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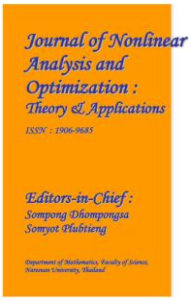

GESTURE CONTROLLER VIRTUAL MOUSE

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ABSTRACT: Gesture controlled virtual mouse is an application that uses webcam to capture images of the user's hand, recognizes hand gestures, and controls the mouse cursor using frames captured by the webcam on the computer machine or built-in camera on a laptop to perform the particular mouse function such as right-click, left-click, volume-control, double-click, scrolling, multi-item selection, drag and drop.

KEYWORDS: Hand gestures, Image Processing, Hub Connector, Wireless mice, Frame Capturing, Feature Extraction.

1. INTRODUCTION

Generally we use gestures to communicate non verbally and to deliver a certain message. The gestures can be delivered or sent in the form of face movements, person's body or hands. As a result, employing hand gestures as a tool humans can engage with one another more efficiency with the aid of computers. After emergence of technologies like artificial intelligence etc. traditional methods of user interaction involving the keyboard, mouse and pen are no longer adequate. The motivation behind the doing this application stems from the recognition of limitations inherent in traditional input devices like mice and keyboards. The gesture controlled virtual mouse application seeks to address these challenges by introducing a more intuitive and natural mode of interaction with computers, enabling users to control their devices through hand gestures.

2. REVIEW OF LITERATURE

In today's world, everyone is increasingly immersed in virtual reality due to emerging technologies like artificial intelligence. Although we have wireless mice, sometimes we encounter issues such as a failed hub connector leading to mouse dysfunction. To address this, our paper proposes a virtual mouse utilizing a webcam to track finger and hand movements. It recognizes various gestures and controls the mouse cursor using frames captured by the webcam. Traditional methods involving additional hardware like wired or wireless mice can decrease battery life or processing power. Therefore, utilizing a virtual mouse is a simple and effective solution that can alleviate many problems. The gesture-controlled virtual mouse is developed using the Python programming language and libraries such as OpenCV. Our model also incorporates packages like pynput and pyautogui to navigate the computer screen, as well as media pipe to track hands. Our model performs various operations including left-clicking, right-clicking, scrolling, double-clicking, multi-item selection, scrolling, and drag-and-drop. The results of our proposed model demonstrate very high accuracy levels.

3.METHODOLOGY

Project Overview: Provide a brief overview of the project's objectives and scope, outlining the development of the gesture controlled virtual mouse application.

Software and Technologies: Detail the software tools and technologies used in the development process, such as visual studio code, open cv, media pipe etc.

Frame Capturing: In this first stage, video frames are taken by our application from a camera or other input device. Our algorithm uses these frames as the visual data input to interpret hand motions.

Image Processing: Our program applies a variety of image processing techniques to the frames after they are collected. This entails making adjustments to the collected frames for noise reduction, brightness, and contrast. Moreover, backdrop subtraction may be used by the system to separate the hand from the background and facilitate gesture detection.

Feature Extraction: After processing the images, our application extracts relevant features from them. These features include the position, shape, and movement of the hand within the captured frames. By extracting these features, our application gains the necessary information to understand the gestures being performed.

Feature Matching: With the extracted features, our application then matches them against predefined patterns or templates representing different hand gestures. This step enables our system to recognize and interpret the gestures made by the user

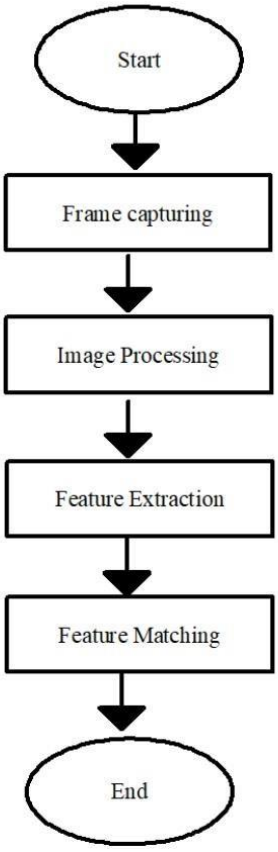

Fig 1. Workflow

4. RESULTS

Fig 2. Neutral Gesture

Fig 3. Move Cursor

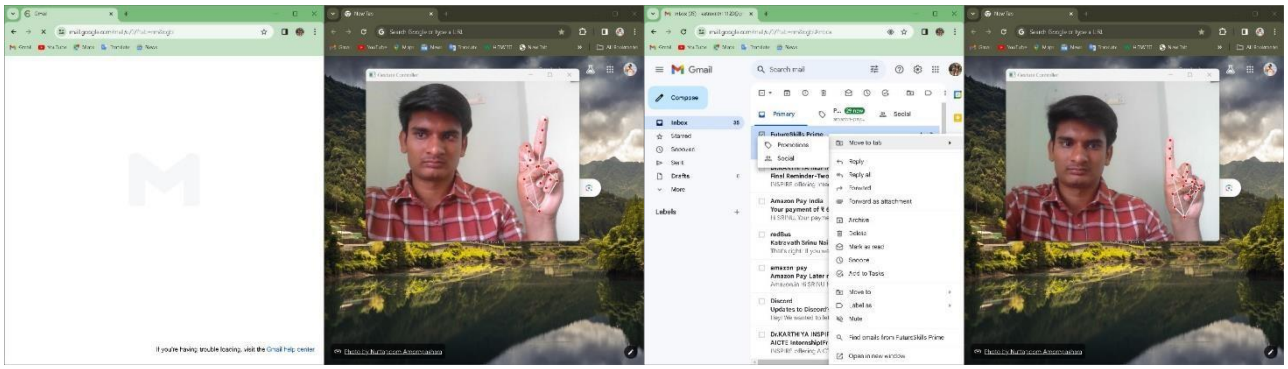

Fig 4. Left Click

Fig 5. Right Click

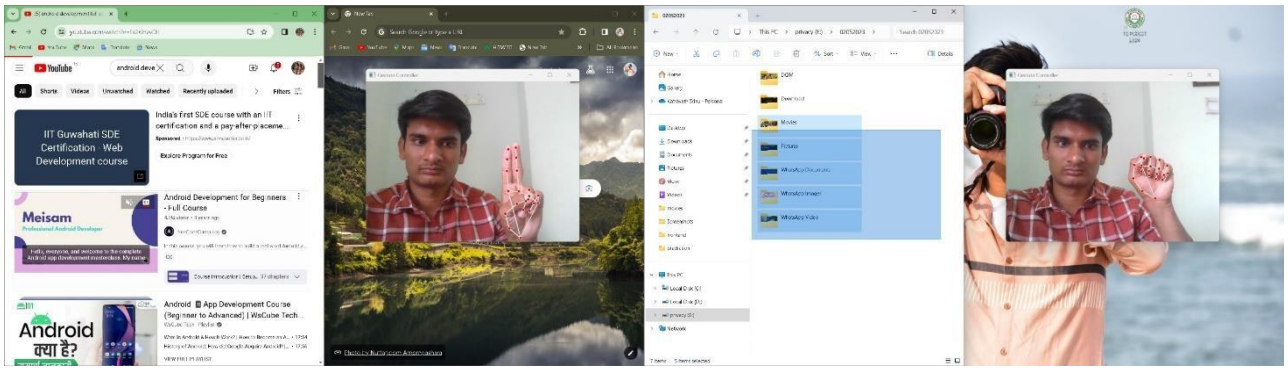

Fig 6. Double Click

Fig 7. Multiple Item Selection

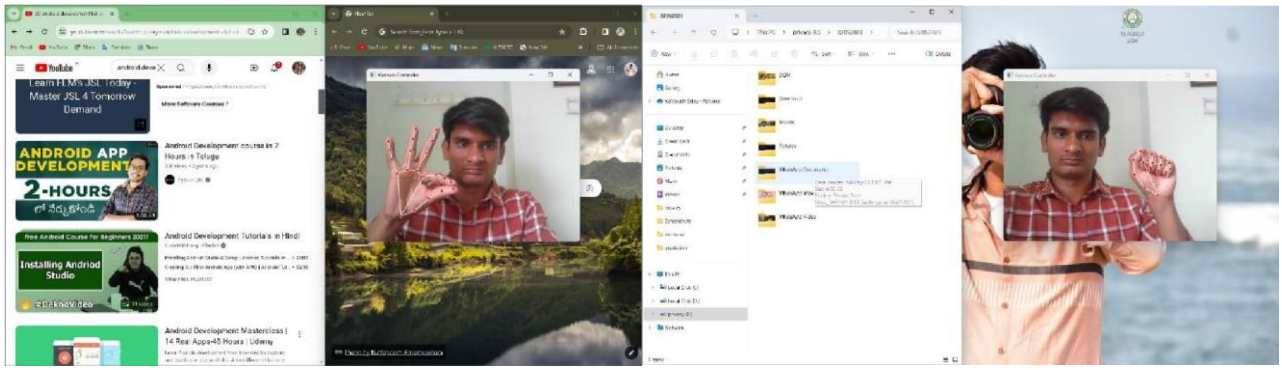

Fig 8. Scrolling

Fig9. Drag and Drop

5. FUTURE ENHANCEMENT

Future developments and improvements in gesture controlled virtual mouse systems are extremely promising. Future research should focus on improving gesture detection algorithms to increase their accuracy and accommodate a wider variety of gestures, which will improve user interaction with gadgets. Furthermore, investigating integration with cutting-edge technologies like virtual reality (VR) and augmented reality (AR) may open up new possibilities in immersive computer settings. Moreover, improvements in hardware capabilities, like more advanced cameras or sensors, may result in hand tracking that is more accurate and sensitive. Researchers and developers working together could also result in the addition of features other than cursor control, which could change the way people use computer interfaces. All things considered, gesturecontrolled virtual mouse systems have a bright future ahead of them, full of possibilities for creativity and better user experiences in a variety of fields.

6.CONCLUSION

The development of our comprehensive gesture controlled virtual mouse application offers a revolutionary approach to human-computer interaction. By capturing hand movements through web cam, users can navigate digital interfaces intuitively. The gesture-controlled virtual mouse improves

accessibility, encouraging users to transition away from traditional mouse control methods and embrace virtual alternatives. Despite its benefits, challenges such as environmental robustness and gesture recognition accuracy persist.

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