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# FACIAL MOVEMENTS MOUSE BASED CURSOR CONTROL FOR PHYSICALLY DISABLED

**1 Saba Sultana**, Assistant professor, Department of CSE, Cmr Technical Campus, Telangana, India sabasultana014@gmail.com
**2 K. Saikiran**, Department of CSE, Cmr Technical Campus, Telangana, India, kummarisaikiran86@gmail.com
**3 T. Naveen**, Department of CSE, Cmr Technical Campus, Telangana, India, 197r1a0552@cmrtc.ac.in
**4 Naga Pranav**, Department of CSE, Cmr Technical campus, Telangana, pranavbannu@gmail.com

**ABSTRACT:** People with disabilities, both physically and mentally, are a fundamental piece of our general public yet have not yet had similar chances to partake in the Data Society as others. Along these lines, for computers to be associated with new developments, it is expected to design accommodatingly accessible frameworks. The objective of this drive is to carry incapacitated individuals nearer to arising innovation. An assistive multimodal system is presented in this project that is geared toward disabled individuals who require distinct interfaces from the average person. People with limited hand strength are the intended users of this system. The program deals with the communication between a client and a machine, empowering individuals to move the PC cursor left, right, up, and down. The algorithm also makes it possible for the user to click to open and close apps, files, and folders. It gives people with disabilities the opportunity to use computers.

***Keywords*** *– Facial features, facial expressions, cursor control.*

## 1. INTRODUCTION

Natural human-computer interaction has recently received a lot of attention. In universal computing, a number of studies on human-computer interaction are presented. Without the need for costly equipment, the vision-based interface technology extracts motion information from an input video image. In any case, to make a fantasy based multimodal human PC interface system, eye, mouth, and facial following and ID ought to be performed. Today, a lot of people suffer from diseases that make them physically disabled, like paraplegia, which prevents a person from using his body from the neck down. Only their eyes have the ability to move in different ways. Out of a population of 7 billion, 518 million people reported having a disability at the 2011 Census. On February 7, 2018, roughly 650 million individuals — 10% of the total populace — were disabled. They require assistance from another individual even when they are eating. These individuals need assistance with their day to day schedules. Now, people with disabilities type on computers with long sticks in their mouths. People with disabilities will benefit from the approach we describe in becoming self-sufficient.

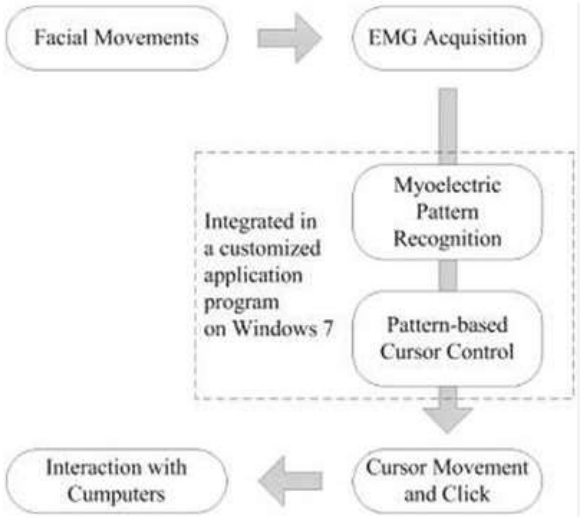


Fig.1: Example figure

They will be able to have fun, meet new people, and work on their lives with it. The arranged work to control a nonintrusive human-PC interface incorporates facial ID, facial following, eye-flicker recognition, mouth movements, and continuous squint translation. to connect with the PC as opposed to utilizing a mouse by moving your eyes and face.

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Its will likely make it simpler and more powerful for individuals with actual incapacities who don't have hands to utilize PCs. We use a camera in this project to measure eye motions and locations, also known as measuring the point at which the eye looks at something. We are able to use our eye movements as signals to control and communicate with computers using only our eyes thanks to this. This is an easy option for people who are physically challenged because it uses eye tracking. A computer or laptop with a built-in webcam is all we need.

## 2. LITERATURE REVIEW

**Facial Feature Based Method For Real Time Face Detection and Tracking ICURSOR:**

This project aims to demonstrate a program that can substitute a human face for the standard mouse as a novel means of interacting with a computer. Continuous discovery and following of facial attributes (nose tip and eyes) to use their exercises as mouse occasions. In our audit, we tried to compensate those with hand obstructions who can't use the mouse by making an application that associates with the PC using facial prompts (nose tip and eyes). It tends to be utilized with a large number of facial scales. Face competitors are immediately removed utilizing a Six-Segmented Rectangular (SSR) channel and confirmed utilizing a support vector machine in our principal identification strategy[4][5]. To try not to get on misleading up-and-comers behind the scenes, a movement sign is utilized. Face tracking follows the patterns between the eyes using modern template matching.

**Real-time eye-gaze estimationusing a lowresolution webcam:**

Eye obsession and saccade in mental examination, iris ID in a security framework, and the eye-controlled mouse in an assistive framework for the impaired or older all depend on eye recognition and look assessment. Eye observing is regularly completed by prominent infrared-based strategies or costly eye trackers in customary exploration. Applications that action eye consideration, for which clients habitually utilize a customer grade PC or even a PC with a reasonable camera, are progressively expected to dissect client conduct. To meet the prerequisites for fast application improvement at a lower cost, utilizing intrusive techniques or expensive or particular equipment is at this point not reasonable. In this review, we present a low-goal camera-based continuous eye-stare assessment framework that can precisely gauge eye-stare without the utilization of obtrusive discovery or costly or particular gear. To make it simpler to distinguish the eyes in low-goal webcam video outlines, an illuminance separating strategy is utilized to lessen the effect of light varieties. A point based eye acknowledgment strategy and area rules are joined in a half breed model to exactly and effectively find the eyes. In the eye-stare assessment step, the appearance-based properties of eyes are addressed by the Fourier Descriptor. The Support Vector Machine then decides the area of the eye-stare. The suggested methods are computationally straightforward while delivering excellent performance. The experiments' results further demonstrate the suggested method's practicality.

**Using Kernals for a video based mouse replacement interface:**

Some people are unable to use a computer mouse with their hands due to conditions like multiple sclerosis or cerebral palsy. These people can choose from a variety of mouse replacement options. One strategy is to let them use head movements captured by a web camera to control the mouse cursor. The Camera Mouse, for example, follows a physically chosen little region of the subject's face, for example, the nose or the temple line, utilizing an optical stream method. The optical stream tracker might lose the face highlight assuming the followed picture fix gets away from the component that was initially chosen or on the other hand assuming that the client moves their head rapidly. We made and integrated the Part Subset-Tracker into the Camera Mouse to handle the issue of part setback. A model based technique known as the Piece Subset-Tracker utilizes a preparation set of test pictures to create online layouts for positional following. Utilizing piece moves toward that are habitually utilized in arrangement, we fostered the improved Camera Mouse to work out these formats progressively. Under five different exploratory circumstances, we look at the exhibition of three variations of the Bit Subset-Tracker, each

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with an alternate part. As per explores different avenues regarding test members, integrating the Kernel Subset-Tracker into the Camera Mouse fundamentally and genuinely increments correspondence data transmission. Face highlights were precisely followed without include float in any event, during fast head developments and extreme head directions. At last, we discuss how a stroke casualty with huge movement disabilities had the option to utilize an on-screen console to speak with the Camera Mouse and the Kernel Subset-Tracker.

**Real-Time Eye Blink Detection using Facial Landmarks", Center for Machine Perception:**

A real-time method for detecting eye blinks in a conventional camera-captured video series is presented by the authors. Recent landmark detectors that were trained on datasets from the real world show remarkable resistance to camera head direction, varying light, and facial expressions. We demonstrate that the landmarks can be identified with sufficient precision to reliably determine the eye opening's level. Consequently, the proposed method evaluates landmark locations and extracts a single scalar variable that identifies the eye opening in each frame: the eye aspect ratio (EAR). Finally, an SVM classifier recognizes eye blinks as a short-term pattern of EAR values. The straightforward approach performs better than the most recent results on two typical datasets.

**Hardware and software implementation of real time electrooculogram (EOG) acquisition system to control computer cursor with eyeball movement:**

A brand-new artificial intelligence and neuroscience technology is known as a human computer interface (HCI). Using bio signals like the electrooculogram (EOG), electromyogram (EMG), electroencephalogram (EEG), and functional near-infrared spectroscopy (fNIRS), among others, the formation of HCI frameworks has aroused the curiosity of scientists all around the world lately in light of the fact that it empowers them to find out about state of the art advances in the field of man-made consciousness. The arrangement and improvement of a totally working Electrooculogram (EOG)- based human PC association point are presented in this survey. The vital equipment and programming for EOG signal procurement, as well as working equipment like a wheelchair, mechanical arm, portable robot, etc, and moving the PC mouse pointer utilizing EOG signal, were constructed and executed in this work. There are three segments to the connection point: Ongoing equipment and mouse cursor development, simple to advanced transformation, and EOG signal catch and enhancement are undeniably included. Five dispensable Ag-Agcl terminals are utilized to distinguish eye development and measure the expected distinction between the cornea and the retina. A functioning high and low pass channel is utilized to create a precise EOG signal in light of the fact that the EOG signal has a recurrence scope of 0.3 to 15 Hz. The channel's simple EOG signal result is changed over into a computerized signal with an Arduino. The EOG data is serialized by Arduino for arrangement, and a cutoff reference point is obliged controlling gear. Live information is ordered by its even and vertical aspects utilizing strategies like Support Vector Machine (SVM) and Linear Discriminant Analysis (LDA) in the Characterization module. As a paired classifier, it picks the best hyperplane from two factors. Each time the eye position was refreshed, the pointer consequently advanced in a specific course. For this activity, the PyMouse module of Python is used. The primary outcome of this research effort is the ability to control mouse cursor movement and eye gesture-based hardware like robots and wheelchairs.

**Eye-controlled mouse cursor for physically disabled individual:**

A clever way to deal with controlling PC screen pointer development utilizing iris development is portrayed in this review. The methodology allows really crippled people to control the PC cursor improvement to the left, right, up, and some place close properly recognizing the region of the iris in the eye and making a translation of it to a particular put on the PC screen. The calculation additionally makes it workable for the client to snap to open and close apps, files, and folders.

## 3. METHODOLOGY

In previous systems, complex algorithms were

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utilized. They used biometric methods to identify themselves. Some devices, like lasers, needed to be mounted on the user, which was impossible. Consequently, our objective is to develop a low-cost application that relies on user feature classifications rather than biometrics. Less equipment and easier calculations ought to be utilized. The objective is to use such a device to help people with upper limb disabilities who are unable to use a standard mouse or keyboard.

**Disadvantages:**

Biometric identification is the only method available at this time.

To make this better, we used the feature classification method.

1. Tools for mounting: These systems were cumbersome because the user had to wear a device that was mounted, like lasers or cameras.
2. Identification via biometrics: Biometric identification was used, and users had to register before using the system. The proposed proposal corrects the fact that not everyone was invited.
3. sophisticated software: Numerous computations based on various indicators were required by the previous systems' complex algorithms.

The algorithm used in this project focuses a lot of its operations on estimating a face's facial landmarks. These markers allow us to accomplish a lot. There are numerous applications, effects, and possibilities associated with facial landmarks. Dlib's prebuilt model, which is really an execution of, accurately predicts 68 2D facial milestones and distinguishes faces rapidly. We can make important highlights with these expected facial milestones that will empower us to distinguish specific exercises, for example, utilizing the eye-perspective proportion to recognize a flicker or wink or the mouth-viewpoint proportion to identify a yawn, and so on or maybe even a glower. These activities are coded as triggers in this undertaking to control the mouse pointer. The PyAuto GUI module was used to control the mouse cursor. The Object detection algorithm presented in is utilized for face identification and is based on machine learning. For object recognition, this strategy employs a Haar-features-based approach that enables quick and precise object recognition. We portrayed five developments as the supporting of head advancements: standard head, head left, head right, head up, and head down; in this venture, the face that addresses the detected head (the headI) is the front of the face; closing one's eyes plays out the left or right snap choice. To enact or deactivate, open and shut the mouth.

**Advantages:**

The advantages of the current system are as follows:

1. Quick response time
2. Personalized processing
3. Low factor of memory
4. Highly beneficial to people with disabilities

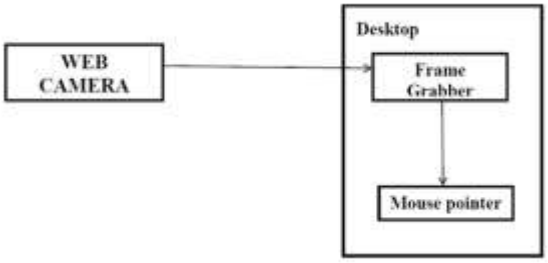


Fig.2: System architecture

**MODULES:**

For this project, we created the following modules.

**1. Detect Face:**

This part's essential capability is to perceive the face and the camera. You will be prompted to select one camera if the system detects more than one. It studies the locations, areas, and distances between them geometrically after recognizing the face. The component will recognize facial features and calculate their distances using geometric analysis. It causes facial characteristics to become more localized. The subsequent picture based procedure utilizes design acknowledgment and format coordinating.

**2. Track face movement:**

To act as the mouse pointer's development and directions, the nose tip's development and directions are observed. Flashes are distinguished by following the eyes, which are in this way different into mouse clicks. The following procedure works by utilizing layout matching to decide the new organizes of the element subsequent to guessing where it will be

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in the ongoing edge in light of its past position.

**3. Perform mouse operations:**

In this module, the threshold value for new pixels is determined by comparing them to previous pixels, and mouse click actions on blinks are carried out by first determining whether the blink is left or right and then clicking.

## 5. EXPERIMENTAL RESULTS


Fig.3: Home screen


Fig.4: After switching camera


Fig.5: Right click operation


Fig.6: Reading input


Fig.7: performing right click operation


Fig.8: Refresh page


Fig.9: Cursor movement

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Fig.10: Eye blinking

## 6. CONCLUSION

Using this method, we can deduce that facial expressions and ocular movement can be used to control cursor movement, eliminating the need for hands to operate the computer. This eliminates the need for another person to control the cursor, allowing amputees and those with disabilities to use the cursor with just their eyes. Other approaches, such as clicking events and human computer interface systems that make use of ocular movement and eye blinks to carry out cursor operations, could be developed, altered, or improved using this technology in the future. To accomplish productive and exact development, innovation was applied to this eye following methodology.

## 7. FUTURE SCOPE

Move toward utilizing electrooculography (EOG): In this strategy, the retina is utilized to control the mouse. The mouse development is constrained by a sign. In order to record the user's eye gaze, EOG electrodes are positioned close to the user's head and eye. The electrode sensor records the signal, amplifies it, removes noise, and digitizes the signals. Since the top and lower corners are not gotten by cathodes in this method, they can't be distinguished.

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## REFERENCES

[1] SunitaBarve, DhavalDholakiya, Shashank Gupta, DhananjayDhatrak, “Facial Feature Based Method For Real Time Face Detection and Tracking ICURSOR”, International Journal of EnggResearch and App., Vol. 2, pp. 1406-1410, Apr (2012), IEEE, 2012.

[2] Yu-Tzu Lin Ruei-Yan Lin Yu-Chih Lin Greg C Lee “Real-time eye-gaze estimationusing a lowresolution webcam”, Springer, pp. 543-568, IEEE, Aug (2012).

[3] Samuel Epstein-Eric MissimerMargritBetke “Using Kernals for a video based mouse

replacement interface", Springer link, Nov (2012).

[4] Cech and Soukupova, "Real-Time Eye Blink Detection using Facial Landmarks",Center for Machine Perception, February 2016.

[5] Hossain, Zakir, Md Maruf Hossain Shuvo, and Prionjit Sarker "Hardware and software implementation of real time electrooculogram (EOG) acquisition system to control computer cursor with eyeball movement" In 2017 4th International Conference on Advances in Electrical Engineering (ICAEE), pp. 132-137.

[6] Mohamed Nasor, K K Mujeeb Rahman, Maryam Mohamed Zubair, Haya Ansari, Farida Mohamed "Eye-controlled mouse cursor for physically disabled individual", 2018 Advances in Science and Engineering Technology International Conferences (ASET), 2018.

[7] I. Essa and A. Pentland, (1997), Coding, analysis, interpretation and recognition of facial expressions. IEEE Trans. Pattern Anal. Mach. Intell.

[8] H. Rowley, S. Baluja and T. Kanade, (1998), Neural network-based face detection. IEEE Trans. Pattern Anal. Mach. Intell. 2001.

[9] Erik, H. (2001). Face Detection: A Survey. [Online]. Department of Informatics, University of Oslo.http://www.tsi.enst.fr/~chollet/Biblio/Articles/Domaines/BIOM ET/Face/sdarticle.pdf

[10] Shinjiro, K. and Jun, O. (2000, Aug.) Automatic Skin-color Distribution Extraction for Face Detection and Tracking. [Online]. ATR Media Integration and Communications Research Laboratories. www.cipprs.org/vi2002/pdf/s7-1.pdf

[11] T. Ezgi, (2002) Face Detection Using a Mixture of Subspaces. [Online]. The Middle East Technical University.www.ece.arizona.edu/~pgsangam/ietepaper.pdf.

[12] M. Artur, W. Stefan, and R. Martin Line [1996] Based Robot Localization under Natural Light Conditions[Online].www.ni.uos.de/fileadmin/user_upload/publications/merke_welker_riedml.ecai04ws.pdf

[13] M. -H. Yang, N. Ahuja, D. Kriegman and A. survey, (1999), A survey on face detection methods, IEEE Transactions on Pattern Analysis and Machine Intelligence.

[14] M. Störring, H.J. Andersen and E. Granum, (1999), Skin colour detection under changing lighting conditions. In: H. Araujo and J. Dias, Editors, Seventh International Symposium on Intelligent Robotic Systems, Coimbra, Portugal , pp. 187–195.

[15] K. Toyama, Look, (1998) Ma—No Hands! hands free cursor control with real-time 3D face tracking, Proceedings of Workshop on Perceptual User Interface (PUI'98).