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# HUMAN COMPUTER INTERACTION BASED HEAD CONTROLLED MOUSE

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**ABSTRACT**

*A Head-Trace Mouse system via webcam, using image processing technology torecognize the movements of head and mouth. Head Tracking Virtual Mouse is an application that uses the feature classification method to map the mouse pointer on the screen to the movements of head and eye in frames through a camera. The system analyzes the relationship between different combinations ofthe detected head and eye open and closing action, and thenmaps them to mouse events on the computer system. Our aim is to use this application mainly for the upper limb disabled who are unable to use the traditional mouse.*

***Keywords— Eye, Human head, open Cv, mouse, Deep learning***

**INTRODUCTION**

The proposed head tracking based control system is a software application running on the low-cost head trackers. The application detects users' motion with "mouse cursor control" function of head tracker. Mouse cursor control allows users to redirect mouse cursor to motion position. Therefore, we will realize where user watches according to the positionof mouse cursor. By moving at the point for few seconds, the tool would generate the corresponding events. In this way, users can selectand click the corresponding functions. The head-trace mouse system is a human-computer interaction system based on the real-time detection of head and mouth poses.

It collects user's head image (this paper refers to the positive region of the face) through camera, and then analyzes the user's head pose(standard, left, right, up, down) and mouth pose (open,close), after that, transfers the poses of head and mouth into the physical operations of a mouse using state machine theory. The head-trace mouse system can use a camera either built-in or connected through USB interface. The system automatically drives the camera to capture and analyze images of the user in front of a computer, and then transfer the user's action intothe shifting of mouse pointer on the screen. One of the authors is using the head-trace mouse system.

The camera fixed on the computer is an ordinary CMOS camera. To make it convenientfor user to determine his own head position, the system displays the real time image capturedon the top right of screen. A user can adjust the camera and hishead to make sure the head position is in the middle of the captured images. The rectangles in the image mark the user's head and mouth detected by the system respectively. Part B, the circular icon, is a mouse pointer specially designed for the system.it shows the control panel of the system. When the system detects the user's face and mouth, the system can be activated by opening mouth. This system realizes real-time

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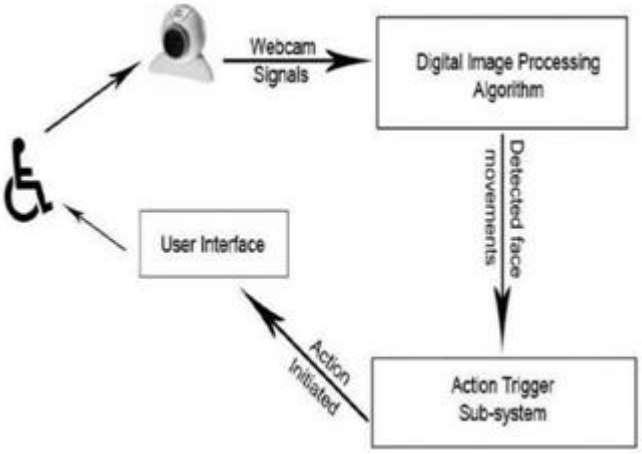
detection of input images by recognizing head and mouse poses, with high accuracy and being exempt from any contacting-type devices. It offers significant convenience for the upper-limb disabilities and the seniors. The utilization of the system also notably alleviates the discomforts caused by long-term usage of computer.it can be used for disabled person.

**LITERATURE SURVEY**

A review on head based Human Computer Interaction which focuses features such as head tracking, face and facial expressionrecognition, eye tracking, and gesture recognition HCI is presented by Porta (2002) and Turk (2004). Adaptive and intelligentHCI is discussed by Duric et al. (2002) with a review of computer head for human motion analysis and a discussion oftechniques for lower
arm movement detection, faceprocessing, and gaze analysis. All of these articles agree that approaching the naturalness of human-human interaction plays a central role in the future of HCI and that this objective can be approached by designing adaptive HCIsystems that are affective, context-aware and multimodal. According to Reeves et al. (2004), a multimodal HCI can be an effective means for reducing uncertainty of single-modally sensed data (such as speech or hand motion), thereby improving robustness. Although, the incorporation of all features of human-human interaction into human computer automatically facial expressions and gestures.

**ARCHITECTURE**




**EXISTING SYSTEM**

A vision-based human--computer interfaceispresented in the paper. The interface detects voluntary eye-blinks and interprets them as control commands. The employed image processing methods include Haar-like features for automatic face detection, and templatematching based eye tracking and eye-blink detection. Interface performance was tested by 49
users (of which 12 were with physical disabilities. And also

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able to browse on internet Test results indicate interface useful entereed in offering an alternative meanofcommunication with computers. The users and Polish text (with average time of less than 12s per character) The interface is based on a notebook equippedwith a typical web camera and not need of extra light sources and it is a open source

**PROPOSED SYSTEM**

Patients with no or limited hand function usually have difficulty in using conventional input devices such as a mouseor a touch screen. Having the ability of manipulating electronic devices can give patients full access to the digital world, thereby increasing their independence and confidence,and enriching their lives. In this study, a hands-free humancomputer interface was developed in order to help patients manipulate computers using facial movements Five facial movement patterns were detected by four electromyography (EMG) sensors, and classified using myoelectric pattern recognition algorithms.

Algorithm presented in this project performs operations deeply centered on predicting theEYElandmarks of a given face. we can build appropriate features thatwill further allow us to detect certain actions, like using the eye-aspect-ratio to detect a blink or a wink, using the mouthaspect-ratio to detect a yawn etc or maybe even a pout. In this project, these actions are programmed as triggers to control the mouse cursor. PyAutoGUI library was used to control the mouse cursor. For face detection, a machine learning based approach is used, Object detection algorithm proposed in. This technique employs a Haar-features based approach for object detection, which makes the rapid andaccurate object detection possible. We defined five motions as the basis of head movements, namely, standard head, head left, head right, head up, and head down, the face which represents the detected head and closingof the eye performs the selected option of left click, right click.

**Benefits**:

1.Quick response time2.small memory factor

**IMPLEMENTATION**

This project is deeply centered on predicting the EYElandmarks of a given face. We can accomplish a lot of things using these landmarks. Using these predicted landmarks of the face, we canbuild appropriate features that will further allow us to detect certain actions, like using the eye-aspect-ratio to detect a blink or a wink, using the mouth-aspect-ratio to detect yawn or pout.

**CALCULATION**

First the framework catches pictures by camera then recognizesthe face region in thepictures. Let the beginning directions (0, 0) be at the upper left corner in the Figure.Furthermore, the flatand vertical direction are noted x and y individually. The directionvalues are determined in pixels. The square shape which approaches the face is the identified head region. We compute the mathematical focal point of the square shape,and name it as head focal directions, forexample (Sx, Sy) .Then we can dissect the particular head development by time series

relationship of the focal directions.

1. INITIALIZATION:

User sits up in front of the computer. Let the Head-Trace Mouse run.

The python libraries OpenCV and Dlib and Imutils will detect LeftEye, RightEyeNose Mouth

2. SET LIMIT ESTEEM:

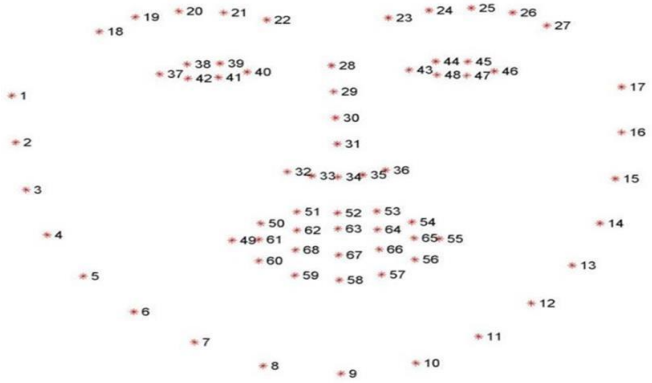
Decide the limit esteem (kx,ky) in view of involvement.3.JUDGE THE HEAD DEVELOPMENTS:

Analyze the images after initialization. The head central coordinates of one image is noted as (Cx, Cy). We compare (Cx, Cy) with new coordinates (Sx, Sy) to get the following conclusions:

If Cx - Sx> Kx, the judgment is that head moves left, abbreviated as left.

If Cx - Sx < -Kx, right.If Cy - Sy < -Ky, up. If Cy - Sy> Ky, down.

If | Cx - Sx | < Kx and | Cy - Sy | < Ky, standard head.



Go back to step (2) standard head picturecaught by cam where the external rectangular edges the identified standardhead. the main issue (Sx, Sy) in the rectangular with stronglines, is the focaldirections of the standard head.

The strong lines outlines rectangular shows the area of head unmoving. Throughout framework activity, in the event that the head focal directions are inside this district, the head is pronounced as still. In the event that not, a relateddevelopment is guaranteed. the U, L,D, R parts are the head development course,importance head climb, left, down, right,separately, as verified in sync (3) of Head move calculation Utilizing these anticipated milestones of the face, we can fabricate fitting highlights that will additionallypermit us todistinguish specific activities, such as utilizing the eye-perspective proportion (more on this beneath)to identify asquint or a wink, utilizing the mouth-viewpoint proportionto recognize ayawn and so on or perhaps a frown. In this undertaking, these activities are modified as triggers tocontrol the mouse cursor. PyAutoGUI library was utilized tocontrolthe mouse cursor

► **Step 1:** Considering our prerequisites, we will require an image, to begin with. Later we need to create a cascade classifier which will eventually give us the features of the face.

► **Step 2:** This step involves making use of OpenCV

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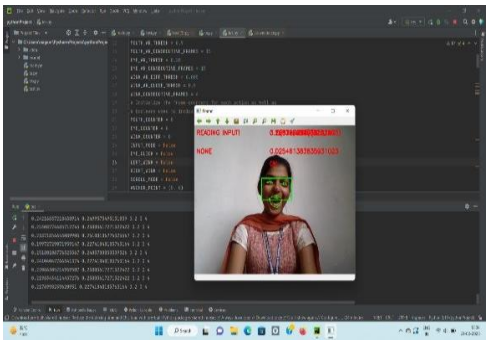
which will read the image and the features file. So atthis point, there are NumPy arrays at the primary datapoints. All we need to do is to search for the row andcolumn values of the face NumPyN dimensionalarray. This is the array with the face rectangle coordinates.

► **Step 3:** This final step involves displaying the image

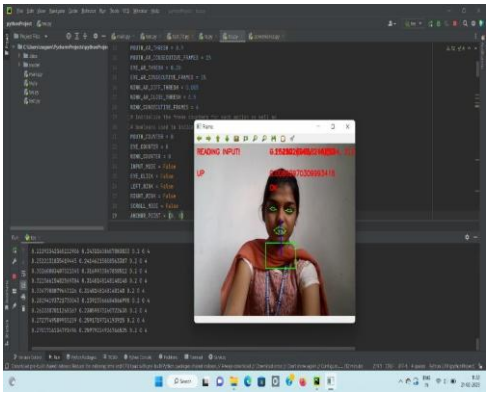
with the rectangular face box. Screen shots.

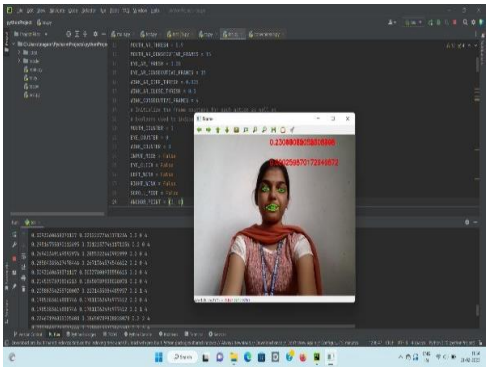
In the screen you can see the cursur moves in the view of eye hall,development.special case movements will raise and window close u move the cursor close corners of the screen.

RESULT: INITIALIZATION:



OPENMOUTH *FOR INPUT MODE*





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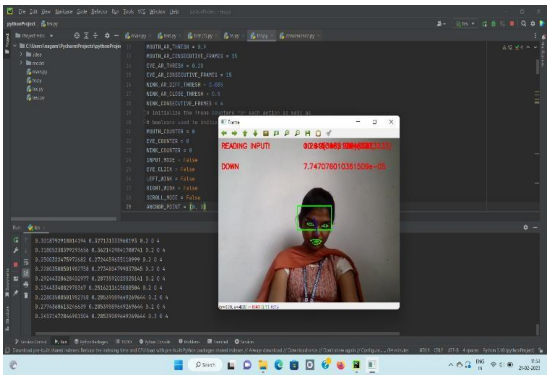


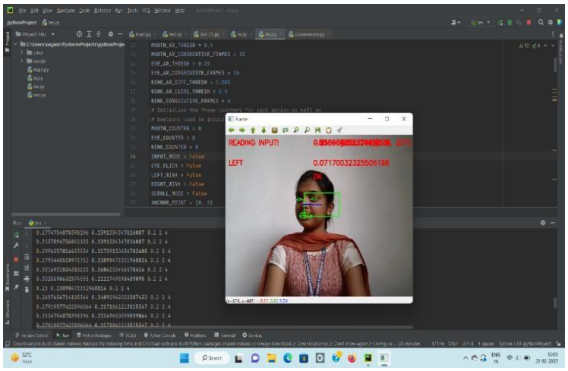


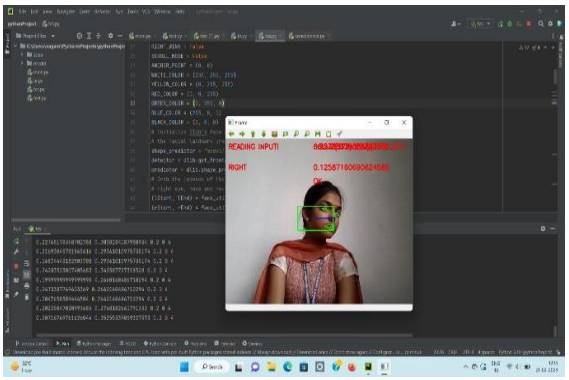


**CONCLUSION**

This paper introduced the principles of a computer-human interaction system based on realtime state-detection of head and mouth. And the head-trace mouse system was designed and implemented. It was proved that this system was capableof performing the majority of an ordinary mouse's operations. With this system, users can operate

computers by their head and mouth movements in front of web cameras. This system has been tested by an extensive number of persons and has been widely recognized. Thecommercial products of this system have been produced.

We have implemented a system to access the mouse pointer on the computer screen usingonly EYEfeatures. With the use of acamera and python technology, the system architecture is prepared. User is able to view head and eye movements captured throughthe camera which is displayed on the screen, accordingly the user can move the mouse pointer as needed andalso perform various mouse actions. The proposed system is feature based thus allowing any user to use the system withoutprior registration. This system is especially useful for the upper limb disabled. Currently, we are extending ourimplementationto support keyboard press technology for the for the ease of theUser to use theKeyboard hands free along with the already existing mouse movements provided by thesystem. This wouldthen enable the User to access the computer owing to only easeof the User to use the Keyboard hands free along with the already existing mouse movements provided by thesystem. This would then enable the User to access the computer owingto only EYEfeatures and movements without the use of traditional mouse and keyboard i.e Hands free system

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