MOUSE COUSER CONTROL USING HAND GESTURE

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Abstract

The technique of establishing a process of interaction between human and computer is evolving since the invention of computer technology Vision-based dynamic gesture recognition is an important means of human-computer interaction. The mouse is an excellent invention in HCI (Human-Computer Interaction) technology. Though wireless or Bluetooth mouse technology is invented still, that technology is not completely device free. This project takes forward the approach of the Human Computer Interaction (HCI) by controlling cursor movement through hand movement using a   real-time camera. Virtual mouse acts as a contactless mouse, thus can be more useful and time saving. People with some problem in their hands can use this virtual mouse to control the mouse functions in the computer.

Keyword: Gesture-based interaction, Hand gesture recognition, Cursor control, Depth-sensing technology, Human-computer interaction, Accessibility

1.   Introduction:

In the world of computers, using hand gestures to control the mouse cursor offers a fresh and intuitive way of interacting with digital interfaces. This means that instead of relying solely on a physical mouse, users can guide the cursor through natural hand movements. This approach has the potential to enhance accessibility and streamline interaction, making computing more inclusive for a wider range of users.

The system we're exploring, "literature survey" is designed to understand and respond to these hand gestures. By employing specialized technology, it captures and interprets various movements, effectively turning them into precise cursor actions. This could be a significant step toward a more seamless and user-friendly computing experience.

In this study, we will dive into the workings of "literature survey" starting with an overview of the technology behind it. We'll also explain how the system is calibrated to recognize individual users' gestures accurately. Through a series of experiments, we'll assess how well the system performs compared to traditional mouse input methods.

By the end of this investigation, we hope to provide insights into the potential of hand gesture control for cursor manipulation. This could lead to more accessible and natural ways of interacting with computers, benefiting a wide range of users.

2. Literature Survey

[1] The mouse is one of the wonderful inventions of Human-Computer Interaction (HCI) technology. Currently, wireless mouse or a Bluetooth mouse still uses devices and is not free of devices completely since it uses a battery for power and a dongle to connect it to the PC. In the proposed AI virtual mouse system, this limitation can be overcome by employing webcam or a built-in camera for capturing of hand gestures and hand tip detection using computer vision. The algorithm used in the system makes use of the machine learning algorithm. Based on the hand gestures, the computer can be controlled virtually and can perform left click, right click, scrolling functions, and computer cursor function without the use of the physical mouse.

[2] This paper describes a vision-based tracking system for identifying hand gestures for use in controlling computer programs, such as browsers, Powerpoint, or any other applications. The goal is two-fold. First, gesture recognition can complement other forms of human computer interaction (such as keyboard, mouse, and voice), but provides such control at a distance without touch. For example, this gesture technology will allow a person to easily interact with a virtual vehicle in an intuitive and natural manner, greatly increasing the utility of the virtual reality design system, and enabling systems to be designed and developed in a more efficient and effective manner. Second, it can be used as a convenient computer interface to the millions of people who are unable to adequately use typical computer interaction techniques. The system uses a standard windows PC and an inexpensive commercially available USB camera. This arrangement does not require any connection to the user (either by tags or active beacons worn on the hand).

[3] This paper presents our on-going development of machine-user interface which implements hand gesture recognition using simple computer vision and multimedia techniques. The interface allows using their hands to control the cursor as well as easily move and resize windows that are open on their screen. Our aim is to enable human to interface with the machine and interact naturally without any mechanical devices. This interface is simple enough to control your system using human behaviours such as hand pointing of the gesture and so on. Anyone with a computer and a camera should be able to take full

advantage of this project. However, our main target is advanced computer users, since these are the users who are most likely to have many windows open, requiring frequent window management. First the input image is converted to a binary image to separate hand from the background. Then centre of hand is calculated and computed calculated radius of the hand is found. Fingertip points are been calculated using the Convex Hull algorithm. All the mouse movements are controlled using the hand gesture

[4] This paper proposes a novel vision based cursor control system, using hand gestures captured from a webcam through a color detection technique. The system will allow the user to navigate the computer cursor using their hand bearing color caps or tapes and cursor functions, such as right and left clicks, double clicks, scroll up and down will be performed using different hand gestures. The proposed system uses nothing more than a low resolution webcam that acts as a sensor and it is able to track the users hand bearing color caps in two dimensions and can recognize up to five different hand gestures, which are interpreted as mouse functions

3.   RELATED WORK

Hand gesture recognition using MediaPipe is a way to teach computers to understand how our hands move. This is really useful because it lets us do things like control a computer or play with things in a virtual world.

Researchers and tech developers have used MediaPipe to make systems that can figure out what our hands are doing. It's like having a special language that computers can understand when we move our hands. They've made it work for different things, like making a computer do what we want or playing in a virtual world. It's like magic for your hands and the computer.

4.   RESEARCH METHODOLOGY
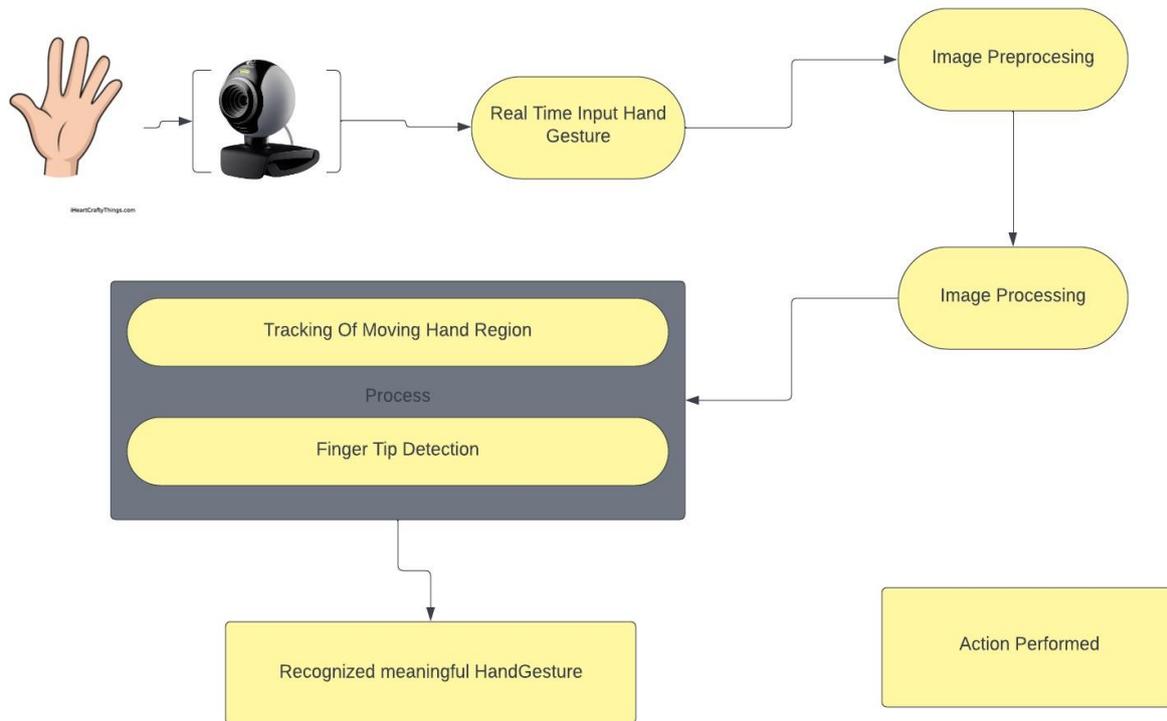
Hand Gesture (Input): Represents specific hand gestures recognized by the system for controlling the cursor.

Image preprocessing is a crucial step in computer vision applications, including those related to hand gesture recognition for mouse cursor control

Segmentation is a critical image processing technique in the context of "Mouse Cursor Control Using Hand Gesture" and plays a crucial role in isolating the hand gesture from the background.

Hand Detection and Segmentation: Before finding the center and size, you need to detect and segment the hand from the rest of the image using the segmentation techniques mentioned earlier

The location of **finger tips** provides information about the hand's posture and is crucial for tasks like tracking, pointing, and controlling a mouse cursor.

A simple gesture like moving the hand left or right can correspond to cursor movement.

5. CONCLUSIONS

In conclusion, the concept of controlling the computer mouse using hand gestures is not just a futuristic idea; it's a reality that's evolving rapidly. This technology is making computer interaction more intuitive and accessible to a wide range of users. It has found applications in gaming, virtual reality, accessibility, and beyond, enhancing user experiences in various domains.

6. REFERENCES

[1] J. Katona, "A review of human–computer interaction and virtual reality research fields in cognitive InfoCommunica- tions," Applied Sciences, vol. 11, no. 6, p. 2646, 2021.

[2] D. L. Quam, "Gesture recognition with a Data Glove," IEEE Conference on Aerospace and Electronics, vol. 2, pp. 755–760, 1990.

[3] D.-H. Liou, D. Lee, and C.-C. Hsieh, "A real time hand gesture recognition system using motion history image," in Pro- ceedings of the 2010 2nd International Conference on Signal Processing Systems, July 2010.

[4] S. U. Dudhane, "Cursor control system using hand gesture recognition," IJARCCE, vol. 2, no. 5, 2013.

[5] K. P. Vinay, "Cursor control using hand gestures," Interna- tional Journal of Critical Accounting, vol. 0975–8887, 2016.

[6] L. Thomas, "Virtual mouse using hand gesture," International Research Journal of Engineering and Technology (IRJET, vol. 5, no. 4, 2018.

[8] J. Jaya and K. Thanatoid, "Implementation of certain system for medical image diagnosis," European Journal of Scientific Research, vol. 53, no. 4, pp. 561–567, 2011.

[9] P. Nandhini and J. Jaya, "Image segmentation for food quality evaluation using computer vision system," International Journal of Engineering Research and Applications, vol. 4, no. 2, pp. 1–3, 2014.

[10] J. Jaya and K. Thanatoid, "Implementation of classification system for medical images," European Journal of Scientific Research, vol. 53, no. 4, pp. 561–569, 2011. GSMCOE, Balewadi, Pune 9 Cursor Control using Hand Gestures

[11] J. T. Camillo Lugaresi, "MediaPipe: A Framework for Building Perception Pipelines," 2019, https://arxiv.org/abs/1906.08172.

[12] Google, MP, https://ai.googleblog.com/2019/08/on-device- real-time-hand-tracking-with.html.

[13] V. Bazarevsky and G. R. Fan Zhang. On-Device, MediaPipe for Real-Time Hand Tracking.

[14] K. Pulli, A. Baksheev, K. Kornyakov, and V. Eruhimov, "Realtime computer vision with openCV," Queue, vol. 10, no. 4, pp. 40–56, 2012

[15] A. M. Patil1, S. U. Dudhane1, M. B. Gandhi1," Cursor Control System Using Hand Gesture Recognition", International journal of advanced research in computer and communication engineering, vol. 2, issue: 5, May 2013.

[16] A. Banerjee, A. Ghosh, K. Bharadwaj, "Mouse Control using a Web Camera based on Color Detection," IJCTT, vol.9, March 2014.

[17] Y. Zhou, G. Jiang & Y. Lin, "A novel finger and hand pose estimation technique for real-time hand gesture recognition," in Pattern Recognition vol. 49, pp. 102-114, January 2016.

[18] P. Kumari, S. Singh & V. Kr. Pasi, "Cursor Control using Hand Gestures," Recent Trends in Future Prospective in Engineering & Management Technology 2016, International Journal of Computer Applications (0975 – 8887), 2016