Proposed - Simulation of mouse using human face(HCI)

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***Abstract*—The main application of this paper is used for that it's capable of swapping mouse with human face for interaction with PC. Facial structures (tip, eyes and nose) are traced and tracked in to use their movements of mouse events. Coordinates of the nose tip in the video feed are interpreted to develop the coordinates of the mouse on the screen. The right /left blinks control right/left events for click. The external device will be cam for the video stream. It is used for capable of swapping mouse with human face for interaction with PC. Facial structures (tip, eyes and nose) are traced and tracked in to use their movements of mouse events. Coordinates of the nose tip in the video feed are interpreted to develop the coordinates of the mouse on the screen. The right /left blinks control right/left events for click. The external device will be cam for the video stream. This project aims to present an application that is able of replacing the traditional mouse with the human face as a new way to interact with the computer. The employed image processing methods include webcam for detecting the face, and template matching method based eye region detection. The Haar feature technique is used for eye feature extraction. Hough transform, circular method is used to control the cursor movements. This method is used for physically challenged persons to operate the computers effectively with their eye movements.**

***Index Terms*— Eye detection, Eye movement, Face detection, Human-Computer interaction, Support Vector Machine (SVM).**

I. INTRODUCTION

Highlight a section that you want to designate with a certain In the past few years knowledge becomes progressed and less costly. With high performed processors and economical cams, people are using real-time applications using image processing. The artificial intelligence is one of them. Our work aims to use human face which is interacting with machine. Our system captures feature along with cam and note its act to interpret to events which is communicating with the machine. We are compensating people those have hands disabilities. Our system prevents them from using mouse. Our system uses facial expression which interacts with the machine. The nose tip was selected as the pointing device; the reason behind that decision is the location and shape of the nose; as it is located in the middle of the face it is more comfortable to use it as the feature that moves the mouse pointer and defines coordinates, it is placed on axis that the face take turns about. It is in convex shape which makes it easier to track as the face moves. Eyes were used to simulate clicks. User now fire events. He blinks their eyes while different devices were used in our system. (e.g. infrared cameras, sensors, microphones) we used an off-the-shelf cam that affords a moderate resolution and frame rate as the capturing device in order to make the ability of using the program affordable for all individuals. We will try to present an algorithm that distinguishes true eye blinks from involuntary ones, detects and tracks the desired facial features.

II. RELATED WORK

With the growth of attention about machine vision, the interest in our project has increased proportionally for physically challenged persons, especially persons without hands and legs. Keyboard and mouse are the most essential input devices to work with a computer. By the use of on-screen keyboard, a pointing input device such as mouse is sufficient to operate a computer with GUI software. The basic actions of a mouse are Mouse Movement and Mouse Button Click. This method is on developing an assistive technology that replaces the mouse movement by head movement using Open CV. The Mouse Button Click is implemented by any facial expression such as blinking eye, eye movement and nose movement..[2]. It controls mouse-moving by automatically affecting the position where eyesight focuses on, and simulates mouse-click by affecting blinking action. However, the proposed vision-based virtual interface controls system work on various eye movements such as eye blinking[3]. . By the use of on-screen keyboard, a pointing input device such as mouse is sufficient to operate a computer with GUI software. The basic actions of a mouse are Mouse Movement and Mouse Button Click. This paper is on developing an assistive technology that replaces the mouse movement by head movement using Open CV. The Mouse Button Click is implemented by any facial expression such as blinking eye, opening mouth and head movement[4]. As we mentioned before different human features and monitoring devices were used to achieve our project, but during our research we were interested only in works that involved the use of facial features and webcams. We noticed a large diversity of the facial features that were selected,

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the way they were detected and tracked, and the functionality that they presented for the project. Researchers chose different facial features: eye pupils, eyebrows, nose tip, lips, eye lids' corners, mouth corners for each of which they provided an explanation to choose that particular one. Different detection techniques were applied (e.g. feature based, image based) where the goal was to achieve more accurate results with less processing time. To control the mouse pointer various points were tracked ranging from the middle distance between the eyes, the middle distance between the eyebrows, to the nose tip. To simulate mouse clicks; eye blinks, and sometimes eyebrow movement were used. Each our method that we read about had some drawbacks, some methods used expensive equipment, some were not fast enough to achieve real-time execution, and others were not robust and precise enough to replace the mouse. We tried to profit from the experience that other researchers gained in the project field and added our own ideas to produce an application that is fast, robust, and useable. tabs, and so on. For three authors, you may have to improvise.

III. MATHODOLOGY

1. In which 1st detect the web cam, take 1st element in the array list. If no then immediately there is a prompt massage that device not connected.
2. Pixels range of human face depends on range of RGB pixels as human color pixels.
3. ROI's are eye pupils, nose tip and BTE. For that we use SSR filter (S1, S2, S3, S6, S4 and S6) for left eye, BTE, right eye, nose tip, cheekbones. For eye pupil using clusters if dark point clusters passing s1 means it left side of left eye click event. If it is pass from the right side then it is right side eye click event.

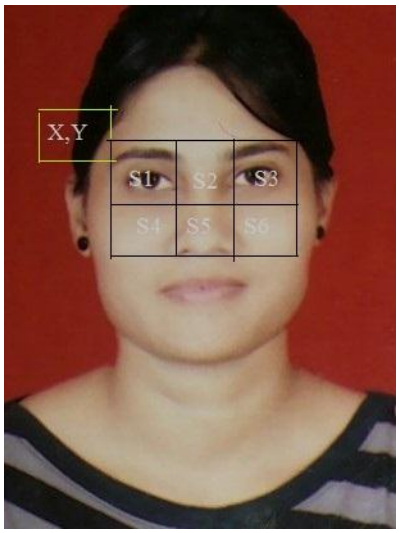

Figure1: SSR Filter

4. For find nose tip check the brightness means most bright point fall in S5. Brightness is more important when we perform the nose tip event.
5. We get ROI's then we convert it into gray pixels and then after it into binary format.
6. Action performed by blink detection and mouse movement. In blink detection there is manual (voluntary) means certain amount of range is fixed in microseconds and natural (Non voluntary).
7. Mouse movement works is in form of x and y axis. Final location is (0,0), When our nose moves horizontally and vertically it forms the co-ordinates and finally our nose mouse pointer at that location whatever we want.

IV. EXISTING SYSTEM

Eye tracking and head movement detection are widely investigated as alternative interface methods. They are considered to be easier to use than other methods such as voice recognition or EEG/ECG signals. They also have achieved higher accuracy and performance. In addition, using eye tracking or head movement detection as alternative interface, control or communication methods is beneficial for a wide range of severely disabled people who are left with minimal ability to perform voluntary motion. Eye and head movements are the least affected by disabilities because, for example, spinal cord injuries do not affect the ability to control them, as they are directly controlled by the brain. Combining eye tracking and head movement detection can provide a larger number for possible control commands to be used with assistive technologies such as a wheelchair.

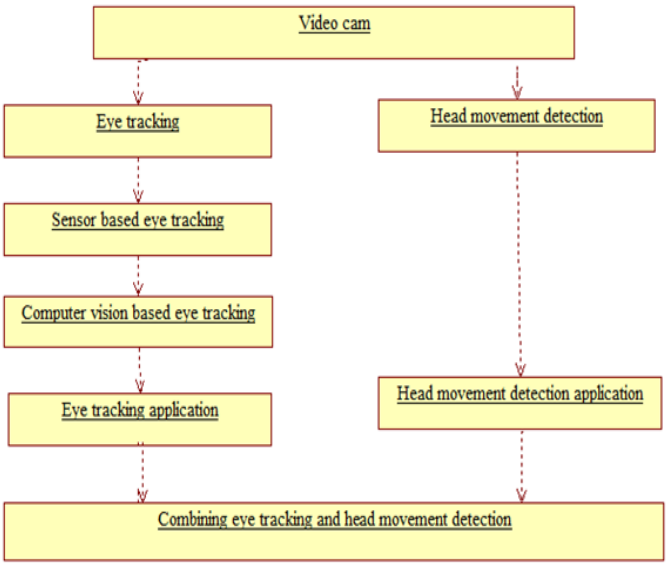

Figure2: Flow of Existing system

V. ARCHITECTURE

Now in this we found the facial features that we need, we are tracking them in the video stream. The nose tip is tracked to use its movement and coordinates as the movement and coordinates of the mouse pointer.

The eyes are tracked to detect their blinks, where the blink becomes the mouse click. The tracking process is based on predicting the place of the feature in the current frame based on its location in previous ones; template matching and some heuristics are applied to locate the feature's new coordinates.

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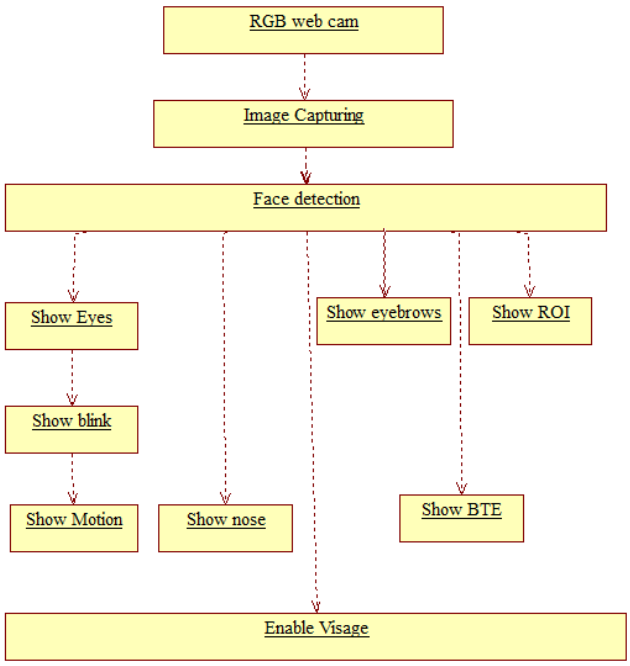

Figure 3. Imlementation of system

VI. ALGORITHM

Clustering Algorithm:

We will be using feature based face detection methods. This is to reduce the area in which we are looking for the face, so we can decrease the execution time. For finding face candidates the SSR filter will be used, it is used to find out the region of interest.

Process- How captures the facial feature :-

A. RGB format output obtain when the web cam device connect to the machine.
B. We will fetch all devices which give us RGB format and we will select first one.
C. We will set a cam on a face to recognize it as a human face and process will get enable.
D. After we will fetch the region of interest i.e. eye pupils and nose tip.
E. At real time process will take place. Continuously we fetch the data from webcam in form of frames.
F. We will operate our nose mouse pointer according to region of interest on screen of computer.

VII. PROPOSED SYSTEM

The nose tip was selected as the pointing device; the reason behind that decision is the location and shape of the nose; as it is located in the middle of the face it is more comfortable to use it as the feature that moves the mouse pointer. When our project runs successfully then we go to run file, there is creating a loading support vector machine. With the help of LSVM there is creating a window it contains Show eyebrows, nose, eye blink, ROI, BTE, Motion.

1. Detect the face: See fig. 4

Figure 4. Detect face

2. When we want eyes, eyebrows and nose it detects and form square on nose and eyes. And form line on eyebrows. See fig. 5.

Figure 5. Show S1, S3

3. When we detect the eyes, eyebrows, nose and BTE, it forms a square on nose , eyes and BTE(Between the eye). And form line on eyebrows. See fig. 6.

Figure6. Show BTE

4. When we detect the motion analysis, there is a orange cluster found on the process of eye blink. See fig 7.

Figure 7. Show motion

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5. When we want region of interest(ROI) on that time form double square on eyes and nose. And here is blink detection – it works as a mouse click events.

Figure 8. Show ROI

6. Now go to the Enable visage, When click on enable visage there is again a new window form see fig 8. But its hide and from their onwards cursor of mouse totally depends on nose and mouse clicks depends on blinking eyes.

Figure 9. Hide Window

Figure 10. Enable Visage Window

VIII. CONCLUSION

This paper focused on the analysis of the development of hands-free PC control - Controlling mouse cursor movements using human eyes, application in all aspects. Initially, the problem domain was identified and existing commercial products that fall in a similar area were compared and contrasted by evaluating their features and deficiencies. The usability of the system is very high, especially for its use with desktop applications. It exhibits accuracy and speed, which are sufficient for many real time applications and which allow handicapped users to enjoy many compute activities. In fact, it was possible to completely simulate a mouse without the use of the hands.

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REFERENCES

[1] Amer Al Rahayeeh and maid faezipour "Eye tracking and head movement detection", IEEE transactions, University of Bridgeport, Bridgeport. vol. 1, pp. 2168-2372, 6 November 2013.

[2] Ioana Bacivarov, Mircea Ionita, Peter Corcoran, "Statistical model of appearance for eye tracking and eye blink detection and measurement", IEEE transactions, vol. 54. No. 3, AUGUST 2008, pp.

[3] Akhil Gupta, Akash Rathi, Dr. Y. Radhika, "Hands-free PC control" Controlling of mouse cursor using eye movements," International Journal of Scientific and Research Publications, vol. 2, issue 4, April 2012, pp. 2250- 3153.

[4] M.Mangaiyarkarasi and A. Geetha, "Cursor control system using facial expressions for human- computer interactions," International Journal in Computer Science &Electronics (IJTCSE), Annamalai University, Chidambaram, India. ISSN: 0976-1353 Volume 8 Issue 1 –APRIL 2014,

[5] Shrunkhala Satish Wankhede, Ms. S.A. Chhabria and Dr. R.V. Dharaskar, "Controlling mouse cursor using eye movements," G.H Raisoni college of engineering and management, Nagpur, Maharastra. International Journal of Application or Innovation in Engineering & Management (IJAIEM) in year 201, ISSN 2319 - 4847.

[6] Tarun Dhar Diwan, Rajesh Tiwari, "Automatic Eye Blink Tracking and Detection in an Image Sequence," Dr.C.V.Raman University Bilaspur, C.G and Shri Shankaracharya College, of Engg. & Tech. Bhilai. C.G Vol. 2 (5) , 2011, 2348-2349.

[7] V. Pradeep , "A simple algorithm for using face as a pointing device using opencv", JTC College of engineering and technology, Coimbatore, India. Vol 2, issue 4, feb 2012 and ISSN 2277 128X.

[8] Aleksandra Kro´lak • Paweł Strumiłło, "Eye-blink detection system for human–computer interaction," Springer , vol. 294, Univ Access Inf Soc (2012) 11:409–419, 2 October 2011, DOI 10.1007/s10209-011-0256-6.:

[9] Sourabh Kanwar, "real time eye tracking and mouse control for physically disabled ," VIT University, Villach, Austria, Conference ICL2009 , September 23 -25, 2009 Press, Dec. 2007, pp. 57-64,

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