EYE-BALL CURSOR MOVEMENT CONTROLLING USING OPENCV IN PYTHON

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ABSTRACT

The Eye-Ball Cursor Movement project proposes an innovative approach to overcome the limitations of traditional input devices. By using OpenCV, the system analyzes live video feed from a webcam to detect and track the user's eye movements accurately. The Eye-Ball Cursor Movement project proposes an innovative approach to overcome the limitations of traditional input devices. By using OpenCV, the system analyzes live video feed from a webcam to detect and track the user's eye movements accurately**.** An individual Human computer interference system is being introduced. In olden times, as an input device the mouse and keyboard were used by human computer interference system. Those people who are suffering from certain disease or illness cannot be able to operate computers. The idea of controlling the computers with the eyes will serve a great use for handicapped and disabled person. Also, this type of control will eliminate the help required by another person to handle the computer. This measure will be the most useful for the person who is without hands through which they can operate with the help of their eye movements. The movement of the cursor is directly associated with the of the pupil. Hence our first step would be detecting the center of point pupil. This process of pupil detection is implemented using the OpenCV. Index Terms—Human Computer Interaction (HCI), Eyeball movement, Computer, OpenCV.

I. INTRODUCTION

The computer technologies are growing rapidly, the importance of human computer interaction becomes more notable. Some persons who are disabled cannot be able to use the computers. Eye ball movement control mainly

used for disabled persons. This eye controlling system with the computers will make them to work without the help of other individual. Human-Computer Interface (HCI) is focused on computer technology to provide interface between the computer and the human. There is a need for finding the similar technology that makes the effective communication between human and computer. Human computer interaction plays the vital role. Thus, there is a need to find a method that spreads an alternate way for making communication between the human and computer to the individuals those who have disablement and give them an equivalent space to be an element of Information Society. In recent years, the human computer communication is attracting the attention of various researchers across the world. Additionally, the proposed algorithm could be used in remote and resource-limited settings where access to specialized medical professionals may be limited.

II. EARLIER WORK

Before the advent of the Eye-Ball Cursor Movement project, the prevailing landscape of human-computer interaction primarily relied on conventional input devices such as keyboards, mice, touchscreens, and voice recognition systems. While these tools have been effective for many users, they often posed significant challenges for individuals with physical disabilities or motor impairments, hindering their ability to engage with technology seamlessly and independently.

The traditional input devices, though functional, were not universally adaptable to the diverse needs of users with limited motor control. For example, individuals with conditions like quadriplegia, cerebral palsy, or severe arthritis found it exceedingly difficult, if not impossible, to operate a conventional mouse or keyboard. This presented a profound barrier to accessing digital content, communicating, or utilizing software applications. Assistive technologies did exist to address these challenges, but they often came with limitations of their own. Alternative input devices like joystick controllers, sip-and-puff switches, or specialized touch interfaces offered solutions to specific disabilities but were not always intuitive, efficient, or universally accessible across different contexts and environments.

Drawbacks:

- Calibration and Accuracy
- Latency
- Variability in User Behavior
- Complex User Interfaces

III. PROPOSED METHOD

The methodology devised for the Eye-Ball Cursor Movement project encompasses a well-defined sequence of stages, each pivotal in realizing the project's overarching goal of enabling mouse control through eye movements for individuals with physical disabilities. The project's foundation rests on a comprehensive system architecture that outlines the hardware and software components required, including the integration of a suitable webcam for real-time video feed capture and adept computing hardware for image processing.
Data acquisition and preprocessing form the initial steps, where live video streams are captured and subjected to noise reduction, image enhancement, and stabilization techniques to optimize video quality. The crucial task of eye detection and tracking follows, employing OpenCV's versatile computer vision capabilities to identify the eyes and track their movements across successive frames.
The Eye ball cursor movement proposes an innovative approach to overcome the limitations of traditional input devices. By using OpenCV, the system analyses live video feed from a webcam to detect and track the user's eye movements accurately. The proposed system will convert the eye movements into cursor movements, effectively replacing the traditional mouse. This hands-free control method can significantly enhance the accessibility and usability of computers for individuals with motor disabilities.

Advantages:

- Accessibility
- Efficiency
- Gaming and Entertainment
- Medical and Clinical Applications
- Training and Simulations

IV. METHODOLOGY

Data Collection: Collect a dataset of eye images for training your eye detection model. You can use a webcam to capture images of your eyes in various lighting conditions and positions.

Preprocessing:

Preprocess the collected images by resizing, normalizing, and enchancing contrast to ensure consistency in the dataset.

Training the Eye Detector:

Train an eye detection model using machine learning techniques. You can use tools like Haar cascades, Dlib's face and landmark detection, or deep learning-based methods like Convolutional Neural Networks (CNNs).

Real-time Eye Tracking:

Use the trained eye detector to identify and track the user's eyes in real-time video feed from the webcam.

Cursor Control Algorithm:

Develop an algorithm to map the movement of the user's eyes to cursor movement on the screen. This algorithm will calculate the cursor's new position based on the detected eye movements.

Cursor Interaction:

Implement cursor interaction mechanisms, such as mouse clicks or gestures, based on predefined criteria (e.g., blinking or prolonged gaze).

User Interface:

Design a user interface that displays the camera feed, the cursor's position, and any relevant feedback or controls.

Calibration:

Implement a calibration process to ensure accurate eye tracking. During calibration, the user may be asked to focus on specific points on the screen, allowing the system to learn their gaze patterns.

Optimization:

Optimize the code and algorithms for efficiency, as real-time eye tracking requires computational resources.

Integration:

Integrate the eye-controlled cursor movement system with the operating system to enable control of the mouse cursor and other system functions.

Deployment:

Deploy the system for the intended users, whether they are individuals with disabilities, professionals in specific industries, or gamers

V. RESULT AND ANALYSIS

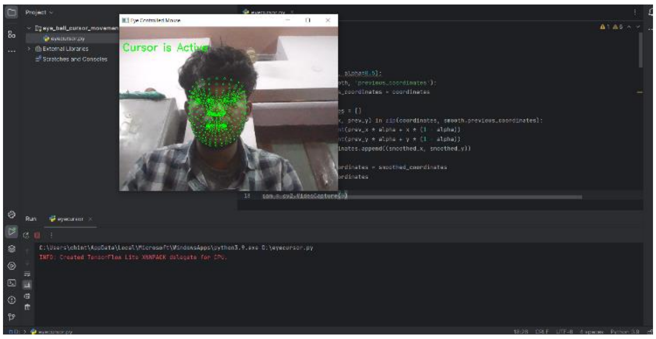

Figure 1: Cursor is Active

Figure 2: Cursor is not Active

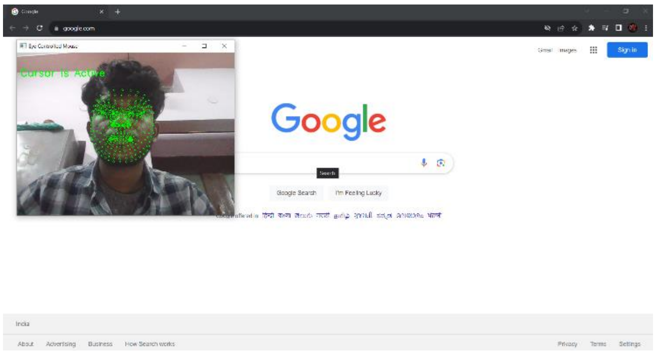

Figure 3: Moving Cursor

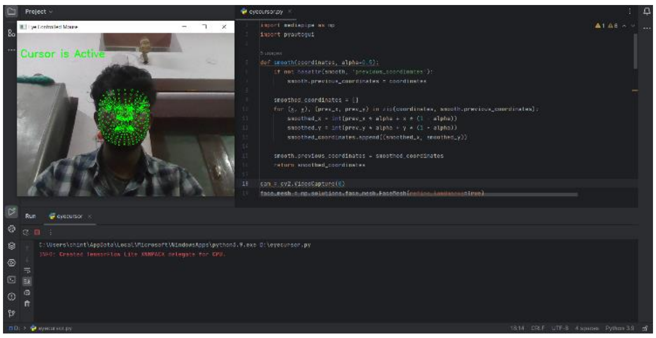

Figure 4: Clicking

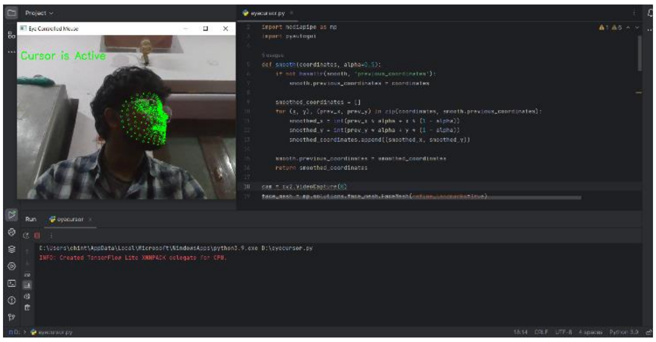

Figure 5: Cursor is Active on any Side

VI. CONCLUSION

In conclusion, The Eye-Ball Cursor Movement Controlling project demonstrates a novel application of OpenCV to create a hands-free mouse control system for individuals with motor disabilities. By harnessing computer vision techniques, the proposed system accurately tracks the user's eye movements, effectively replacing the traditional mouse with a more accessible alternative. Through the successful implementation of the various modules, the system provides a practical and affordable solution to empower users with motor impairments, improving their overall computer interaction experience. This project offers a hands-free mouse control system, primarily aimed at individuals with physical disabilities or motor impairments, empowering them to navigate and interact with computers using their eye movements.

VII. 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] Čech and Soukupová, “Real-Time Eye Blink Detection using Facial Landmarks”, Center for Machine Perception, February 2016.

[3] 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.

[4] A. Geetha and M. Mangaiyarkarasi, “Cursor Control System Using Facial Expressions for Human-Computer Interaction”, Vol 8 Issue 1 APRIL 2014, ISSN: 0976-1353 International Journal of Emerging Technology in Computer Science & Electronics, pp 30-34.

[5] Jilin Tu, Thomas Huang, Elect and Comp EngrDept, Hai Tao, ElectEnggDept, “Face as Mouse through Visual Face Tracking", IEEE, (2005).

[6] John J. Magee, MargritBetke, James Gips, Matthew R. Scott, and Benjamin N. Waber “A Human-Computer Interface Using Symmetry Between Eyes to Detect Gaze Direction" IEEE Trans, Vol. 38, no.6, pp.1248- 1259, Nov (2008).