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HCI: ACCESSIBLE TO DISABLE

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Abstract: Human-Computer Interface(HCI) is centered around the utilization of Computer innovation to give an interface between the PC and the human. There is a requirement for tracking down the reasonable innovation that makes successful correspondence between humans and Computers. Human Computer connection assumes a significant part. Consequently, there is a need to track down a technique that spreads a substitute way for making correspondence between the human and computer to the people. As computers helped to learn growing up, the meaning of human-computer communication is quickly extending. Human and PC interconnection has extended as of late. Individual and PC calculations are a need in the work area as well with respect to scholastic purposes.

In the proposed framework, we have incorporated face recognition, face following, eye location, and translation of a grouping of eye flickers progressively for controlling a nonintrusive human computer interface. Ordinary strategy for connection with the computer with the mouse is supplanted with natural eye developments. This strategy will help the incapacitated individual, truly tested individuals particularly individuals without hands to figure out effectively and effortlessly purpose. A webcam is expected to secure pictures of facial developments are recorded by the webcam. The picture is preprocessed by flipping and changing over into a dim-scale picture. These developments are additionally charted to a PC screen to likewise situate a mouse cursor. The development of the mouse is naturally changed by the place of the anchor point. The camera is utilized to catch the picture of face development.

The framework would take the ongoing video input from the client with the assistance of OpenCV and run behind the scenes. It can play out all mouse controls alongside some other console controls. An extra element to this framework is given by utilizing the Sound to Text (Discourse Acknowledgment) Module. A client can utilize this module to type expected text simply by directing the text to the framework.

Keywords: PWDs, disabled, facial gestures, OpenCV, feature extraction, recognition, HOG, HCI, cursor control, Speech Recognition.

I. INTRODUCTION

As computer aided learning is growing up, the significance of human-computer interaction is rapidly expanding. Human and computer interconnection has expanded in recent years. Personal and computer computations are a need in the workspace as well as for academic purposes. Thus, a vision-based approach is taken into account and an effective technique to develop human-computer interface systems is used. A webcam is required to acquire images of facial movements that are recorded by the webcam. These movements are further graphed to a computer screen to position a mouse cursor accordingly. The movement of the mouse is automatically adjusted by the position of the anchor point. Camera is used to capture the image of face movement.

The system would take the real-time video input from the user with the help of OpenCV and run in the background. The input images taken from the user are converted from RGB images to grayscale images; a certain point on the user's face would control the cursor on the screen and the right and left wink would implement the right and left click respectively. Squeezed eyes would facilitate the enabling of the scroll function in case of reading PDFs and other documents. It would thus facilitate the use and movement of the cursor through the face gestures. Along with this user can make use of the audio to text module in order to type required text by just dictating the text to the system.

II. PROBLEM STATEMENT

To design and develop a user-friendly facial gesture and speech recognition utility to interact with the pc, and a digital human-computer interaction device, whereby no bodily contact with the machine is required and additionally to produce a higher human-machine interplay routine for physically challenged people who might be accustomed to perform tasks easily.

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III. OBJECTIVES

1. To accurately detect gestures and process them to perform various tasks defined in the system.
2. To provide ease of access while using the system.
3. To create a utility where persons with disabilities can easily communicate with a PC and use it with only facial gestures.
4. The client ought to have the option to control all mouse exercises by simply utilizing facial motions
5. User should be able to control some most used actions easily with gestures.
6. Speech Recognition for typing text and copying it to the desired destination.

IV. MOTIVATION

The motivation behind this project lies in growing an economically feasible and hardware-independent machine using which humans can control the system without having any bodily reference to the PC. The main aim lies in creating a system that is environmentally friendly to use and at the same time, effortless for handicapped or persons with disabilities. It needs to supply flexibility to the person as properly as it needs to be no longer time-consuming.

V. LITERATURE SURVEY

Many researchers have contributed work supporting eye tracking or gesture determination in several domains. They have used different systems and technology to trace the eyeball of the user.

1. Real-time detection of eyes and faces
In reference [1], the author tried to work on the system's slow response to eye detection. A processor namely, Pentium 11333 Mhz, the machine is used for the detection of the pupil and the face. This includes taking 30 frames per second. Moreover, it makes use of a PCI frame grabber that is incapable of processing the acquired image, and therefore synchronization of the frames is done with the help of hardware that illuminates the pupil.

2. Fast and robust classification using asymmetric AdaBoost and a detector cascade
In [2] the paper addresses a real-time detection of the face during which each scale and location within each image is analysed for real-time speed. Colour filtering or motion filtering in video clips are also used by other devices. Colour and movement in broad databases are not readily accessible. Vision-based eye tracking is the clear picture of the attention tracking movement described on how the movements of the eyes were done and the way the tracking of the eyes together with the gaze movements accustomed occur. The instance of eye gaze provides context to the pc system that the user is watching and so supports effective interaction with the user systems and is accustomed to measure visual attention and to facilitate different sorts of user interaction tasks.

3. Perceptual user interfaces using vision-based eye tracking
In [3], The system utilizes robust eye-tracking data from multiple cameras to estimate 3D head orientation via triangulation. Multiple cameras also afford a bigger tracking volume than is feasible with a private sensor. The obtained results demonstrate the effectiveness of the top pose calculation subsystem, both applications use head pose data within the type of regions gazed by the user, verification is done based on whether gaze estimates by a people are the identical as those actually estimated by the system. The results are given within the type of a percentage of correct recognition by our tracking system.

4. OpenCV based real-time video processing using android smartphone
In [4], The author has used OpenCV for Real-time video processing within the android smartphone. Here the author is trying to create two Android applications supporting video processing using two different methods; one by using OpenCV library, the second one is using an Android library with a self-implemented algorithm called ‘CamTest’. Here the author has used eight image recognition techniques to test the efficiency of the Android library and OpenCV in every frame of video captured on an Android smartphone. With above techniques, the paper concludes that most image processing techniques using the OpenCV library perform higher than the self-made Android library algorithm, and that OpenCV gives greater focus to improvement than energy consumption. Different approaches are used for eye detection.

5. Controlling mouse cursor using eye movement
In [5], the author has explained the three different approaches. The Regression approach is used to minimize the distance between the predicted and actual eye positions, Bayesian approach learns model of eye appearance and non-eye appearance. and Discriminative approach Treats the problem as one of classification.

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VI. PROPOSED METHODOLOGY

The implementation of the proposed system is as explained below:
1. The system continuously captures video through a webcam.
2. This input stream is flipped and converted into the frame and this frame is converted to grayscale.
3. The frame is processed to find the face. When a face Is detected features of the face are extracted.
4. These features are compared with the trained model features and then the gesture made by the user is recognized.
5. According to the gesture made the action on the mouse cursor or any other action is initiated by the system.
6. Following Gestures are implemented along with their associated actions.

Table I

SR. NO.	GESTURE	ACTION
1.	Opening of Mouth (>0.6)	Activate/Deactivate Mouse Controls
2.	Right Eye Wink	Right Click
3.	Left Eye Wink	Left Click
4.	Squinting Eyes	Activate/Deactivate Scrolling
5.	Head Movements (Pitch and Yaw)	Scrolling/Cursor Movement
6.	Closed Eyes	Print Screen
7.	Mouth Open (0.2 to 0.4)	Volume Up
8.	Mouth Open (0.4 to 0.6)	Volume Down

VII. CONCLUSION

The proposed system would take real-time input from users with the help of OpenCV and run the application in the background. This application can be implemented on laptops and desktops with inbuilt or external webcams. With the help of this application, the user can perform actions like moving the cursor in all directions, clicking functions, the scroll function, and the dragging function. Thus, the system would be functional and useful for physically challenged users. One prominent advantage of the application is available in a ready-to-install executable file without the need for external packages.

The application can be set to auto-start on system boot to avoid the inconvenience of manually launching the application. Some system limitations are low lighting conditions because the user's face will not be clearly detected under low light. The system can only operate on devices with an integrated webcam or the webcam must be connected to the device explicitly. Future work will include efficient user input in low-light conditions. Also, along with desktops and laptops, this application has the scope of being implemented on android devices. Customization options for gestures and computer activity can be added. The system can be converted into an executable while where the user can re-assign actions and gestures according to his/her requirement with restore to default options.

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