IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Face Gesture and Speech Based Virtual Mouse and Virtual Assistant

Sakshi Pokale, Trupti Raje, Khushi Vishwakarma, Sudhakar Yerme

Student, Student, Student, Assistant Professor

Dept of Computer Engineering,

Usha Mittal Institute Of Technology Mumbai, India

Abstract: The proposed Face Gesture and Voice CommandBased Virtual Mouse system, which also functions as a virtual assistant, introduces accessible method for interacting with computers and devices. This innovative system enables the manipulation of the cursor on computer screens through facial movements and verbal commands.It contains speech recognition module then converts the voice input into text by using speech recognition using pyautogui module then that text matches with the conditions provided in the program if conditions match with program then it executes the operation. Leveraging real-time video captured via a web-camera or voice prompts, it provides an alternative user interface for enhanced computer interaction. Consequently, this solution holds considerable promise for individuals with physical disabilities. Ensuring the precise interpretation of facial gestures and voice commands is paramount for effectively controlling the mouse pointer and executing essential functions.

Index Terms **- Virtual assistant, Virtual mouse, Speech recognition, Face gesture.**

I. INTRODUCTION

In today's digital age, computer interaction plays a vital role in various aspects of our lives. Human and computer interconnection has expanded in recent years. Personal and computer computations are a need in the workspace as well as for academic purposes. Thus, a vision-based approach is taken into account and an effective technique to develop human-computer interface systems is used. However, traditional input devices like computer mouse may pose limitations for individuals with mobility impairments or those seeking alternative means of interaction. To address these challenges, this project aims to develop a system that enables users to control a computer mouse using facial gestures and voice commands. This innovative approach offers a hands-free and intuitive way of interacting with computers, providing individuals with disabilities greater accessibility and independence in utilizing computer applications.

II. PROBLEM STATEMENT

In the modern computing environment, traditional input devices like mouse and keyboards can be limiting, especially for individuals with physical disabilities or in situations where hands-free control is needed. This project aims to develop a Face Gesture and Voice Command-Based Virtual Mouse system which also act as a virtual assistant, providing an innovative and accessible way to interact with computers and devices. The system should accurately interpret facial gestures and voice commands to control the mouse pointer, click, and perform other essential actions.We try to make an efficient voice assistant which completes tasks with at least time. In this we added some automation like Google Automation, YouTube Automation to make fully virtual assistants which users used easily and effectively. The project should address the challenges of real-time facial gesture recognition, voice recognition, and seamless integration into existing operating systems, making it a versatile solution for a wide range of users and applications. The primary goal is to enhance user convenience and accessibility by offering a hands-free and intuitive computing experience.

III. LITERATURE REVIEW

Several face enabled mouse system have been researched and implemented by other researchers.

In research paper [1] , The proposed system would take real-time input from users with the help of Open CV and run the application in the background. An anchor point on the user's face would control the cursor on the screen, opening of the mouth will calculate the distance between the upper and lower lips and will enable/disable the input. The left wink and the right wink would implement left and right-click functions respectively. Squinted eyes enable the scroll function in case of reading the documents or a file. It would thus facilitate the use and movement of the cursor through face gestures. This application can be implemented on laptops and desktops with inbuilt or external webcams. With the help of this application, the user can perform actions like moving the cursor in all directions, clicking functions, scroll function and drag function. Thus the system would be functional and useful for physically challenged users. One prominent advantage of the application is available in a ready-to-install executable file without the need of external packages.

In research paper [2] , It is an isolated voice command recognition for autonomous man-machine and intelligent robotic systems. This article approach was characterized by up to 60 proposed an approach for building GMbased ASR with the small command vocabulary for man machine communication tasks. The grammar FST graph is created based on the sequence of words in a command. Our experiments showed that the GM-based approach obtains 60models with LM. Moreover, it is up to 20proprietary Google Speech Recognition API. The latter fact means that even very complex acoustic models cannot provide reliable solutions for voice command recognition especially for non-native speakers. Our GMs have higher resistance to variations of noise and pronunciation. The proposed approach can be used for offline recognition to control autonomous robotic systems without need for global Internet connection.

In research paper[3] , This voice assistant will gather the audio from the microphone and then convert that into text, later it is sent through GTTS (Google text to speech). GTTS engine will convert text into audio file in English language, then that audio is played using play sound package of python programming Language.

IV. METHODOLOGY

The ”Face gesture and speech based virtual mouse and virtual assistant” is a system designed for physically challenged individuals who cannot use a regular computer mouse. The system uses artificial markers as reference points. It also extends its functionality to both disabled and able-bodied users by incorporating voice commands for actions such as clicking, browsing, and opening specific applications. For instance, saying ”YouTube” would open the YouTube application. The system’s architecture involves a user interface for function initiation and real-time video streaming from a webcam. The system interacts with the webcam and microphone drivers, capturing and processing live video using OpenCV. The mouse scaling module utilizes head position to determine the mouse cursor’s coordinates, enabling mouse movement based on head transitions. The system further includes audio-enabled navigation, where voice commands are recognized and mapped to perform command actions. Input from video or audio streams is analyzed by an interpreter to execute the corresponding mouse pointer movements or button clicks as instructed by the user. Voice Assistant : First it receives input(voice) given by of model the user through speech recognition module then converts the voice input into text by using speech recognition using pyautogui module then that text matches with the

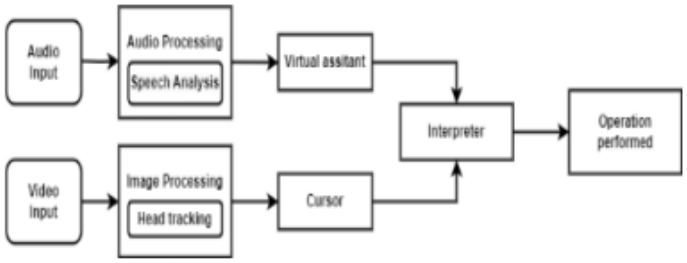

Fig. 1. Flowchart of model

conditions provided in the program if conditions match with program then it executes the operation otherwise does not execute anything Now we add some automation in Voice assistant for example “search Artificial intelligence opens a browser and search the results of artificial intelligence.”, etc.

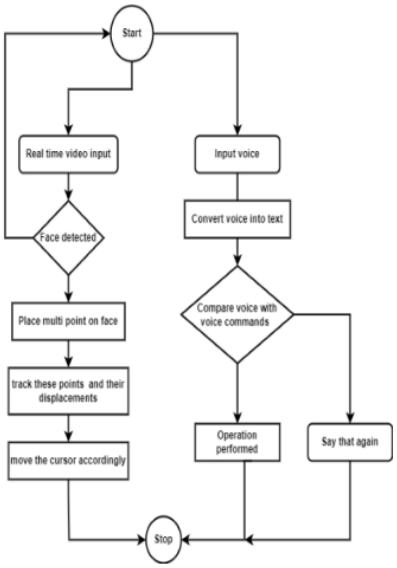

Fig. 2. Flowchart of model

Fig. 3. Face Points

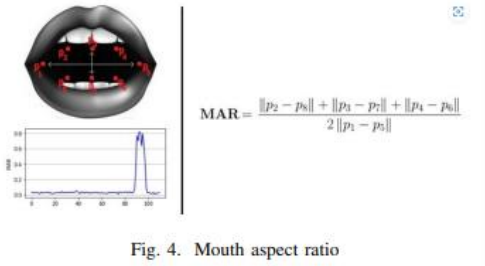

Fig. 4. Mouth aspect ratio

3.1 Face movement based cursor control:

Computer Vision is used for catering the needs of the users who are invalid in the sense that they are not able to perform basic operations on the computer such as the use of mouse. A procedure is presented that moves the mouse from one place to another on the desktop through users’ face gestures. Initially, real-time user input is acquired from the user and the input is used for the functioning of the cursor. Hence, using this user input various operations can be performed. The system design of the application is as follows: Above flowchart represents the algorithm used for face detection and the movement of the cursor. A face is divided into 68 distinct landmarks, rather than taking the entire face into account, which makes the working algorithm very fast. Exploiting the orientation of the points on the eye, we use the concept of Eye Aspect Ratio, which is used to determine whether the eye is open

or closed. For scrolling on the page, we have used the concept of Mouth Aspect Ratio, which is just used to determine whether the mouth is open or closed.Opening the mouth for about 5 seconds will activate the scrolling mode and the mouse which used to move up and down will now scroll up and down. For deactivating the scroll one, the user can do the same action again. For moving the mouse cursor across the screen, the user must move the nose out of a reference circle. In whatever direction the user keeps their nose with respect to the centre of the circle, the mouse will move in that direction. Keeping the nose tip in the reference circle will stop the moving cursor.

IV.RESULTS AND ANALYSIS

The required packages of Python programming language has been installed and the code was implemented using PyCharm Integrated development environment (IDE) and the python code we have developed runs in Python 3.8, and below are the few outputs which we have received in our AI-based voice assistant named Buddy.The command of ”launch project” will run the face gesture controlled virtual mouse. It leverages models such as CNN implemented by MediaPipe running on top of pybind11.

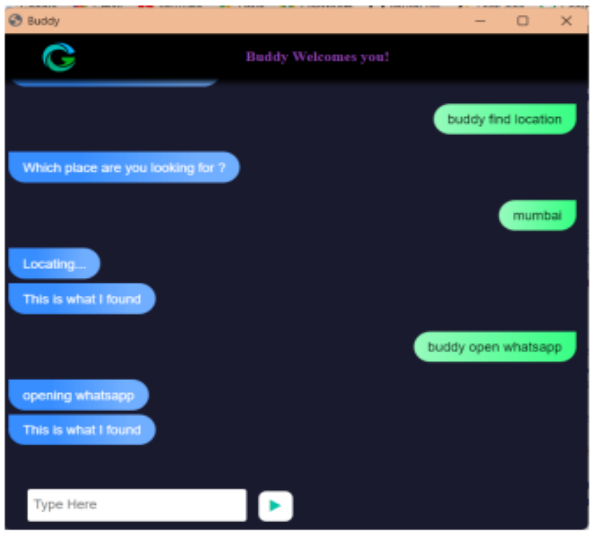

Fig. 6. Buddy voice assistant

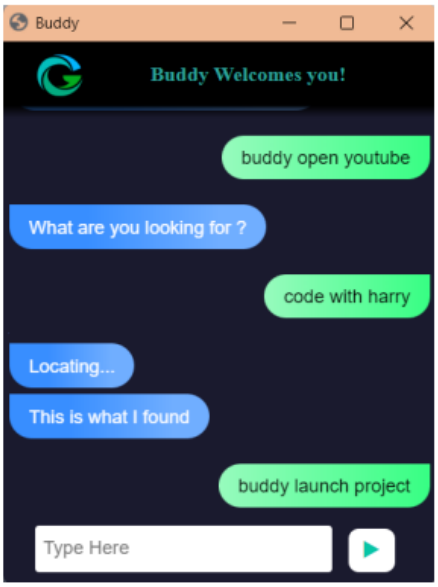

Fig. 7. Buddy voice assistant

V. CONCLUSION

This project holds significant importance in the field of computer accessibility and human-computer interaction. By enabling individuals with mobility impairments or those seeking hands-free interaction and also for disabled (handicapped) people, this system contributes to promoting inclusively and equal access to computer technology. It empowers users to control the computer mouse using natural facial gestures and voice commands, reducing reliance on traditional input devices and improving the overall user experience. The research conducted in this project contributes to the development of innovative techniques and algorithms for facial gesture detection, voice command recognition, and their integration into a cohesive system. Furthermore, the project’s significance lies in its potential to enhance accessibility, independence, and user empowerment for individuals with disabilities. By providing an alternative and intuitive interaction method, it promotes inclusively and addresses the diverse needs of computer users, thereby contributing to the advancement of assistive technologies and human-computer interaction research

VI. FUTURE SCOPE

The Face Gesture and Voice Command-Based Virtual Mouse and virtual assistant system holds promise for enhancing computer interaction, especially for users with physical disabilities. Improving speech recognition accuracy using advanced algorithms and expanding the command set for tasks like application management can enhance versatility. There is a scope of adding wide set of command according to the user need. Introducing support for multiple languages would broaden accessibility. Continuously refining facial gesture recognition algorithms, potentially through deep learning, is crucial for precise interpretation. Integration with existing accessibility tools and adaptive user interfaces can improve user experience. Compatibility with various platforms and fostering opensource collaboration can drive innovation. User feedback through usability testing is vital for identifying and addressing usability issues. These enhancements can make the system more sophisticated, adaptable, and inclusive for improving computer interaction and accessibility.

REFERENCES

[1] Rodney Pinto,Dr. Minal Lopes,Akshada Dongre, Ameya Patkar.”Computer Cursor Control Using Eye and Face Gestures” IEEE(2020).

[2] Artem Sokolov and Andrey V. Savchenko. ”Voice command recognition in intelligent systems using deep neural networks” IEEE(2019).

[3] S. Subhash, P. N. Srivatsa, S. Siddesh, A. Ullas and B. Santhosh, ”Artificial Intelligence-based Voice Assistant,” IEEE(2020).

[4] Dr. K. M. Rayudu, Dr. M. Narendra, P. Anitha, Dr. T. Siva Ratna Sai, M. Sandeep, ”Virtual Mouse Operation Using Webcam” Mathematical Statistician and Engineering Applications (26 December 2021).

[5] N. S. TK and A. Karande, ”Real-Time Virtual Mouse using Hand Gestures for Unconventional Environment,” 2023 14th International Conference on Computing Communication and Networking Technologies (ICCCNT), Delhi, India, 2023.

[6] V. Kepuska and G. Bohouta, ”Next-generation of virtual personal assis- ¨ tants (Microsoft Cortana, Apple Siri, Amazon Alexa and Google Home),” 2018 IEEE 8th Annual Computing and Communication Workshop and Conference (CCWC), Las Vegas, NV, USA, 201

[7] Laura BURbach, Patrick Halbach, Nils Plettenberg, Johannes Nakyama, Matrina Ziefle, Andre Calero Valdez Ok google, Hey Siri, Alexa. Acceptance relevant of virtual voice assistants International communication conference, IEEE 2019