VIRTUAL MOUSE USING EYE TRACKING

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Abstract:

This research is a novel algorithm that uses the iris movement to control the mouse movements of a computer. The iris position will be located first and it will be mapped on the computer screen at a certain position. This can be useful for the physically handicapped individuals to communicate with the computer and also do the work required. With the help of the Iris movement we can move the cursor up and down as well as left and right. It also helps the person to make right and left clicks of the mouse by blinking the eyes which helps to open the files and also close them. This algorithm will also help a person to scroll the pages down and up.

1. INTRODUCTION

Originally computers were used to solve mathematical problems and word processing. However, computers have become important in the last few years for every aspect of our daily activities. Such behaviors vary from technical tasks to personal uses like surfing the internet, shopping, socializing and entertainment. Computers are built to be readily available to ordinary people. However, computer use is a very difficult activity for people with serious physical disabilities, such as cerebral palsy or amyotrophic lateral sclerosis. Many human computer interface (HCI) research studies have been carried out to enhance the relationship between the user and the computer system. Some of those are only applicable to ordinary citizens. Such forms of interfacing include a touch sensitive screen, forms of speech recognition and many more. Despite the success of those methods, they were not appropriate for individuals with physical disabilities.

Many researchers have sought to establish methods to help the impaired communicate with computers through the use of signals such as brain electroencephalography (EEG), facial muscle signals (EMG), and electro-oculogram (EOG). 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 highly costly and not available to those who wanted them. The method mentioned in this paper is distinctive, because we did not use electrodes, infra rot, or any other light source to monitor the eyes, unlike existing methods.

The only hardware needed is a Desktop or laptop along with a webcam, making it both practical and feasible. The software is designed to process these frames individually at very high processing speeds by taking consecutive user snaps from the camera and to compare the iris shift in each frame with respect to the initial frame. Until the eyes can be monitored the picture undergoes multiple processing stages. The iris shift is determined after obtaining the processed image, and the program prompt.

2. LITERATURE REVIEW

Eye tracking technology has played an increasingly important role in psychology, marketing, and user interfaces, centered on an eye sensor that tracks the orientation and locations of the eye. Eye trackers have existed for a number of years, but early in the history of the field of eye tracking, the use of eye trackers was primarily limited to laboratory experiments to analyze the existence of human eye movements, instead of using such movements as an actual control mechanism within a human(HCI). Because the cost of eye trackers a decade ago was around 30,000, it was too costly to consider using actual user. In recent years, many high- companies have developed low- eye trackers with the production of better and cheaper components for gaze interaction, such as Tobii's EyeX tracker, Gaze Point's GP3 tracker and the Eye Tribe Tracker**.[1]**

Batch mode is employed for human eye (Iris) detection. The technique for tracking iris is applied on static images. This technique works clearly whether the iris orientation is left, right, or centre. If the iris location is up or down, this won't work. The machine doesn't work in real time. Handling blinks and close eyes isn't professional. This paper aims to develop and introduce a network of human computer interfaces that monitors the orientation of the human eye. The specific motion as well as direction of the iris is used to control the device by subsequently positioning the mouse cursor. **[2]**

An eye tracker has documented eye movement of students during debugging to examine whether and how high and low-performance students behave differently during debugging. Sequential review of the software codes was conducted to show important sequence of the areas studied. Such important gaze path sequences were then contrasted with those of students with varying debugging results. Results indicate that high-performance students tracked programs in a more abstract manner while debugging, whereas low-performance students appeared to stick to a line-by-line sequence and were unable to easily extract the higher-level logic of the programme.**[3][A]** Real-time driver interruption detection is the cornerstone of many interruption countermeasures and important for developing a driver-centered driver support system.This paper investigated semi-supervised methods for driver disturbance identification under real driving conditions to minimize the expense of marking training Laplacian vector support machine and semi-supervised extreme learning software were tested using eye and head movements to identify two driver states: attentively and cognitively distracted.**[3][B]** HCI uses mouse, keyboard as an input device typically, but this paper provides a hand-free interface between machine and human. Here offering a novel concept to use human eye movement to guide computer mouse cursor. It regulates movement of the mouse by influencing the location where eyesight is focused automatically. The project consists mainly of three parts, Image Capture, Image Processing and Cursor Control, respectively. Using Hough Transform, after capturing image from webcam, the pupil's shape is recognized and the center coordinate helps to decide the exact position on the screen where the user often looks to coordinate

would direct the computer mouse to shift specific location. This device is also effective in addressing the disabled's HMI problems, and it can provide them with a way to interact with the outside world.**[3][C]**

With the advancement of technology, image processing has a very wide area of use. Some of these applications too is the health sector. Some progress on image recognition and eye tracking has been made. Has software implementation in both systems. Image processing, a subdivision of the signal processor, can consist of an image or video-like visual object as an input and output as an image or specific parameters thereof. Eye monitoring is also more of a method in image processing. Generally, eye tracking refers to eye movements, image processing, or image processing through the software input and the data collected. This project was created for people who are inefficient when it comes to using hand-held mouse. With the aid of colours, a real-time view can be obtained in this thesis analysis. **[4]**

The key feature of today's e-learning is enhancing teaching strategies by using technology-dependent resourceful tools to enhance teacher-student contact and interaction. To this end, we have proposed a product that aims to be a virtual marker and also has additional benefit that it contains features of a Mouse. The new Virtual Marker is changed to be more than a marker and also serve as a mouse pointer giving it the benefit of all of a mouse's functions. In this paper, we introduced a Virtual Mouse hardware implementation that has an improvement in the performance of the current "Virtual Marker," by making it highly sensitive in real time**.[5]**

A significant number of people with neuro- disorders or those who are disabled by injury can not use computers for simple activities such as sending or receiving messages, surfing the internet, watching their favourite TV show or movies. A previous research study concluded that eyes are an excellent candidate for ubiquitous computing because they move during contact with computer machinery anyway. Use this underlying information from eye movements may allow these patients to be brought back to using computers. We propose an imouse gesture control device for this function which is controlled entirely only by human eyes. The aim of this work is to develop a generic open-source eye-gesture control system that can effectively track eye movements and allow the user to perform actions mapped to specific eye movements / gestures using webcam computers. It senses the pupil from the face of the user, and then monitors their motions. It needs to be accurate in real-time, so that the user can use it easily like other everyday apps. **[6]**

3. EXISTING SYSTEM

Some researchers have been attempting to establish techniques that help the elderly communicate with devices. Signals such as brain electroencephalography (EEG), facial muscle signals (EMG) and electro oculogram (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.

4. METHODOLOGY

4.1 Face Detection Methods

Face detection is the step stone for all facial analytical algorithms, including facial orientation, facial mapping, face recognition, facial recognition / authentication, facial expression tracking / recognition, gender recognition.

4.2 FEATURE BASED METHODS

The characteristic-based approach is to identify faces by extracting facial structural features. It is first classifier and then used to distinguish between facial and non-facial regions. The aim is to transcend the limitations of our instructive awareness of faces. This method is divided into many phases and also images of several faces.

4.3 EYE DETECTION APPROACHES

There are some detection methods that undergo various stages, such as the positioning of the face and eyes from different locations.

4.3.1 Regression Approach

This minimizes the difference between expected and real eye positions.

4.4 EYE TRACKING TECHNIQUE

4.4.1 Pupil Tracking

Pupil tracking is a gaze-detection technique that is often used in combination with other methods. The eye is much more than a tool for moving the cursor at high speeds. Input of eye movement is obviously faster than input of any factors. Until any mechanical pointing system is controlled, the user typically looks at the destination to which he or she wants to travel.

4.5 CONTROLLING THE MOUSE POINTER

The input of eye movement is taken from the individual's pupil. If a person looks at a center mouse pointer, that point would be taken as the input point and it sets that location as the basis for gaze tracking and it begins moving in the direction of the person's eye movement and the cursor stops moving when the person's eye hits its initial place.

4.5.1 Left and right movement of the pupil

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 as well, and the same happens in the right direction as well.

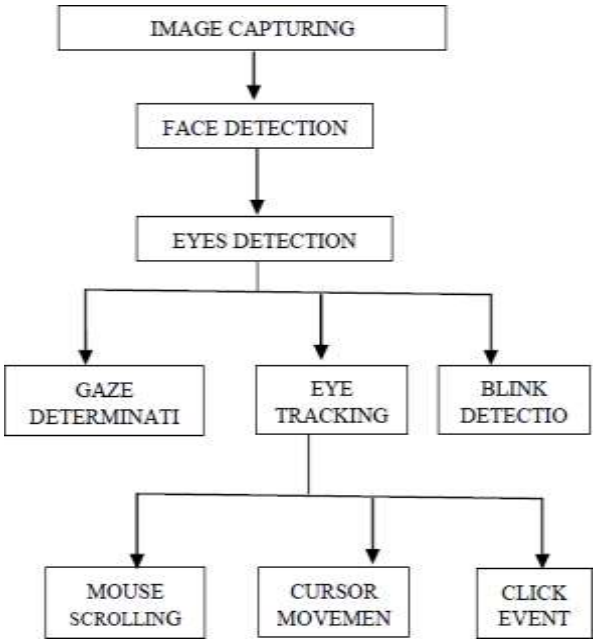
4.5.2 Up and down movement of the pupil

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.

4.6 CONTROLLING THE MOUSE CLICK EVENTS

A blink of an eye can be done to the mouse click case. As the mouse pointer begins to shift the eye pupil's path if a person decides to perform a chosen event then the person blinks the eye mouse pointer executes the click event.

5. WORKING



The user will sit in front of the personal computer or laptop screen, a small video camera positioned above the panel to monitor the eyes of the user. The computer analyzes the eye's video image on an ongoing basis and decides where the user views the device. There is nothing connected to the head or body of the customer. The user stares at the key for a given time span in order to "pick" any key, and to "press" any key, the user only blinks his eye. Calibration procedure isn't needed in this framework. Data for this method is eye-only. There is neither external hardware attached nor needed.

6. CONCLUSION

Therefore this model helps the people especially the handicapped to use the computer easily using their eye movements and the webcam of the system .By keeping the track of their eye movements this model helps the people to left click and right click the mouse pointer .In short it makes the eyes of the person as the mouse pointer .The person can also scroll up , scroll down and also open or close the files that they want.

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