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Virtual Mouse & Keyboard Using Hand Gesture

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Abstract: The development of technology is evident in the modern world. Artificial intelligence is a feature of modern machines. This project also uses artificial intelligence in a minor way. This project shows how to use a camera to track finger movements in computer windows and how to use a single finger movement to manage the entire system. With the advancement of augmented reality technology and the gadgets we use on a daily basis, Bluetooth and wireless technology are becoming more and more common.

This article presents an intelligent virtual mouse that uses gestures and hand gestures to perform computer mouse operations using computer vision. The main purpose of this application is to perform computer mouse cursor functions and scrolling functions using a webcam or computer's built-in camera instead of using a traditional mouse. Hand and finger pointing using computer vision according to HCI. With the AI virtual mouse system, we can use the built-in camera or webcam to follow finger movements and play games. When using a wireless or Bluetooth mouse, some accessories are included, such as the mouse, a dongle to connect to the computer, and batteries to power the mouse, but for this message the user is using the built-in pin video or use the webcam and use gestures to control the computer mouse. In the planning process, the webcam captures and captures images, then recognizes various gestures and gestures, and then performs special mouse operations.

Keywords: Mediapipe, Autopy, GUI, gestures, OpenCv.

I. INTRODUCTION

The goal of the computer science and technology field of gesture recognition is to use mathematical algorithms to interpret human movements. It falls under the umbrella of computer vision. Although any bodily function or state can cause movement, the face and hands are the primary sources. Facial and gesture recognition are among the topics that are now receiving attention. Devices can be controlled or interacted with by users using basic gestures without requiring physical contact. Numerous techniques have been developed to use cameras to read sign language. and algorithms for computer vision. Gesture recognition can be seen as a way for computers to understand human body language and creates a better bridge between machines and humans than text-based users, legacy interfaces, and even GUIs (graphical user interfaces) that still limit most keyboard input. And mice can communicate normally without mechanical devices. What is a virtual mouse? The virtual mouse only uses the camera to provide the interface between the user and the system. It allows the user to interact with the machine and even control mouse function without using the machine or body.

The camera records the movement made by the user. Information is extracted from the capture and transformed into something significant on the screen using object recognition techniques. Better than using tangible goods.

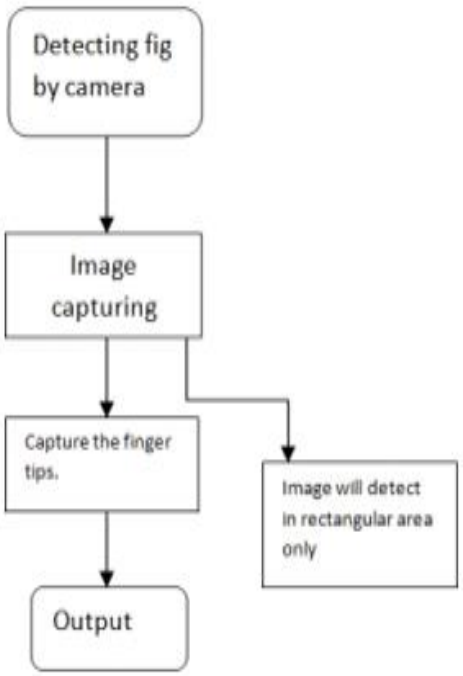
II. MOTIVATION

Accurate conference summaries are crucial as remote work and virtual meetings become more common, yet they are frequently laborious and prone to mistakes. Manual note-taking and transcription are inefficient, especially when intelligibility is impeded by background noise and irrelevant voices. An automated program is desperately needed that can find pertinent content, reliably copy it, and provide succinct summaries in multiple languages.

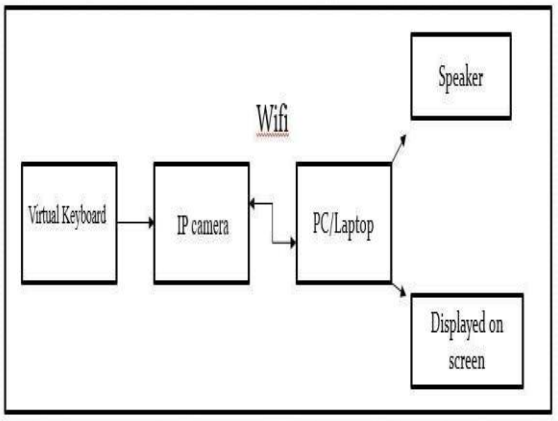
The Meeting Summary Generator tackles this by using state-of-the-art AI models such as Whisper and GPT to speed up transcription, remove unnecessary audio, and give international, diverse teams meeting insights. Users with physical limitations who are unable to utilize conventional input devices like a mouse or keyboard can benefit from a virtual mouse that is controlled by hand gestures. of germs. Increased awareness of hygiene has driven demand for contactless technologies. Hand gestures mimic natural human behaviour, making the interface more immersive and engaging. Gesture-based control feels innovative and futuristic, aligning with trends in augmented reality (AR), virtual reality (VR), and smart devices. Hand-gesture-based virtual mice are highly compatible with AR/VR systems, where traditional input devices may not be practical. The rise of AI and machine learning algorithms enables more accurate hand tracking and recognition, making such applications feasible and reliable. A hand mouse refers to a control method that allows the user to control the mouse.

III. SYSTEM DESIGN

1.BLOCK DIAGRAM FOR MOUSE-



2.BLOCK DIAGRAM FOR KEYBOARD



3.1 CAMERA SETTING- The process is controlled by a webcam from a connected computer or desktop computer. To take a photo, we need to create a photo capture object. We can also apply colour detection techniques to any image by making simple adjustments to the code.

3.2 CAPUTER FRAMES- In all cases, endless loop is used to capture the webcam image and store it for the duration of the program. We capture the flow live frame by frame. We will convert all images captured in the RGB (default) colour space to the HSV colour space. More than 150 colour space conversion methods are provided in OpenCV. But we only look at the two most commonly used, BGR for Gray and BGR for HSV.

3.3 MOUSE MOVEMENTS- The webcam image is always taken in an infinite loop and stored for the duration of the program. Frame by frame, we record the flow in real time. All photos taken in the RGB (default) color space will be converted to the HSV color system. OpenCV offers more than 150 color space conversion techniques. However, we only examine the two most widely utilized, BGR for HSV and BGR for Gray.

3.4 CLICKING- The use of a close guide is the next phase. Click on an object and drag it to play. The distinction, like in the introductory statement, is that since we only have one object, its location just needs to be determined. It will be positioned where the mouse pointer was. Instead of being mouse up, we are mouse down.

IV. LITERATURE SURVEY

The development of a hardware-based system is the subject of this review. Even while this approach yields extremely precise results, wearing a glove that [1] significantly restricts the user's hand's range of motion, speed, and agility makes many movements difficult to perform. Additionally, prolonged glove use might lead to skin conditions and is not recommended for people with sensitive skin types. [2] The development of a hardware-based system is the subject of this review. Despite the fact that this model yields extremely precise results, many movements are difficult to do while wearing a glove, which significantly reduces the user's hand's speed, agility, and range of motion. Additionally, prolonged glove use might lead to skin conditions and is not recommended for people with sensitive skin types. [3]

Create and put into use a system that allows users to interact with the computer system just by utilizing different hand gestures is our objective. It provides an alternative to physical C mouse and allows an individual to perform various mouse functions. [4] the user's hand must be detected and segmented, features from the hand must be extracted, hand gestures must be recognised using machine learning, the virtual cursor must be controlled and mouse clicks must be emulated, scrolling and other interactions must be supported, the system must be calibrated and customised, feedback must be given to the user, and user interaction must be permitted. To be useful for the user, the system must be precise, dependable, and simple to use. [5] A hand mouse refers to a control method that allows the user to control the mouse pointer using their hands. There have been frequent attempts to control a system or software using the hand. A study on the use of a data glove to make a presentation. [6] The click keyboard has mostly been incorporated into smartphone touch screens. More than 60% of households worldwide currently own at least one smartphone, indicating the widespread use of this input technique. Furthermore, 14 predicts that the percentage of people who use smartphones will rise. [7] According to typical computer-human interface test procedures, each subject's typing speed and task success rate are used to evaluate the system's performance. [8] Chandra Shrindre Saraswati As technology advances, there are more options than just using a mouse. By fusing hand gestures and vocal commands, the Gesture Controlled Virtual Mouse simplifies computer use with a human. Direct interaction with the computer is minimal. Almost all i/o tasks can be completed with static and dynamic hand gestures and a voice assistance. Hand gestures are recognized by this project. [9] Karan Kharbanda, Utsav Sachdeva, Maharaja Agrasen Institute of Technology, Delhi, is the inventor of the gesture-controlled virtual mouse. Quam unveiled an early hardware-based system in 1990 that required users to wear Data Gloves. The proposed system by Quam although gives results of higher accuracy, but the gesture controls that can be performed using it are very limited. [10] The CNN and testing batches are made and data argumentation is done with the help of Image data generator. The batch size kept 32and it is shuffled. White preprocessing images are converted into arrays. [11] The CVzone hand tracking algorithm starts with skin color segmentation on the input video stream. This identifies the parts of the picture that are most likely to show a hand. Skin color segmentation is accomplished by converting the input video frame from the RGB color system to the HSV color space. [12] The system may be used with any webcam-equipped device, including smartphones, tablets, and laptops. It is also quite portable. This makes it an easy-to-use and convenient mobile input method. [13] Complete precision and accuracy can be achieved. VK is also helpful in the entertainment and 3D demonstration industries. A virtual keyboard can be utilized to accommodate multiple languages, by simply remapping of characters without any adjustment. [14] The best features mentioned in the SR will be installed on this keyboard. Additionally, it will apply several optimization strategies discovered throughout the evaluation to enhance data entry for those with motor impairments. The performance of this new concept will next be assessed by applying the text entry performance metrics gathered by this study to the new virtual keyboard. [15] Keyboard Virtual = April 2021 Particularly, the technologies are being combined with user interfaces that leverage hand gestures, speech recognition, head tracking, and gaze. Games, education, healthcare, video, and sports are just a few of the industries that have recently made use of virtual reality (VR) and augmented reality (AR) technologies. Since everyone may quickly and simply operate a machine, gestures are one of the features that are commonly used. [16] The modern mouse systems that can be manipulated remotely use colour recognition technology. The current virtual mouse control technology allows us to easily manipulate the mouse cursor, The mouse can be used to click, and carry out other actions using a hand recognition system. [17] The acceleration layer significantly improves the convergence speed as well as the decoding accuracy. Without the auxiliary loss, the DND architecture becomes too deep for the gradient caused by the final loss to travel through the network. In such case, the learning.

Table

Ref. No	Description	Technology/ Algorithm used	Research Gap
[1]	The system utilizes computer vision techniques and depth-sensing cameras to create a virtual monitor in the air.	Machine learning using CNN, OpenCv	Hardware Limitations
[2]	gesture misinterpretation, latency issues, and adaptability across different users. Experimental results indicate that the system offers a user-friendly	Hand gestures recognition CNN model	Latency and Real-Time Responsiveness
[3]	It consist of an IMU sensor placed on the user hand and used to control the cursor movement The device control by IMU sensor along with three devices,	Media Pipe Framework Open-cv	Adaptability to diverse hand shapes
[4]	Convectional virtual keyboards, Aira Type leverages hand and fingertip actions for intuitive letter typing	PMC Module, OpenCv	vision based mouse can without much of a stretch be applied to the web administrations.

[5]	A touch switch device was designed to contact gently with operator's cheek. The operator may puff his cheek to trigger the device to perform a single click.	frame extraction module, redundant data,	Exploring how different input modalities can work together more seamlessly.
[6]	Intelligent text entry aims to provide quick and accurate typing interfaces to users. Although mechanical keyboards can also employ intelligent text-entry schemes.	CvZone and mediapipe	Research can focus on improving the accuracy of virtual mice,.

V. EXCEPTED OUTCOMES

Users can interact with a computer or device without a physical mouse or touchscreen by utilizing a virtual mouse that uses hand gestures. Alternatively, they can control the pointer and carry out commands with hand gestures and movements. What to anticipate is as follows: On the screen, the hand gestures are converted into cursor motions. Mouse clicks are mapped to certain motions, such as pinching or making a first.

- **Left-click**: E.g., a finger-tapping gesture.
- **Right-click**: E.g., a two-finger tap gesture.

Using gestures to simulate click-and-hold. Vertical or horizontal hand swipes could control scroll bars. Ideal for scenarios where physical contact with a mouse is not feasible (e.g., public terminals or during hygiene-sensitive tasks)

VI. SCOPE

1) The project's upcoming work will focus on enhancing the Fingertip Detection module to be insensitive to variations in lighting and determining the 3D posture of the panel for the purpose of augmenting 3D objects in reality.

2) To detect touch events on the projected screen, we will utilize additional graphic elements in the future, such as the symbol and character form features in the human-computer interface.

3.Our future plan includes adding more functionalities such as expanding and reducing windows, closing windows, and so on, by utilizing the palm and multiple fingers.

4.Additionally, we want to incorporate voice recognition into the keyboard.

VII. CONCLUSION

This project shows how to utilize OpenCv, autopy, and mediapipe to create a novel AI virtual mouse that allows users to interact with a computer in front of a camera using finger motions instead of their bodies. In practical applications, the approach is more accurate and efficient than removal. The constraints of current virtual machines are overcome by the suggested approach. Among its numerous benefits are the fact that fingerprints of all sizes and shapes are equal in reality and that it performs well in low light and difficult backdrops. The estimator works effectively in real-time applications, according to experimental results. In order to make the system easier to use and communicate with other smart devices, we also intend to add new gestures.

VIII. REFERENCES

[1] Sanka Sarkar, Indrani Naskar Sourav Sahoo Sayan Ghosh, Sumanta Chatterjee "A Vision Base Application For Virtual Mouse Interface Using Hand Gesture" In International Journal Of Innovation Science And Research Technology ISSN-2456-216 Volume.11 pp.1-6. no. 6 November 2021

[2] Kavita R, Janasruti S U, Lokitha S, Tharani G "Hand Gesture Controlled Virtual Mouse Artificial Intelligence" in International Journal Of Innovation Science And Research Technology -ISS(O)-2395-4396 Volume-9 no-2 pp.1-14 2023.

[3] Neerja Arora "Artificial Intelligence Based Virtual Mouse Using Hang Gestures" Journal of Computer Science Volume-2 no-2 July December-2023 pp.1-4

[4] Meenachi R., Nandan C, Swaroop H G, Varadharaju S "Virtual Mouse Using Hand Gesture" in IJCSPUB ISSN-2250-1770 vol-13 pp.1-5, May 2023

[5] Changhyun Jeon, Oh-Jin Kwon, Dongil Shin, And Dongkyoo Shin "Hand-Mouse Interface Using Virtual Monitor Concept for Natural Interaction" IEEE Volume-5 pp.1-8 2017.

[6] Jungpil Shin1, (Member, IEEE), And Cheol Min Kim "Non-Touch Character Input System Based on Hand Tapping Gestures Using Kinect Sensor" IEEE Volume-5 no-1 pp.-10 May 2017.

[7] Rares Pogoreanu and Radu Gabriel Bozomitu "Wireless Gyro-mouse for Text Input on a Virtual Keyboard" IEEE Volume-10 pp.1-4 2022.

[8] Prithvi J, S Shree Lakshmi, Suraj Nair and Sohan R Kumar and "Gesture Controlled Virtual Mouse with Voice Automation" International Journal of Engineering Research & Technology ISSN: 2278-0181 Volume-12 no-4 pp. 1-4 April-2023.

[9] G N Srinivas, S Sanjay Pratap, V S Subrahmanyam, K G Naga Priya, A Venkata Srinivas Rao "Virtual Mouse Control Using Hand Gesture Recognition" IRJET ISSN-2395=0056 Volume-10 no-02 pp.-1-5 Feb-2023.

[10] Aabha Waichal, Mauli Gandi Srushti Bhagwat, Amruta Bhanji Shalaka Deore, Shubhangi Ingale "Hand Gesture Recognition Based Virtual Mouse Using CNN" International journal of Computer Science 0975- 8887 Volume-184 No-20 pp. 1-5 July-2022.

[11] Akshay Krishan, Ann Treese Raphi, Arjun Anirudha, Meera George "AI Virtual Keyboard For Typing" International Journal of Engineering Research & Technology Volume-11 no-04 pp.1-5 2023.

[12] G M Trupti, Chandhan kumar, Dheeraj P, Vilas, Prasanna Kumar. S. Shivaraddi "Virtual Mouse Using Hand Gesture" International Journal of Advanced Research in Computer and Communication Engineering SSN (O) 2278-1021 Volume 13, no- 4, pp.1-5 April 2024.

[13] Sneha Thorat, Prajakta Suryawanshi, Kalyani Mate, Kavita Joshi "Virtual Keyboard" Dr D.Y Patil Institute of Engineering Management and Research Pune, Volume-8, no-4, Journal of Emerging Technologies and Innovative Research (JETIR), Volume-8, no-4 pp.1-4 April 2021.

[14] Renato de Sousa Gomide, Luiz Fernando Batista Loja, Rodrigo Pinto Lemos, Edna Lúcia Flores, Francisco Ramos Melo, Ricardo Antonio Gonçalves Teixeira "A new concept of assistive virtual keyboards based on a systematic review of text entry optimization techniques" Volume 32, no-2 pp.1-6 March 2016.

[16] Sowjanya M N, Sweatha R, Radha K G, Indresh BS, Kusuma N and Amit Bhupal Pattar "Virtual Keyboard Using Machine Learning" International Journal of Development Research Volume=08, no-1, pp.1-4 18555-18558, pp. 1-4 January-2018.

[17] Ue-Hwan Kim, Sahng-Min Yoo , and Jong-Hwan Kim , Fellow "I-Keyboard: Fully Imaginary Keyboard on Touch Devices Empowered by Deep Neural Decoder" IEEE Transactions On Cybernetics volume-13, no-01 pp.1-13 2019.