IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 11, Issue 7, July 2023

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 7, July 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1107053 |

Virtual Mouse Operation Using Face Detection

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ABSTRACT: The system described in this work provides a hand-free interface between a human and a computer. Generally the mouse which utilized by human beings has been replaced in a brand new way which uses the human facial expression and functions. It uses various image processing strategies Such technologies as facial detection, eye extraction, and the interpretation of a sequence of eye blinks in real-time for controlling a non-intrusive human-computer interface are available. Interaction with the computer is replaced by a human-computer interface which utilizes eye movements as an input. A standard webcam is used to take the input image. The mouse pointer can be moved by making facial movements to the left, right, up, and down, and mouse events are controlled by blinking the eyes. Different type of algorithms, including the Dlib algorithms, are employed to carry out these tasks. The solution is primarily designed to help those who are physically challenged communicate with computers effectively.

KEYWORDS: Face Detection, Mouse operation, facial expression.

I. INTRODUCTION

The computer pointer may now frequently be moved around a computer screen using a finger or a computer mouse with today's technology. The technology recognizes every motion made by either a computer mouse or a human finger and maps it to cursor motions. Some people, such as "disabled," won't be able to use the existing technology since they lack hands to use. Therefore, if the eyeball movement of an amputee or other physically challenged person can be mapped to the cursor, they may be able to operate.

The pointer will be mapped and physically challenged persons will be able to move the cursor if the movement of the eyeballs is tracked, as well as the direction in which the eye is gazing. A technology that would allow disabled and amputees to have increased access to their devices is currently not widely available, and only a few companies are actively pursuing this idea.

In this paper, we aim to develop an eye tracking mouse with most of the functions found in a computer mouse, so that amputees and disable people can operate it with their eyes. It is important for people who have difficulties with speech and movement disabilities, especially handicapped and amputee individuals, to use eye tracking technology within the Human Computer Interaction (HCI). With this work we can eliminate the need for other people to assist with computer operation.

II. RELATED WORK

We looked over a lot of previous works to accomplish each module in this project. The face detection part of the project is the most important. In a work by Maliha Khan, she showed how Principal Component Analysis (PCA) was used for calculating, reducing duplicates, extracting functions, and improving compression performance. PCA is regarded by it as an important linear domain technique applicable to linear models [1]. Tracking various movements on the face holds immense importance to us. To achieve this, we explored various studies on monitoring diverse forms of actions. Ruchi Manish Gurav conducted a study where he developed a hand-pose detector using the AdaBoost approach. The detector was trained with a modified set of Haar-like features to ensure its resilience. Additionally, he proposed a method based on a grammar that is agnostic to context. This method showcased remarkable real-time performance, high accuracy, and robustness for over four hand gestures. However, the usage of rectangles in the method posed challenges, prompting him to investigate alternative algorithms such as convex-hull [2].As part of his survey, R.Suriya examined a variety of applications based on hand gesture recognition using Hidden Markov Models.

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He reviewed hand gesture control and MEMS accelerometer applications, and found that preprocessing hand images is crucial to good output [3].

By utilizing information about the position of the camera in relation to a 2D face image, Wei Lei advanced gesture recognition by synchronizing a virtual 3D face model with the actual face from a given viewpoint. This breakthrough allowed for various applications such as human-computer interface, automatic camera control, and more. In his published work, he introduced a technique that utilizes specific color characteristics of the face and mouth in the YCbCrYCbCr color space to identify the facial region and mouth. This method determines the camera's location and guides subsequent operations by establishing a geometric relationship between the mouth's position and the boundaries of the face. Although this research did not establish a direct link between the detection and any specific actions [4].

Rahib.H employed face recognition, image processing, and CNN. He employed three layers of CNN: a basic convolutional layer, a preprocessing layer, and a fully linked network. A mouse pointer and click could be controlled using head movements if the system is successful [5]. In his paper, Dinh-son Tra addressed the challenges posed by sensor noise and awareness of the environment. He proposed a model that utilizes fingertip detection and incorporates RGB-D images. By utilizing skeletal-joint information obtained from the Microsoft Kinect Sensor version 2, the hand region of interest (ROI) and the central palm are identified and removed. The resulting image is then converted to binary format. Next, a border-tracing algorithm is used to separate and depict the shape of the hands. The K-cosine algorithm is employed to determine the position of the fingertips based on the hand-shape configuration. Finally, the fingertip position is mapped onto RGB images to control the mouse cursor on a virtual screen [6].

A real-time algorithm that uses landmark detectors trained on in-the-wild datasets was proposed by Tereza Soukupova and Jan Cech in their study on capturing eyeblinks with inbuilt computer cameras. By using the landmark, they were able to determine scalar quantities like EAR, eye aspect ratio, and facial expressions [7].

The robustness of this system encouraged us to use analogous system for our study. John Cech has expanded on his exploration into the conception of employing milestones for facial emotion identification by proposing a way for accurate facial corner localization in monocular images. The system makes educated hypotheticals about the head's position and direction, as well as relating facial milestones in the image [8].

III. METHODOLOGY

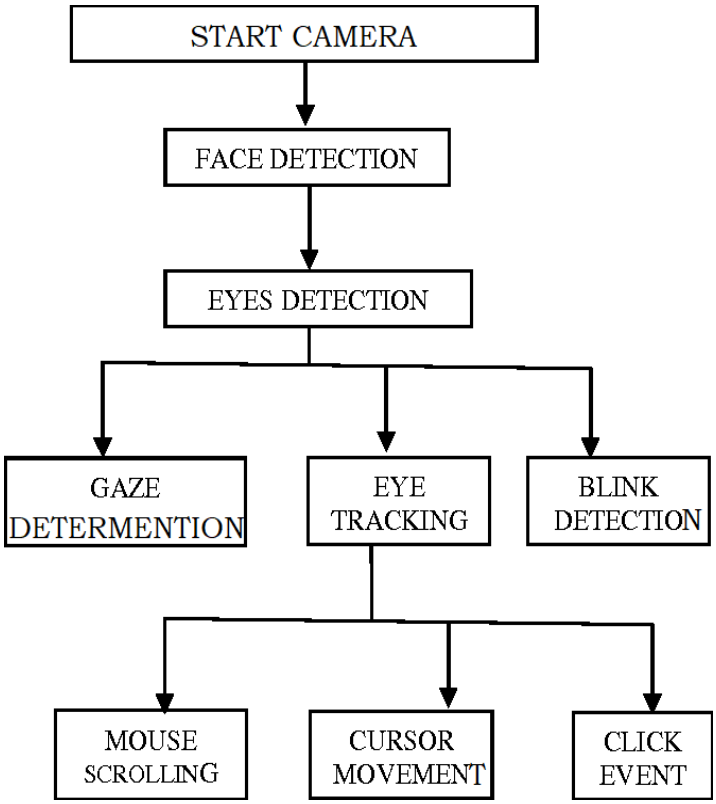

Figure 1:WORK FLOW

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1. Start camera:-
   At the first it start the camera to identify the face of the user. we uses cv2 to open the camera of the system. Form it recognizes the face is available to track.
2. Face Detection:-
   The image provided by the camera is used to make the 68 landmark on face to detect the face by using the module shape predictor 68 face landmark modle.
3. Eyes Detection:-
   After the face detection it detects the eyes to perform the click event. Because the click event is done by the eyes blinking. After that it tack the eye ball. And it tack the eye blink when the eye blink it perform the click event.
4. Cursor Movement:-
   To activate the cursor movement we need open the mouth for a seconds, and to deactivate again open the mouth for a seconds.
5. Mouse Scrolling:-
   To activate the scrolling mode user need to squint the eyes. After that we can able to scroll the page up and down, to deactivate the scrolling mode we need to squint the eyes again.
6. Click Event:-
   When the right eye wink it perform the right click event like that when the left eye wink it perform the left click.

7. Dlib:- Dlib is one of the most powerful and easy-to-go open-source libraries that contains machine learning libraries and algorithms as well as a variety of software creation tools. In 2002, it was released. Since then, it has been widely used by many large corporations and large projects, as well as having a larger number of algorithms that are more relevant to the real world.
8. HOG:-
   Computer vision and image processing use the histogram of oriented gradients (HOG) to count instances of gradient orientation in localized areas of an image in order to detect objects.

PROPOSED METHOD:-

The proposed method for virtual mouse operation using face detection involves using a computer vision algorithm to detect and track the user's face in real-time. By analyzing the facial movements and gestures, the system can interpret them as mouse input, allowing the user to control the cursor on a computer screen without the need for a physical mouse.

EXISTING METHOD:-

Eye Tracking Systems: Various eye-tracking systems, such as Tobii Eye Tracker, allow users to control the mouse cursor by tracking their eye movements. These systems utilize advanced gaze detection algorithms to accurately determine where the user is looking and translate it into cursor movements.

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IV. EXPERIMENTAL RESULTS

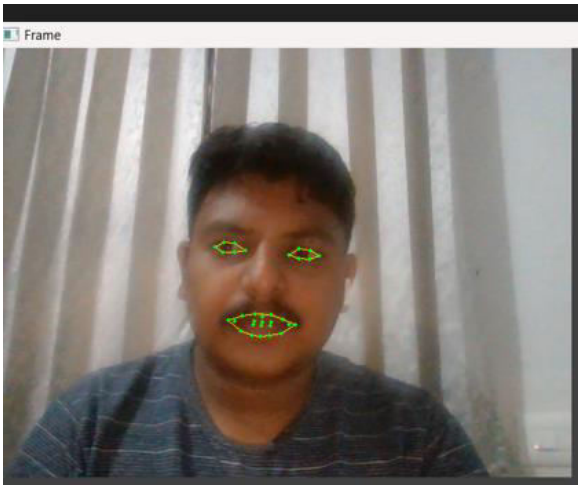

FIGURE 2: FACE DETECTING

FIGURE 3: READING INPUT

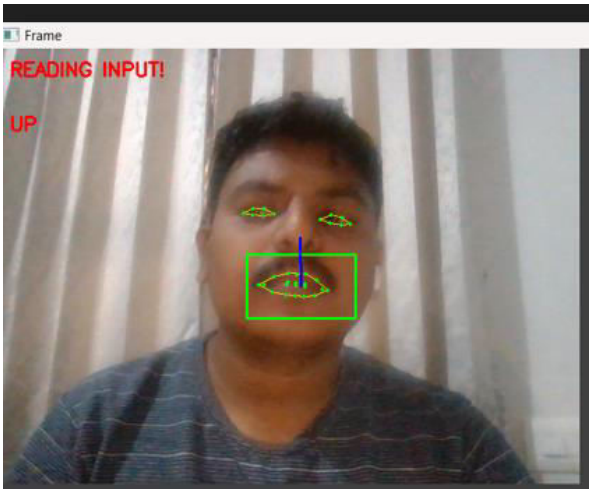

FIGURE 4: CURSOR UP

FIGURE 5: CURSOR DOWN

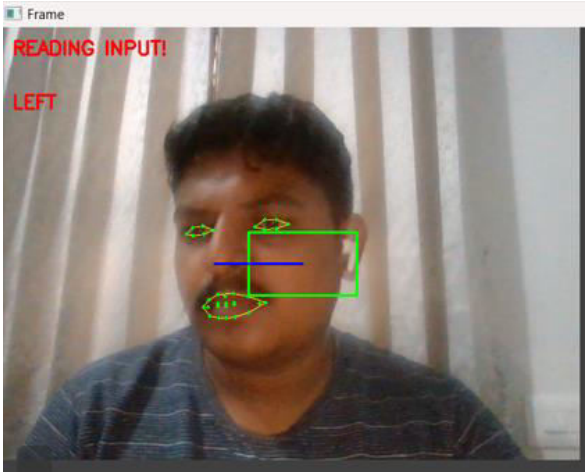

FIGURE 6: CURSOR LEFT

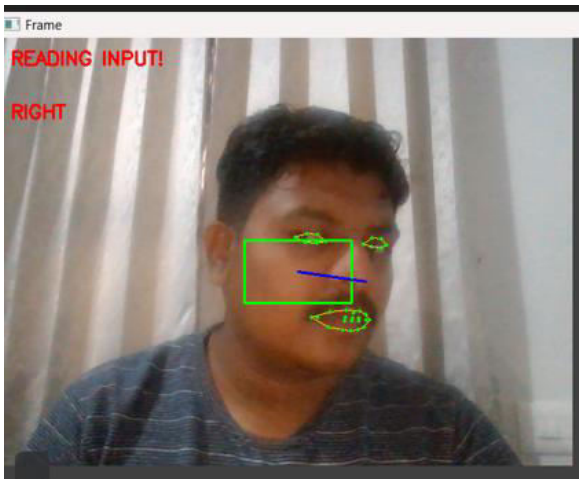

FIGURE 7: CURSOR RIGHT

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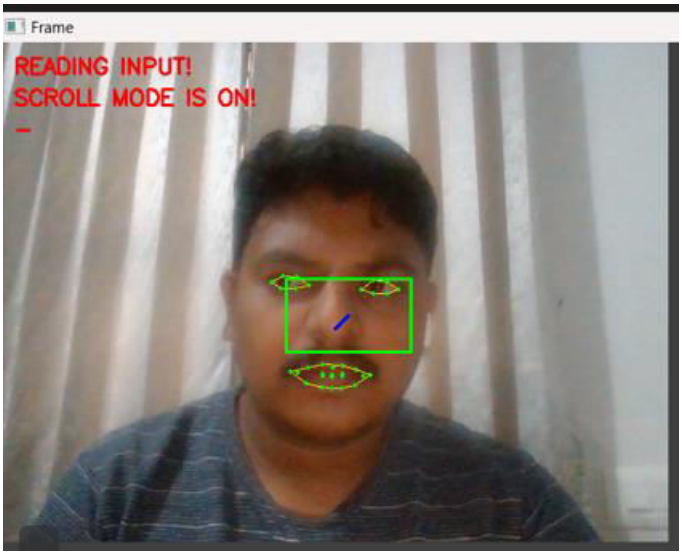

FIGURE 8: SCROOL MODE ON

VI. CONCLUSION

In conclusion, facial detection-based virtual mouse operation is a cutting-edge technology that has the potential to completely transform how people interact with computers. It lets users to control the mouse cursor on a screen using face motions, doing away with the requirement for physical input devices like a mouse or touchpad. It does this by utilizing facial recognition algorithms and computer vision techniques.

REFERENCES

[1] M. Khan, S. Chakraborty, R. Astya and S. Khepra, "Face Detection and Recognition Using OpenCV," 2019 International Conference on Computing, Communication, and Intelligent Systems (ICCCIS), 2019, pp. 116-119, doi: 10.1109/ICCCIS48478.2019.8974493.

[2] R. M. Gurav and P. K. Kadbe, "Real time finger tracking and contour detection for gesture recognition using OpenCV," 2015 International Conference on Industrial Instrumentation and Control (ICIC), 2015, pp. 974-977, doi: 10.1109/IIC.2015.7150886.

[3] R. Suriya and V. Vijayachamundeeswari, "A survey on hand gesture recognition for simple mouse control," International Conference on Information Communication and Embedded Systems (ICICES2014), 2014, pp. 1-5, doi: 10.1109/ICICES.2014.7033762.

[4] Wei, Li, and Eung-Joo Lee. "Human Head Mouse System Based on Facial Gesture Recognition." Journal of Korea Multimedia Society 10.12 (2007): 1591-1600.

[5] Abiyev, Rahib H., and Murat Arslan. "Head mouse control system for people with disabilities." Expert Systems 37.1 (2020): e12398.

[6] Tran, DS., Ho, NH., Yang, HJ. et al. Real-time virtual mouse system using RGB-D images and fingertip detection. Multimed Tools Appl 80, 10473–10490 (2021). https://doi.org/10.1007/s11042-020-10156-5

[7] Soukupova, Tereza, and Jan Cech. "Eye blink detection using facial landmarks." 21st computer vision winter workshop, RimskeToplice, Slovenia. 2016.

[8] Cech, Jan, Vojtech Franc, and Jiri Matas. "A 3D approach to facial landmarks: Detection, refinement, and tracking." 2014 22nd International Conference on Pattern Recognition. IEEE, 2014.

[9] Adarsh M, J and Sumanth M "Effective Heart Disease Diagnosis Using Machine Learning Techniques", International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume – 2, Issue – 6, June 2022.

[10] Adarsh M, J and Chandana K C "Python Based Naive Bayes Classifier for Spam Comment Detection" International Journal of Combined Research & Development (IJCRD) eISSN:2321-225X;pISSN:2321-2241 Volume: 11; Issue: 6; June -2022.

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[11] S P Raghavendra, M.J.Adarsh, ShoiebAhamed and J. Shree Hari, "Estimation of Human Age and Gender Based on LBP Features Using Two Level Decision by SVM" _ K. C. Santosh and B.Gawali (Eds.): RTIP2R 2020, CCIS 1380, pp. 82– 94, 2021. https://doi.org/10.1007/978-981-16-0507-9_8, Springer Nature Singapore.

[12] Adarsh M, J and Pallavi S N "Road Traffic Congestion using Local Binary Pattern", International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume – 2, Issue – 6, June 2022.

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