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EYE CONTROLLED MOUSE CURSOR

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Abstract - This system is bringing a user-friendly face between people and the computers. It exploits various image processing strategies including face detection, eye extraction, conversion of eyeballs movements in real time into an unobtrusive, human-machine interface. This piece of software utilizes a standard webcam for feeding with an image. Mouse cursor control can be done by facial movement by moving head to the left, up, down and to the right and through eye blinking eye control mouse events are achieved. The computer speaks directly to the parts of the brain responsible for visual and motor activities translating numbers, letter and speech sounds into the correct neural signals enabling a one to communicate, store, access and retrieve information, switch channels for various communication activities like sending or receiving messages, browsing internet, watch favourite TV shows or movies etc. The biggest part of the algorithm provides the best eye position result with the aid of decision tree so that eye motion is detected and mouse gesture is translated. Apart from that, it makes it possible to load and erase the apps by way of blinking eyes.

Keywords--
IMouse; eyes gesture controlsystem; eye tracking systems; mouse cursor; eye mouse; webcam; eyemovement .

I. INTRODUCTION

The center of the innovation is making this kind of environment for disabled people that are moving anything except their eyes. Theses people, as for them, eye movement is the only tool for communication with whoever is outside the world by using the computer. In addition, this analysis will aim in the development of dedicated tools which will convey commands to the computing system using solely their eyes. Human Computer Interaction is more and more an inseparable constituent of our usual routine. There is no single method which can tell the mind where to focus on.

Scope of the Project:

The eye gesture method is exclusively designed for human eyes, where the action of seeing is directly translated to commands and consequently the system performs. Eye Gesture is a real-time system that takes advantage of users eye movement to move a mouse cursor right and left. In respect with taking go for the cheaply built online camera which will act as a laptop virtual human interaction device and has a

hand-free interface that will be of great beneficial for persons who are physically handicapped is the main focus of the technique. As the system is in action, the user authentication process is needed, which is to match the authenticated users' faces with their own. If there is authentication of the user, the user can only afterwards be able to login.

Objective of the Project:

1. To create a interactive device cost-effectively.
2. To present a hands free interface between computer and human especially for physically disabled person.
3. To reduce human intervention.
4. To give 100% comfortable environment for disable people.

II. LITERATURE SURVEY

A literature review is critical in this process since it provides an outline of scholarships that have been done in general, the current education, and knowledge of the area where new research is yet to recur. Consulting literature in this task should allow you to understand who has already done similar researches and reveal what is the state-ofthe-art level of analysis in the field of your research. Resources were studied for determination of the aims, the comprehension of the theory and if not, understanding of the research category, planning the data collection approach, and defining the terms that are at the heart of the research , defining the foundation of the determination. The most critical task is to clarify the research domain in which the two interconnected human processes of face detection and cursor movement of a mouses are operating. Nowadays, this eye-tracking technique has attained the utmost significance in psychology, marketing and user interfaces, and it is possible due to the existence of an eyetracking sensor that tracks the direction and location of human eyes . The field of eye tracking has been around for a while, but early in its history of the eyetrackers were mainly used either to measure and examine the existence of human eye movements in a lab setting or the movements of the human eye wereapplied for particular tasks of interaction with computers (HCI). Due to the exorbitant price tag on eye trackers ten years ago- which amounted to around 30,000 – there was no way the company could have thought of integrating it into actual user's design. Many companies, such as Tobii and Gaze Point, have taken advantage of the motivation for more affordable and improved components for eye movement interactions by placing the Eye X and the GPX3 trackers in the market respectively.

Use batch logic to discover for eye (Iris) detection. Use our AI to write for you about any topic! Enjoy Technique of the identification of the iris is shown to static images. This technique has the essence of working when perceived from whether the left, right or centre perspective. If the iris is at the top or the bottom of the scene such as in the case of eyeglasses , it won't work. There is no guarantee of a real-time working of the machine. Keen to continue my study of professionalism, I want to share with class members my view about the human computer interfaces that monitors the human eye movements. Ansys is the perfect example of this type of program the features of which are The expression of the specific rotation and the direction of the iris will mediate controlling the device, followed by placement of the mouse cursor. Certain advancements in field of image recognition , and eye tracking have been made. On the one hand, software has been built into both systems on the other hand. The group of signal processors having the broad input of image or video-like visual object, as an output has image or the particular parameters again. Eye monitoring technology is another kind of biometric security implementation in digital image analysis. Note that usually the term eye tracking can mean eye movemement, processing of an image or processing of the image through the system input data and the data obtained. With this in mind, this project provides a solution for those who are cumbersome with using mouse-handheld. Thanks to colours, the mentioned picture will show a real picture on a real-time analysis in this article.

However, this number is very high for the people with same conditions who are not able to use computers for basic things like text messaging, internet browsing, playing online interactive games or just watching films. The prior research established that eyes place is very favorable for computers because eyes, even during ordinary human interaction with computers, are in a state of transition. These patients, whose utilization of the relevant eye motions may be acceptable to be brought back to computer use. The I-Mouse gesture control system will be operated by human eyes alone. This does not require any other user input. The project's purpose is to create a simple, free, and configurable eye-gesture monitoring system using webcam-computer technology that accurately tracks eye movements and set controls for eye-based tasks. It has the ability to imbed the pupil from the users' face, and it tracks the movements of the person. In order to be used efficiently and become a part of daily routine like

other apps, it needs to be accurate and relevant in current real-time.

EXISTING SYSTEM

Some researchers have been attempting to establish techniques that help the elderly communicate with devices. Signals such as brain electro encephalography(EEG),facial muscle signals(EMG) and electrooculogram (EOG) have been used. Other techniques include monitoring of the limbus, pupil and eye/eyelid, contact lens system, corneal relationship, reflective pupil relationship and measurement of head motion.These approaches include the application of attachments and electrodes to the ear, making them impractical. Many high-end techniques focused on eye movement monitoring to monitor computers were extremely costly and not available to those who wanted them.

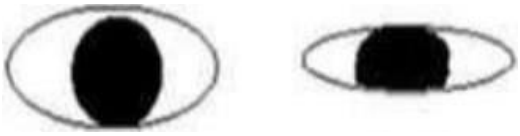
PROPOSED SYSTEM

The input of eye movement function is present in the individual human eye (Pupil). In case a person looks at the crosshair it means that this point is the spot where the input is. This is what allows to set up the ortho and initiates gaze tracking. The base point defines the beginning of the plot. Thus, when a person's eye moves towards the place where the eye has started the movement of a cursor stops. It is used in socalled VR headsets, And it increases…

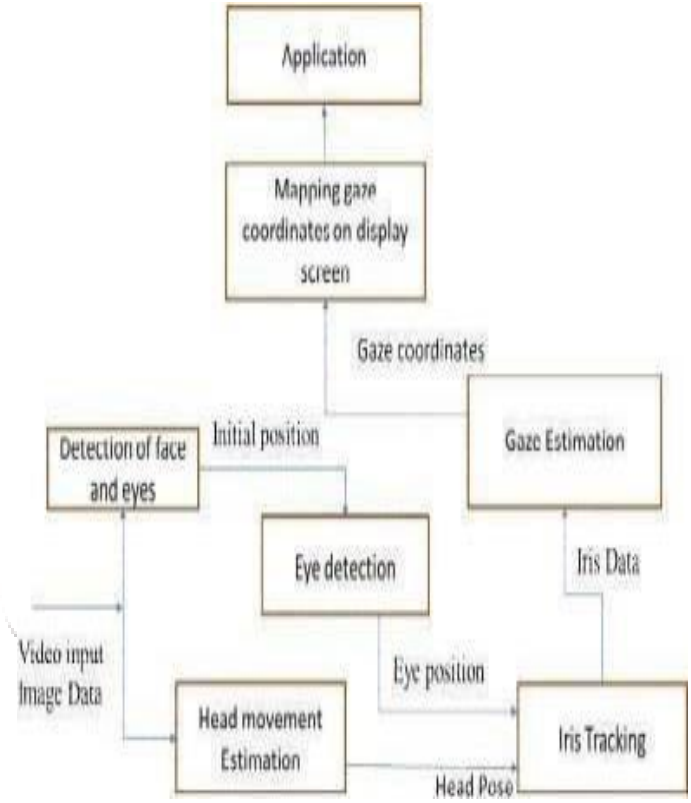
- Accuracy
- Productivity Reliability
- Consistency
- Compliance

- **Left and right movement of the pupi**l: Horizontal eye pupil movement can be achieved using circular artifacts.If the pupil moves in the left direction, the mouse pointer moves in the left direction and right.

- **Up and down movement of the pupil:**Vertical eye pupil movement can be achieved by using pupil scale. The eyes are in slightly half-closed state when gazing downwards. This phenomenon can be used to guide the step from top to bottom of the mouse pointer.



III. SYSTEM ARCHITECTURE



The system is divided into three components:
1) Face detection and tracking component 2) Eye tracking component 3) Gaze to screen coordinates mapping component .The proposed system uses a camera with 20 mega pixels(480pixels-interpolated 20M pixels still image resolution, interpolated 2.1M pixels video resolution) to capture the images of the user for iris tracking and gaze estimation. The flow chart of the proposed system is depicted in above figure. The first image is used for initial face location and eye detection. If any one of these detection procedures fails, then go to the next frame and restart the above using values are stored in database. Then, the

gazeposition is computed by using calibration points on the screen after that using the eye ball model comparison is done between the input images with the stored database image. The accuracy and precision are measured by looking at the calibration points on the screen.

Process flow of proposed method:

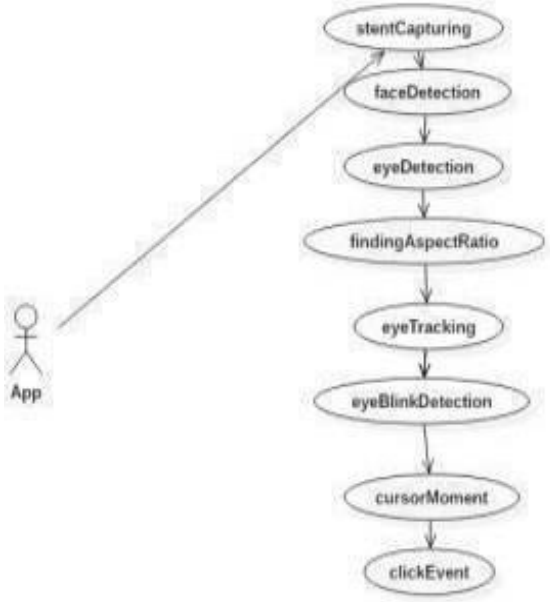
The process flow of the proposed method that consists of three processes: loaded with facialfeature detection/tracking, eye model estimation, iris tracking, and gaze estimation making use of calibration points. The image face-feature featuredetection/tracking processes detect facial features which are used in both model estimation (of face and eye), and gaze estimation. Initially, we find the face position in the image using a face detection approach designed on the concept of Viola- Jones which uses a perplex network of Haar features to detect objects in images. The process of estimating the eye model and iris tracking in this context is divided into two stages, i.e., capturing them pictures for face/eye after that using Haar cascade object detect or extracting of suitable features is used.

Eyes Detection method:

The particular function detection of the gaze, we face the task of eye matrix localization, the extraction of the features required. The undeniable prerequisite while building an IRIS tracking and gaze detection system are the exact eye sockets detection. This task can be efficiently handled by Haar-like object detectors. It enables an object classifier to depend upon only a subpart of an representative image to handle the whole image containing the object. The eye image is obtained with a special camera, looking at it from a small distance and of very high resolution. This gives Iris pictures a nice pixelated pattern.

IV. METHODOLOGY

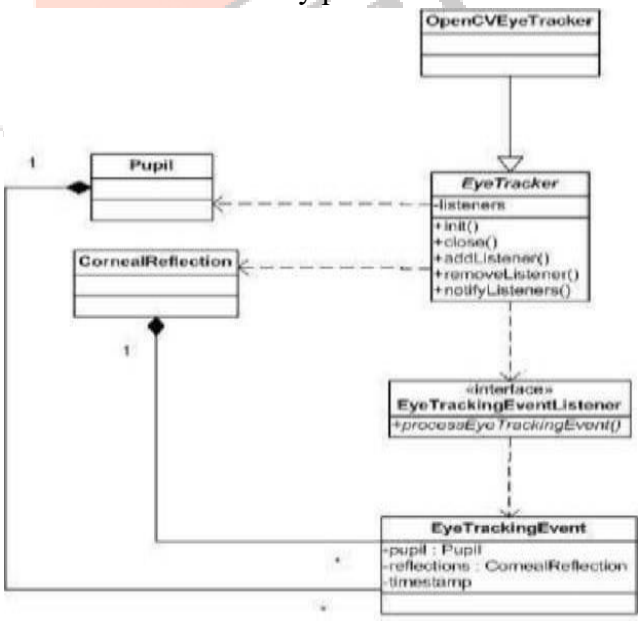
A use case diagram is used to represent the dynamic behavior of a system. It encapsulates the system's functionality by incorporating usecases,



actors, and their relationships. It models the tasks, services, and functions required by a The use diagram depicts the high-level functionality of a system and also tell show the user handles asystem.

CLASS DIAGRAM

Class diagrams are the blueprints of eye mouse systemare used to model the objects that make up the system,to display the relationships between the objects, and to describe what those objects do and the services that they provide.



➢ HARDWARE INTERFACE

The system is going to be ready to perform the task and the project can be switched to pycharm this way. Due to the support of pycharm, these projects are able to run well on different computers.The pycharm monitors.

➢ **SOFTWARE INTERFACE**

- **Pyautogui**: mainly used to operate mouse event simutils.

Python implements such helpful and intelligent libraries, which gives a programmer the chance to save a lot of time. Pyautogui is one of apex software products that has a collection of soreliable tools.

This is the OpenCV + convenience functions library using it for translation, rotation, resizing.

- **OpenCV2** :OpenCV is a cross-platform library.That shall be used to develop the real-time computer vision applications. system/subsystem of an application.

V. FUTURE ENHANCEMENT

1. **Enhanced Accuracy and Precision:** Continuous refinement in eye-tracking technology to improve accuracy and precision is essential. This includes reducing latency between eye movements and cursor response, minimizing calibration errors, and enhancing tracking algorithms to adapt to various lighting conditions and user-specific traits.

2. **Expanded Application Domains:** While the initial focus might be on controlling mouse cursors and basic interactions, exploring broader application domains can significantly enhance the utility of eye-tracking systems. This could involve integrating eye-tracking technology into virtual reality (VR) and augmented reality (AR) environments, medical applications such as assistive devices for individuals with disabilities, or even industrial applications for hands-free control in hazardous environments.

3.**Gesture Recognition Integration:** Beyond eye movements, incorporating other forms of gestural input, such as hand gestures or facial expressions, can provide a more comprehensive and intuitive interface. This fusion of multiple modalities can enhance user experience and enable more natural interaction with digital systems.

4. **Adaptive Interfaces:** Developing interfaces that adapt dynamically to users' eye movement patterns and preferences can improve efficiency and user satisfaction. Machine learning algorithms can analyze users' behavior over time and customize the interface layout, interaction methods, and feedback mechanisms to better suit individual users.

5. **Accessibility and Inclusivity:** Ensuring that eye-tracking technology is accessible to all users, including those with disabilities or special needs, is paramount. This involves not only technical considerations such as compatibility with assistive technologies but also addressing potential ethical and privacy concerns related to data collection and usage.

6. **Usability Studies and User Feedback:** Conducting extensive usability studies and gathering feedback from users across diverse demographics and usage scenarios can provide valuable insights for refining and optimizing eye-tracking systems. User-centered design principles should guide the iterative development process to prioritize user needs and preferences.

7. **Ethical and Privacy Considerations:** Proactively addressing ethical and privacy concerns, such as ensuring informed consent, protecting sensitive data, and minimizing the risk of unintended consequences or misuse, is crucial for fostering trust and acceptance of eye-tracking technology in society.

By addressing these areas of improvement, eye-tracking technology can continue to evolve as a powerful tool for hands-free computing and human-computer interaction, unlocking new possibilities for innovation and enhancing user experiences across various domains.

VI. RESULTS & CONCLUSION

The principal purpose of the developing this project is to deliver cursor control in hands free manner which help to decrease the dependence on mouse moreover we mainly focused physically disabled persons who cannot use their hands to operate the system. It gets poor in dark light environment. This writing focus on a computer vision algorithm which

is built on an idea. The low cost, readily-available solution of eye tracking has been considered. And there are many areas where eye gaze trailing can be applied like human-machine interaction, appliance operation, usability studies, and marketing effectiveness. The quality of images and their lighting conditions affects the performance of the option extraction algorithms in a way that their performance is lower when there is a bad lighting condition. Highered image quality is vital for the proper operation of the vision algorithms of laptops. Sharpened (Refined) Pre-Processing algorithms should be integrated to suppress complex variations of the light and webcam resolution should be multiplied to decrease the pointer size. New feature based on the head-pose will make it possible for the user to move freely while messing with the system. Tying gaze estimation together with gaze projection is going to be valuable so it'll make gaze projections more accurate compared to before. collection of gaze estimation is to be sure that users will be told by way of usage statistics and will make gaze forecasts. Particle filters are to be adapted to gaze estimation because it is quite straightforward and similar to the problem of gaze estimation.

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