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A Review Paper on Retina Based Cursor Movement Control

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Abstract: ***In this paper a new system exists which uses human iris for computer interaction. With vast development in recent technologies, modern computing systems are becoming more flexible. Modern computers are capable of processing millions of instructions per second. In such situation, traditional input devices such as mouse or keyboard are relatively slow. This can overcome by human interaction with the computers.***
With the innovation and development in technologies, motion sensors are capable of capturing positions and natural movement of human body. Due to this a new way for interacting with computers is possible. Hence keeping all this in mind, we propose a system, which is untouched & fast communication system. The system would be capable of capturing eyeball movements which is responsible for
Controlling the cursor. The system processes the data from the camera feed, and calibrates the parameter interfaces in accordance to the user. The system then performs computer vision related algorithms to determine the location of the use's pupils and eyeballs so as to implement Natural eye-computer Interaction
Keywords: Human Iris, Cursor Control, Electro-oculography, CAMSHIFT algorithm, Limbus Limbus Tracking, Pupile Pupil tracking.

I. INTRODUCTION

Now a day human addicted for efficient and quick results for accessing various tasks in day to day life. As results technologies are developing in such a way to satisfy human needs. The computers which are introduced have been improved and can give us more efficient result by replacing eyes in place of mouse. Here what we are doing is that using eyes gaze as a cursor of the mouse by using eye detection and tracking. In this we are using webcam to detect iris which then converted into gray scale format will help us to detect and track the eyes. After tracking we will perform some operations such as click, double click, right click, left click etc. This will save our time by doing tasks rapidly as compare to mouse. This will also be helpful to those people are physically disabled so that they will able to use it.

II. LITERATURE REVIEW

[1] In this paper they intended to be used by disabled people who face a lot of problems in communicating with fellow human beings. This will help them use their voluntary movements, like eyes and nose movements to control computers and communicate through customized, educational software or expression building programs.
Their proposed algorithm tracks the motion accurately to control the cursor, thus providing an alternative to computer mouse or keyboard. Primarily approaches to camera-based computer interfaces have been developed. However, they were computationally expensive, inaccurate or suffered from occlusion.

A. Electro-oculography

(EOG) is a technology where a electrode around user eye record the movement. The problems with this technique is that for using this the disabled person needs someone help to put it and also the system is quite expensive.
Another example is CAMSHIFT algorithm uses skin color to determine the location and orientation of head. This technique is fast and does not suffer from occlusion; this approach lacks precision since it works well for translation movement but not rotational movement.
[2] An eye tracker is a device for measuring eye positions and eye movement. In this study, the selection of the technique rests with the actual demands of the application. During the analysis phase of their research, three techniques were analyzed; the Limbus tracking, Pupil tracking, and third tech is Electrooculography. Each technique has its own Strong points and drawbacks.

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1) Limbus Limbus Tracking explains a method of tracking the eye using the limbus. The limbus is the boundary between the white sclera of the eye and the darker iris.

2) Pupile Pupil tracking is a method of gaze detection that is commonly used often in conjunction with other forms of tracking. There are several reasons for this, but the main advantage is the notion of the “bright spot”. Similar to the case of red eye when taking flash photographs at night, infrared can be used in pupil detection to create a high intensity bright spot that is easy to find with image processing. This bright spot occurs when infrared is reflected off the back of the pupil and magnified by the lens.

3) Electro-oculography The third category uses electric potentials measured with electrodes placed around the eyes. The eyes are the origin of a steady electric potential field, which can also be detected in total darkness and if the eyes are closed. It can be modeled to be generated by a dipole with its positive pole at the cornea and its negative pole at the retina. The electric signal that can be derived using two pairs of contact electrodes placed on the skin around one eye is called Electro-oculogram.

[3] Eye tracking is somewhat unusual as a field, in that it has been the subject of intense research for decades, and yet never reached the level of accuracy, usability and cost- efficiency to become a widespread means of human-computer interaction. Countless times some new development in eye tracking has been heralded as the spark to start an HCI revolution, and each time that revolution inevitably failed to materialize. These failures led researchers to explore new directions and ideas, to the point that there are currently three major techniques which is use for this project.

First is a biological measurement technique called an Electro-Oculogram (EOG). The device consists of pairs of electrodes attached around the eye Inside of the eye is an area called the retina, which carries an electric charge gradient. When eye rotates, this charge gradient produces a potential difference between opposite sides of the eye, which can be detected by the electrons. Unfortunately, this signal is easily corrupted and tends to drift, making accurate detection difficult..

Second is the "Dark Pupil/Light Pupil" technique using infrared light? Under infrared illumination, the pupil becomes very white, almost the exact opposite of its visual-spectrum appearance. By capturing both the dark and light pupil images, the high contrast can be used via image subtraction to evaluate the pupil location with very high accuracy. Because they wanted to leverage more eye data than just pupil location, and because they wanted to use widely available equipment as much as possible, they chose not to use this method.

The final method uses plain visible-light cameras and computer-vision techniques to extract details about the position of various interesting features. The growth of the computer vision field in the last ten to fifteen years has led to a multitude of techniques that are capable of performing such analysis. Because of the variety of options, the ability to use ordinary cameras, and some group member experience in computer vision, we decided to use these techniques for our project.

[4] In iris tracking, the motion and direction of iris is detected for designing and implementing an eye tracking system for developing a human computer interface. In this paper batch mode is used for iris detection. The system allowed the users to interact with the computer system by using their eye movements. The system accurately located and detected the eyes in images with different iris positions and used this information to move the cursor accordingly as this iris has tracking method has been conducted on static images so it provided a higher degree of accuracy. The developed system is restricted to work only when the direction of iris is left, right or center. It doesn't work when the position of iris is up or down. The system is not expanded to work in real time and is not able to handle blinks and dose eyes.

III. SYSTEM DESIGNS



Fig. Physically Challenged Person operate cursor using his eye moment

IV. CONCLUSION

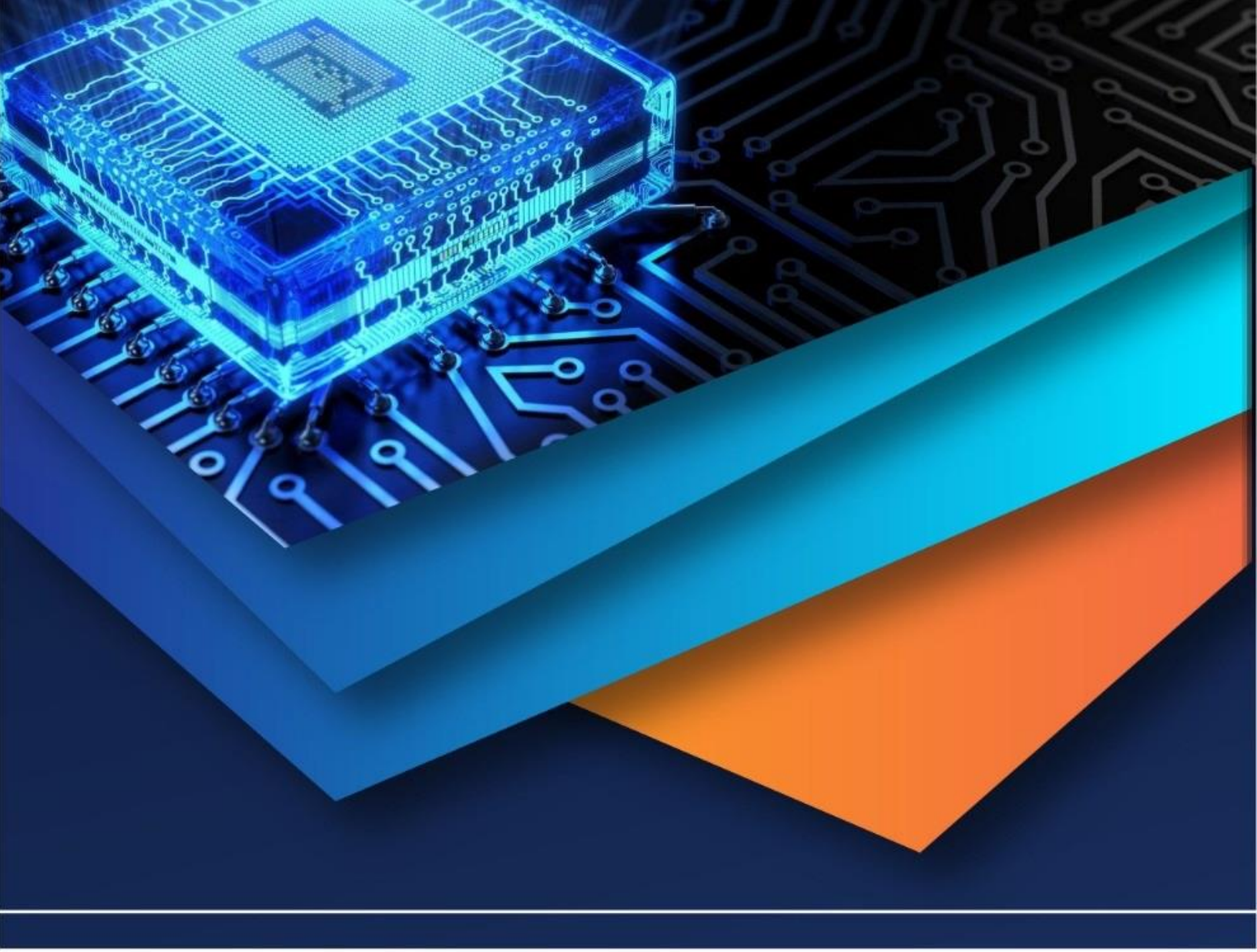
This paper focuses on providing the overview about the various eye based cursor movement techniques developed or proposed. Hence we discuss & study the above Literature survey for developing low-cost based system aims to handle & also affordable for the majority of the physically challenge subjects. Thus we concluded this paper which shows how we can access our computer machine with respect to human iris.

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