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"VIRTUAL MOUSE AND KEYBORD USING MACHINE LEARNING"

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ABSTRACT

Today, computer vision has advanced to the point where a machine can recognise its owner by running a straightforward picture processing application. People use this vision in many parts of daily life at this stage of development, including face recognition, colour detection, automatic cars, etc. In this project, an optical mouse and keyboard are created utilising hand motions and computer vision. The computer's camera will scan the image of various hand gestures made by a user, and the computer's mouse or pointer will move in accordance with the movement of the movements. Users can even conduct right and left clicks using various gestures. Similar to this, several gestures can be used to operate the keyboard, such as the one-finger gesture for selecting an alphabet and the four-figure motion for swiping left and right. Without a wire or other external devices, it will function as a virtual mouse and keyboard. The project's webcam is its sole piece of hardware, and Python is used to code on the Anaconda platform. Here, the Convex hull defects are first constructed, and then an algorithm is generated and maps the mouse and keyboard functions to the defects using the defect calculations. By mapping a few of them with the mouse and keyboard, the computer can recognise the user's motion and respond appropriately.

Keywords*: mouse, keyboard, gesture Convex hull;*

1. INTRODUCTION

A small pink box will appear in the centre of the screen while the computer webcam records video of the person using it while they are seated in front of it. The objects displayed there will be processed by the code and compared with it in that pink box. If they match, a red border will appear, indicating that the computer has located the object. The mouse pointer can then be moved by dragging the object. This will contribute to both the security of the computer and the creation of a virtual computing environment [1]. Using hand gestures, the cursor will be moved here in place of various objects. A different gesture will be used for a right click and a different gesture for a left click. In a similar manner, keyboard functions that would typically be performed on a physical keyboard can be emulated using a single gesture. When the recognised gesture is detected, a red border will appear if the gesture does not match the box, which will only display a pink box otherwise. Any object whose hue is near to the skin tone of a human person triggers the camera to begin and continue to detect it. The video is then compared to the module, and a piece of code is produced. If the code determines that the item seen by the computer camera resembles a human hand, the process proceeds on to the Convex Hull detection stage. Convex hull then determines whether the shown item is a hand or not, and if it is, it counts the amount of flaws. Similar to this, the code is built such that when the process is finished, the number of errors found is counted and a conditional statement is made. To create a flawless mapping of the mouse's functions with the examples' flaws counted, this conditional statement is mounted with, or perhaps it would be more accurate to say mapped with, the mouse.

Similar rules apply to the keyboard, albeit there is a small difference in how the keyboard interacts with the mouse. The keyboard employs a precision and hand position interface; it recognises keyboard function based on hand position and executes that function. The hand position is moved from right to left to perform the scrolling operation. Only the individual's hand's texture and colour can be used to determine the position of the hand, and this method is highly accurate.

2. BLOCK DIAGRAM

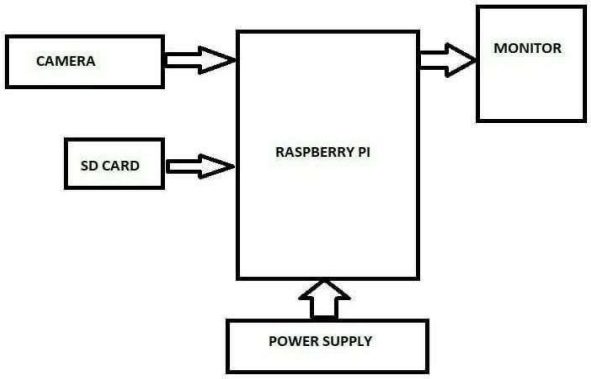

Fig. 1. Block Diagram

Figure 1 shows that raspberry pi, camera is used to capture the gesture and sends live video to the raspberry pi for processing. It is a 5MP camera that directly attaches to raspberry pi. The brain of our system is a raspberry pi, a small credit card-sized computer that runs on a Linux-based operating system. The output of our project is displayed on a monitor, and the operating system is stored on a 16GB SD card One of the greatest ways to add keyboard input is by using a Raspberry Pi with a touch screen display and an on-screen keyboard.

Additionally, if your Raspberry Pi is just equipped with a mouse and no keyboard, you may still text by utilizing the on-screen keyboard. It is simple and quick to add an on-screen keyboard to your Raspberry Pi.

3. METHODOLOGY

- A live video is captured using the Raspberry Pi camera and fed into the computer for video processing.
- The image is then pre-processed for dimension, contrast, and brightness once the video has been turned into image frames using open cv image processing techniques.
- The detection and tracking of hands and fingers is done using machine learning frameworks.
- In this case, the hand will serve as the mouse, and a virtual calculator that can be used using hand gestures has been constructed.
- In PCs and laptops, we often use physical mice or touchpads for personal use. In this project, however, we use HCI technology to detect hand movements and gestures for mouse movements and mouse events, totally eliminating the need for external hardware.
- The result will show up on the monitor.

4. RESULT

The computer records the hand position in the video being captured using the hand position system. An very small virtual keyboard has been assigned to the active video window. The little keyboard is readily available and is coloured red. Keyboard functions can be performed by aligning the figure parallel to the numerals or alphabets.

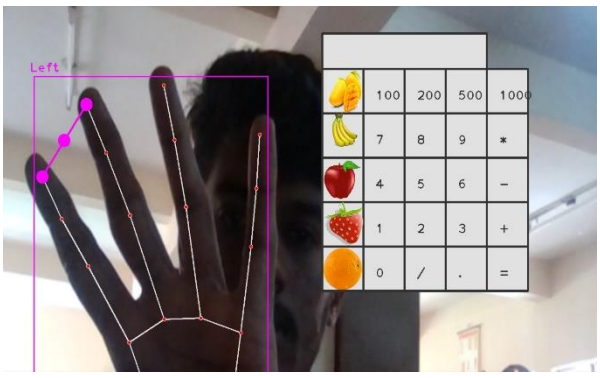

Fig.2 Detecting hand and fingers

The algorithm has a condition that, if the defect count reaches 1, the position of the mouse must change in relation to the location of the defect or location on the finger. As can be seen, the red dot in the index finger maps the place with the necessary information. Convex hull technique is being employed, and since there are four defects in the previous figure, the algorithm has been programmed to do a right click in accordance with mouse controls if there are four defects. Similar to this, the left click function will be used if there are 5 defects.

5. APPLICATIONS

- Can be used in pc and laptops.
- Can be used in smart board in colleges.
- Can be used interactive panels used in corporate.
- Can be used in high tech and industrial sectors.
- Gaming control

6. FUTURE SCOPE

For straightforward pointing and pinching actions, the technology works well, but there is still much space for improvement. The system now employs a static background, but it would be highly desirable and crucial to deploy this hand tracking system in an augmented reality environment where a user may interact with virtual 3D items in the real-world while wearing a head-mount display. In this case, a multidimensional camera angel is required to capture the hand gestures in order to capture information from more than one layer of the recording capability. There will be a need for 3-axis cameras, which are cameras on the X, Y, and Z axes. The 3-D image will be acquired or recorded based on the camera recordings, improving the accuracy of the defect count and making it simpler for the computer to understand the image and identify the defects.

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