Implementation of Mouse Cursor Controlled by Eye Movement for Individuals with Disabilities

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Abstract— People with physical disabilities and mental disabilities are an important part of our society who haven't had the same opportunities as other people to join the Information Society. To include computers in the new technologies, it is therefore necessary to develop systems that are simple to use. The goal of this project is to bring disabled people closer to new Technologies. "A novel algorithm for controlling the cursor's movement on a computer screen by moving the iris is presented in this project. The algorithm enables physically disabled individuals to control the movement of the computer cursor to the left, right, up, and down by precisely mapping the position of the iris in the eye to a specific position on the screen. The algorithm also gives the user the ability to click to open and close applications, files, or folders. A novel concept for using human eyes to control the movement of a computer mouse cursor is presented in this project. In this project, an explanation of how the product works and how it helps special people share their knowledge with the world has been provided.

KEYWORDS: Web Cam, Image Processing, Eye, Matlab.

I.INTRODUCTION

PCs were from the outset used for handling mathematical issues and word taking care of. Starting late, regardless, PCs have gotten essential for each aspect of our step by step works out. These activities go from capable applications to singular uses, for instance, web examining, shopping, blending and preoccupation. It is anticipated that PCs will be readily available to the general public. However, using computers is an extremely challenging task for people who suffer from severe physical impairments like amyotrophic lateral sclerosis or cerebral loss of motion. There have been numerous investigation focuses on human PC interface (HCI) to improve the relationship between the customer and the PC structure.

There are four module to actualize the eye global positioning framework. For example,

- Face Detection
- Eye Detection
- Template creating and Template Matching
- Cursor development

PC usage is expanding rapidly, as is its development. Regardless, this office is only useful for the social orders who are really fit and can without a doubt connect with the PC world. It have hands free interface among human and PC. It becomes extremely challenging for a society that is handicapped by their hands and unable to connect in a fundamental way with such advancements. Assistive advances (AT) can be used to give people who can't do something because of their impairments more independence.

1.2 Different Approaches of Face Recognition

The face confirmation issue can be addressed in two positive ways: photometric (see based) and geometric (join based). A lot of evaluations were done as face affirmation power progressed, three of which were all collected in face check "making." "Face exposure wires detaching picture windows into two classes; one containing faces (tarning the foundation (wreck). It is questionable considering the way that paying little respect to the way that ordinary characteristics exist between faces, they can change unimaginably to the degree age, skin covering and outward appearance. The issue is other than jumbled by segregating lighting conditions, picture credits and checks, comparably as the likelihood of fragmentary impediment and spread.

The going with progress is the face impediment task that wants to see a picture as information and yield the territory of any face or faces inside that picture as some ricocheting box with" (x, y, width, height). "Face

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affirmation has been a vital subject of stores up in the continuous various years. When we try to see a face by simply choosing the match, our brains perform complex assessments of appearances in order to store vast amounts of information about them. This is something that comes naturally to us. Similar to how our minds look at a picture or video of a person and a safe person. Above what many would consider conceivable, supervisors truly do not completely comprehend

II.LITERATURE REVIEW

A literature review in the mentioned journals for the paper is included in this section. A review of the literature on image processing using MATLAB highlights its comprehensive Image Processing Toolbox for tasks like enhancement, noise reduction, segmentation, and analysis. MATLAB offers a user-friendly environment with many built-in algorithms and easy development capabilities. Key benefits include the ability to quickly prototype algorithms, support for various image formats, and powerful tools for numerical operations and visualization. However, for large datasets, researchers must employ techniques like vectorization and pre-allocation to improve performance. MATLAB shows its application in fields like medical diagnostics and human-computer interaction, utilizing techniques for pupil detection, image segmentation, and analysis of eye movements like fixations and saccades. MATLAB provides an accessible, efficient platform for developing custom eye-tracking systems and analyzing the resulting data, though challenges remain in dataset availability and ensuring the generalizability of machine learning models for various applications.

III.PROBLEM STATEMENT

There are currently several eye-gaze following methods available. A couple of experts performed eye gaze following using the Electro-Oculography following procedure. It makes use of the electrostatic field that surrounds the eyes. This field changes as the eyeball grows, and cathodes that are applied to the skin around the eyes can record these minute differences. The usage of anodes makes this strategy bothersome and not proper for standard use.

IV. OBJECTIVES

An eye worldwide situating system is exceptional contrasted with other application for the obstructed person. To develop this application distinctive figuring procedures and strategies for the image taking care of are used. These methodologies and strategies for picture getting ready gives an overall arranged model for eye worldwide situating system." "This application is important for the face area, features acknowledgment, format age and cursor advancement. As we are entirely remarkable about the debilitations. In any case the

individual can't use their body parts they are to be consider as the cripple individual for such people here we will familiarize a methodology with partner them with this current reality." To offer people with unbelievable inadequacies, an opportunity to control a PC fundamentally by moving his/her eyes or head. To design an insignificant exertion joined eye and head worldwide situating structure for individuals with insufficiency of their upper extremities.

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To offer people with unbelievable inadequacies, an opportunity to control a PC fundamentally by moving his/her eyes or head. To design an insignificant exertion joined eye and head worldwide situating structure for individuals with insufficiency of their upper extremities."

OBJECTIVE 1: The Face Detection System serves as the primary module in accordance with the mentioned objective. Using the viola Jones rule, the specific face piece of the customer is perceived from the information picture in this module.

OBJECTIVE 2: as per the referred to objective the second module i.e., Eye Detection System, in which the features are get secluded from the face by applying the Leonardo da vinci rule, that infers the eyes, nose and mouth are get segregated from the face

OBJECTIVE 3:as per the referred to objective the third module i.e., Template Generation and Template Matching. In this module we have to make the design of the eye and we have to save that design in the data base as per the gave direction, for instance, up, down, right, left, etc

OBJECTIVE 4:Finally, the last module of the eye worldwide situating system is the cursor improvement. In this part we have to find the heading of the cursor by differentiating the organization and the as of late set aside format. As we understand that the base difference between the design gives the best match in the arrangement.
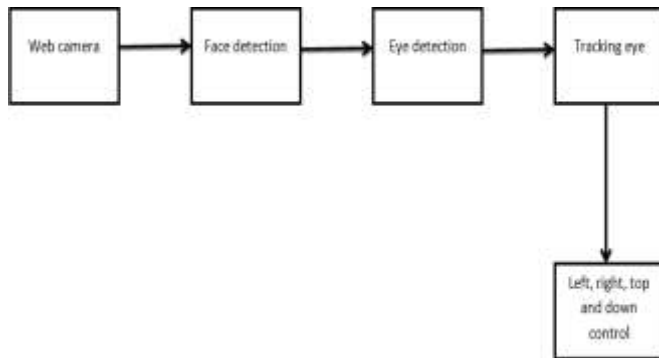
V.PROPOSED SYSTEM

The underlying advance was to use a face recognizable proof count discovers the face on an image plot got by a regular webcam. The subsequent stage required only seeing the eyes from this vantage point. We consider following only one eye improvement for faster getting ready time. By then the iris improvement was followed. Its image stands out more from the rest of the eye because of the dim shade of the iris.This causes us in straightforward acknowledgment of the iris locale. Taking the left and right corners of the eye as reference centers, the move of the iris as the individual changed his eyes place was settled. The move was then used to design cursor territory on the test graphical UI (GUI)." "The first thing that needs to be done is to record the video using the web camera. Frames are formed from the recorded video. Grayscale is also applied to the establishment end from the housing units. To locate the counter and edges in the image, it takes a real-face

picture following establishment. It identifies the frame's eye and mouth from the edges and counters. As a result of remembering, we calculate the Eye to Mouth Aspect Ratio. Decision Algorithm detects eye blink and head moment. Here, the use of both eyes results in unparalleled or quicker time management.

Figure: Proposed block diagram

5.1 WEBCAM

A webcam is a type of camcorder that moves or feeds an image or video dynamically to or through a PC to PC connection, such as the Internet. Webcams are typically small cameras that are attached to the equipment, added to a customer's screen, or placed in a work area. During a video visit meeting, webcams can be used to connect live and video conversations between at least two people. Using the iChat messaging program

(also known as Messages), for instance, one can use Apple's iSight camera, which is integrated into various iPhones, iMacs, and Apple PCs. Customers can record a video or move it to the Internet using webcam software. Compacted plans are typically used for electronic video streams because transmitting it over the Internet requires a significant amount of data. A webcam's best objective is also lower than that of the majority of handheld camcorders because more important standards would be lost during transmission. Webcams have a lower objective, which allows them to be somewhat smaller than the majority of camcorders, but the result is good for video talk events.

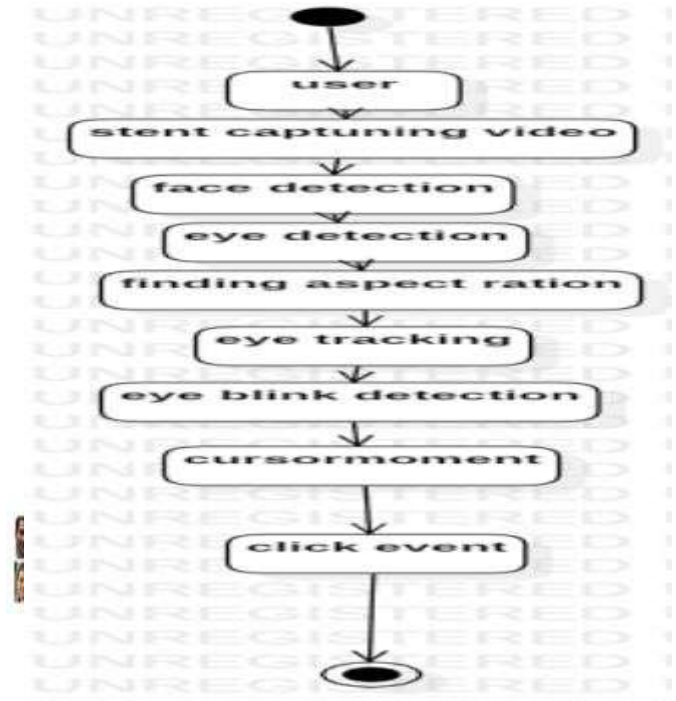Figure : Webcam

5.2 FACE DETECTION

Face acknowledgment structure realized to run under Matlab. Taking into account the features of the local Successive Mean Quantization Transform (SMQT) and the divided Sparse Network of Winnows (SNoW) classifier. Considering the paper: Face Detection using close by SMQT features and split up SNoW classifier.

Face acknowledgment is the way toward distinguishing at least one individuals in pictures or recordings by investigating and contrasting examples. Calculations for face acknowledgment regularly remove facial highlights and contrast them with an information base to locate the best match. Face acknowledgment is a significant piece of

numerous biometric, security, and observation frameworks, just as picture and video ordering frameworks.

Figure : Steps in the face recognition workflow.
Face affirmation use PC vision to remove discriminative information from facial pictures, and model affirmation or AI strategies to show the presence of faces and to organize them.

To encode the discriminative information required for face affirmation as a moderate component vector using techniques and counts, for instance, you can use PC vision procedures to perform feature extraction.

It familiar a system with perceive face of the customer rapidly and precisely in the image. Regardless, the region of the image that is being investigated for a facial component ought to be regionalized to the region that possesses the highest likelihood of containing the component. In order to quickly distinguish any object, including human appearances, using AdaBoost classifier falls that rely upon Haar-like features rather than pixels, Viola and Jones developed an estimation known as Haar Classifiers. By regionalizing the recognizable proof domain, counterfeit positives are prevented and the

speed of acknowledgment is extended due to the reduction of the area investigated.

5.3 Eye detection

The issue of disclosure and using picture-taking care of figures to follow an eyeball In the wake of inspecting all the assembled data by strategies for numerical, mathematic and physical frameworks; the ball will be recognized. Our goal will be to find the ball's area and follow it in a video. This brand name has anticipated applications for modified changing, telecom, reporting, scrutinizing and planning.

Finding the best item in each packaging determines the suggested price. The results are promising when the moving things are relatively few and of different sizes. So to speak, when there are different objects of a comparable size, present in the video, this figuring fails to convey exact results . In order to conform to the requirements, the selected video contains few moving elements.

VI. State chart Diagram

The lead of an item system is derived from state machine plots, and this diagram is utilized to investigate the various article states. A single class is represented by a statechart diagram. When illustrating responsive systems, statechart traces are crucial

A State Machine Diagram is used to represent the condition of the system or part of the system at finite instances of time.

This paper will track eyes in real time from a web camera using viola Jones face detection algorithm. Here we are using mat lab implementation for track the eyes. The web camera, image acquisition toolbox, and face detection algorithm are the main advantages of mat lab.

Figure : state diagram

6.1 UML DIAGRAMS

The use case diagram is a straightforward method for representing the user's interaction with the system. We will use four types of uml diagrams in this example. It is used to show the relation between user and different use cases in which the user is involved**.**

Figure : Use case Diagram of eye controlled mouse cursor
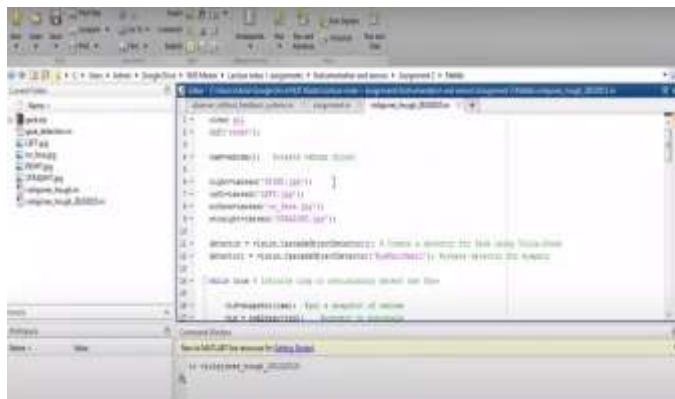
VII.RESULT ANALYSIS

Figure : Code execution using mat lab
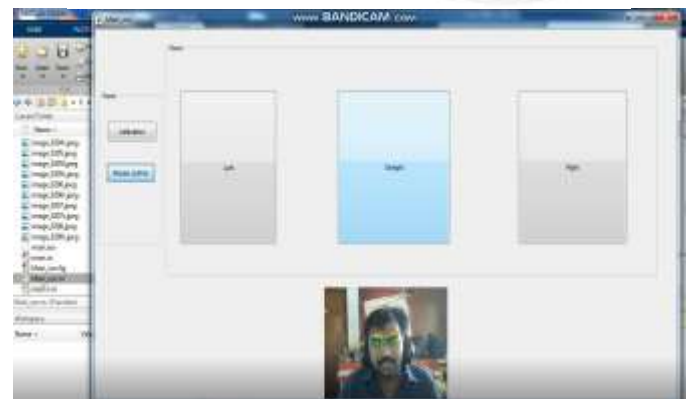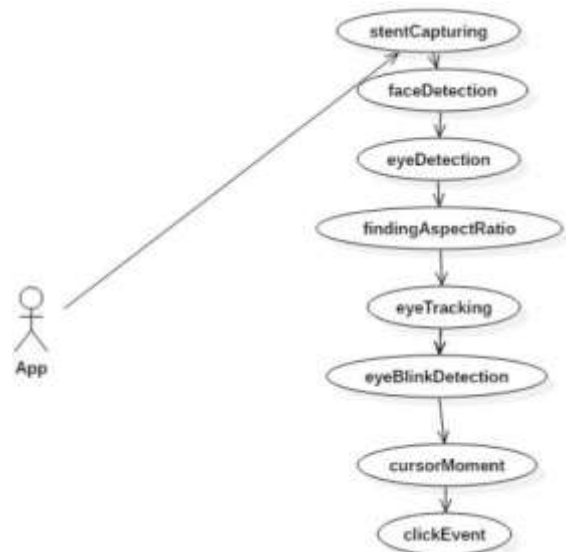

Figure : Calibration
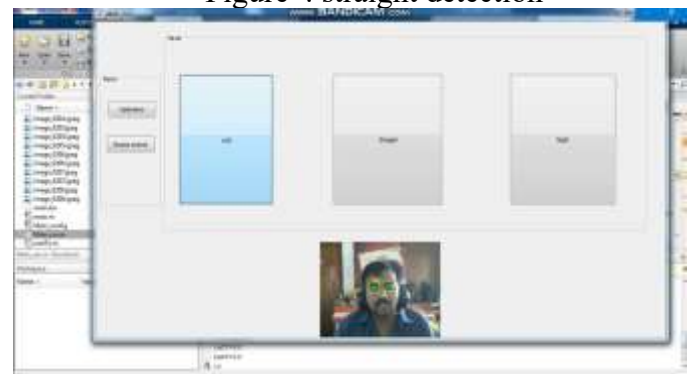

Figure : straight detection
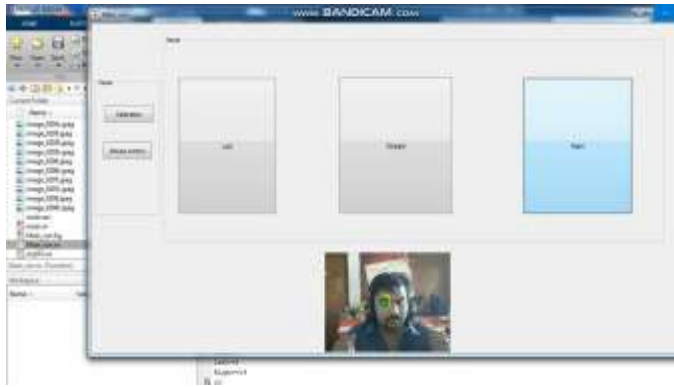

Figure 6.4: Left detection

Figure 6.5 : Right Detection

STEPS

1. With the help of web camera, the video is said to be recorded
2. The recorded video is converted into Frames
3. From the frames it is further converted into Grayscale for the background elimination
4. After the elimination of background it takes a proper face image to find Counter and "Edges in the image
5. From edges and counters it Identifies Eye and Mouth in the Frame
6. After identifying we calculate Aspect Ratio of Eye and Mouth

Eye Blink and Head Moment is Detected through Decision Algorithm.

VII. ADAVATAGES AND DISADVANTAGES.

7.1 FEATURES

- Simple, Easy to utilize
- Simple prerequisites
- No extra Hardware
- Faster catch of edges
- GUI settings
- Multi reason

7.2 BENEFITS

- Easier Computer Control"
- Help disabled & handicapped people to use computer
- Helpful in commercial Interactive games and advertisements

7.3 LIMITATIONS

- Real time Limitation
- Frames Captured Per Second
- Improper Usage may lead to Eye proble

VII. CONCLUSION

A structure that enables an incapacitated individual to speak with the PC was viably developed and attempted. Additionally, the method can be elevated for use in a variety of contexts. The system can be acclimated to help the injured with controlling home devices, for instance, TV sets, lights, portals, etc. Additionally, the system can be adapted to be used by people who have lost all movement to operate and control a wheelchair. The eye mouse can similarly be used to perceive drowsiness of drivers in order to hinder vehicle accidents. The eye improvement acknowledgment and following have also conceivable use in gaming and PC produced reality.

In this Paper, a PC vision figuring-based solution is implemented with the goal of developing a low-cost, short-term solution for eye gaze following. There are a couple of usages of eye gaze following, as an outline in HCI, machines the board, usability considers and in advancing practicality. Improved Pre-Processing computations should be familiar with reimburse lighting assortments and the web-cam objective should try to be expanded to reduce the pointer size. Accuracy for choices extraction estimations depends on picture quality and lighting conditions. Algorithmic rule execution falls down in defenseless lighting settings. A part depicting head-position should attempt to be introduced; it'll enable the customer to moved straightforwardly while interfacing with structure. Introducing the work of look evaluation identified with look projection will be useful due to it'll improve look projections drastically. look appraisal confirmations to be told from use estimations and understand look projections. Atom filters are used for look evaluation because they are extremely clear and comparable to the drawbacks of look evaluation.

8.2 FUTURE SCOPE

The quality may consolidate with the lighting conditions in future work. Using a highly skilled camera, work on the movement to get a more precise result. Counting the improvement in research (using the nose)'s usefulness. In addition, include a talk module that can be controlled by the mouse and launched from the PC's start menu. In a similar vein, we can incorporate research helpfulness through face enhancements and apply this to the banking and playing zones as well.

REFERANCES

1. B. Rebsamen, C. L. Teo, Q. Zeng, M. Ang. Jr. "Controlling a wheel chair indoors using thought" IEEE Intelligent Systems, 2007, pp. 18-24.
2. C. A. Chin "Enhanced Hybrid Electromyogram / Eye gaze tracking cursor control system for hands-free computer interaction", Proceedings of the 28th IEEE EMBS Annual International Conference, New York City, USA, Aug 30-Sept 3, 2006, pp. 2296-2299.
3. J. Kierkels, J. Riani, J. Bergmans, "Using an Eye tracker for Accurate Eye Movement Artifact Correction", IEEE Transactions on Biomedical Engineering, vol. 54, no. 7, July 2007, pp. 1257-1267.

4. A. E. Kaufman, A. Bandyopadhyay, B. D. Shaviv, "An Eye Tracking Computer User Interface", Research Frontier in Virtual Reality Workshop Proceedings, IEEE Computer Society Press, October 1993, pp. 78-84.

5. T. Kocejko, "Device which will allow people suffered from Lateral Amyotrophic Sclerosis to communicate with the environment", MSc thesis, January 2008. G. A. Myers, K. R. Sherman, L. Stark, "Eye Monitor", IEEE Computer Magazine, Vol. March 1991, pp. 14-21.

6. C. Collet, A. Finkel, R. Gherbi, "A Gaze Tracking System in Man-Machine Interaction", Proceedings of IEEE International Conference on Intelligent Engineering Systems, September 1997.

7. B. Hu, M. Qiu, "A New Method for Human-Computer Interaction by using Eye-Gaze", Proceedings of IEEE International Conference on Systems, Man, and Cybernetics, October 1994.

8. P. Ballard, G. C. Stockman, "Computer operation via Face Orientation", Pattern Recognition vol. 1. Conference A: Computer Vision and Applications, Proceedings., 11th IAPR International Conference, 1992.

9. https://www.mathworks.com/matlabcentral/file exchange/ 247-vfm

10. Eye-Controlled Mouse Cursor for Physically Disabled Nanda kumar. M, G. Hruday, K. Lohith Raj, N. Satwik