library, has gained popularity for real-time image processing and gesture recognition due to its flexibility and robustness.

3. CONCLUSIONS

The development of a mouse cursor control system using hand gestures marks a significant step forward in the evolution of human-computer interaction. By utilizing a standard webcam along with powerful tools like OpenCV and Python, this project demonstrates that touchless and intuitive control can be achieved without the need for expensive or complex hardware. The system effectively interprets hand movements in real-time, enabling users to perform basic mouse functions such as moving the cursor and clicking through simple gestures.

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