ICEST-2K24 [International Conference on Engineering, Science and Technology]
In Association with
International Journal of Scientific Research in Science, Engineering and Technology
Print ISSN - 2395-1990 | Online ISSN : 2394-4099 (www.ijsrset.com)

Aero Gesture : Aerial Webcam Gestures for Ultimate Control Using Gesture Prediction

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ABSTRACT
Now a day's computer vision has reached its pinnacle, where a computer can identify its owner using a simple program of image processing. In this stage of development, people are using this vision in many aspects of day-to-day life, like Face Recognition, Color detection, Automatic car, etc. In this paper, computer vision is used in creating an Optical mouse and keyboard using hand gestures. The camera of the computer will read the image of different gestures performed by a person's hand and according to the movement of the gestures the Mouse or the cursor of the computer will move, even perform right and left clicks using different gestures. Similarly, the keyboard functions may be used with some different gestures, like using one finger gesture for alphabet select and four finger gesture to swipe left and right. It will act as a virtual mouse and keyboard with no wire or external devices. The only hardware aspect of the project is a web-cam and the coding is done on python using Anaconda platform. Here the Convex hull defects are first generated and then using the defect calculations an algorithm is generated and mapping the mouse and keyboard functions with the defects. Mapping a couple of them with the mouse and keyboard, the computer will understand the gesture shown by the user and act accordingly.

Keywords: Gesture Recognition, Keyboard, Mouse, Virtual Control, Image Processing.

I. INTRODUCTION

In the ever-evolving landscape of human computer interaction, one innovation stands out as both intriguing and transformative – gesture-based virtual mouse and keyboard systems. These systems, which enable users to control digital interfaces and devices through natural hand movements, represent a paradigm shift in how we interact with technology. Traditional input methods, such as physical mice and keyboards, have long been the primary means of communicating with computers. However, as our reliance on digital devices grows, the demand for more intuitive, touchless, and immersive interfaces has intensified. Gesture-based systems have emerged as a compelling solution to meet this demand. In this discussion, we delve into the world of gesture-based virtual mouse and keyboard systems, exploring their applications, underlying technology, and the opportunities they present in various domains. We will also consider the limitations and challenges associated with these systems, as well as their potential to shape the future of human computer interaction. Join us on this

journey as we uncover the fascinating realm of gesture-based interfaces and their impact on how we connect with the digital world.

II. LITERATURE SURVEY

Research on the Hand Gesture Recognition Based on Deep Learning" 2018, with the rapid development of computer vision, the demand for interaction between human and machine is becoming more and more extensive. Since hand gestures are able to express enriched information, the hand gesture recognition is widely used in robot control, intelligent furniture and other aspects. The paper realizes the segmentation of hand gestures by establishing the skin color model and AdaBoost classifier based on haar according to the particularity of skin color for hand gestures, as well as the denaturation of hand gestures with one frame of video being cut for analysis.

Dynamic and Personalized Keyboard for Eye Tracker Typing" 2016, Patients who suffer from Amyotrophic lateral sclerosis (ALS) or stroke cannot talk and express their everyday basic needs and requests. They can communicate using eye trackers since they can still use their eyes and sometimes move their heads. This study suggests new methods for improvements in both speed and ease of use for eye tracker software's. The first one is letter prediction to improve the speed, and second one is a new design that obviates the need of blinking with eye trackers, thus providing more comfortable and longer sessions of writing.

Algorithm for decoding visual gestures for an assistive virtual keyboard." 2020, Text production is one of the most frequent activities on a computer, a trivial task that can be limiting for individuals affected by severe neuro motor disorders such as Amyotrophic Lateral Sclerosis (ALS) that can lead to Locked-in syndrome (LIS). These individuals need augmentative and alternative communication tools, since they may have only the eye movements as a form of communication and interaction with the outside world. This work investigates methods of interaction based on eye movement tracking and presents a virtual keyboard that utilizes gaze detection as a text input. It describes the development of the shape detection algorithm for the assistive keyboard, typed word voting from a Brazilian Portuguese lexicon and preliminary results on the decoding algorithm.

Virtual Mouse Control Using Colored Finger Tips and Hand Gesture Recognition" 2020, In human-computer interaction, virtual mouse implemented with fingertip recognition and hand gesture tracking based on image in a live video is one of the studies. In this paper, virtual mouse control using fingertip identification and hand gesture recognition is proposed. This study consists of two methods for tracking the fingers, one is by using colored caps and other is by hand gesture detection. This includes three main steps that are finger detection using color identification, hand gesture tracking and implementation on onscreen cursor. In this study, hand gesture tracking is generated through the detection of the contour and formation of a convex hull around it. Features of hands are extracted with the area ratio of contour and hull formed. Detailed tests are performed to check this algorithm in real world scenarios.

I-Keyboard: Fully Imaginary Keyboard on Touch Devices Empowered by Deep Neural Decoder" 2019, Text entry aims to provide an effective and efficient pathway for humans to deliver their messages to computers. With the advent of mobile computing, the recent focus of text-entry research has moved from physical keyboards to soft keyboards. Current soft keyboards, however, increase the typo rate due to a lack of tactile feedback and degrade the usability of mobile devices due to their large portion on screens. To tackle these limitations, we propose a fully imaginary keyboard (I Keyboard) with a deep neural decoder (DND). The

invisibility of I Keyboard maximizes the usability of mobile devices and DND empowered by a deep neural architecture allows users to start typing from any position on the touch screens at any angle. To the best of our knowledge, the eyes free ten-finger typing scenario of I-Keyboard which does not necessitate both a calibration step and a predefined region for typing is first explored in this article. For the purpose of training DND, we collected the largest user data in the process of developing I-Keyboard. We verified the performance of the proposed I-Keyboard and DND by conducting a series of comprehensive simulations and experiments under various conditions. I-Keyboard showed 18.95% and 4.06% increases in typing speed (45.57 words per minute) and accuracy (95.84%), respectively, over the baseline.

Research on Digital Image Processing Technology and Its Application" 2018, Computer digital image technology is a very important branch of the computer application discipline, and its application areas include measurement, computer-aided design, physics, three dimensional simulation and other industries. Moreover, with the improvement of computer hardware performance, image processing algorithms have improved the application of digital image processing technology. This article focuses on the current digital image processing technology and its application status.

Immersive gesture interfaces for 3D map navigation in HMD-based virtual environments" 2018, 3D maps such as Google Earth and Apple Maps (3D mode), in which users can see and navigate in 3D models of real worlds, are widely available in current mobile and desktop environments. Users usually use a monitor for display and a keyboard/mouse for interaction. Pharmaceutical innovation faces challenges. Research merges quantum computing and machine learning to revolutionize drug discovery, simulation, and safety assessment for expedited progress. [10] Head-mounted displays (HMDs) are currently attracting great attention from industry and consumers because they can provide an immersive virtual reality (VR) experience at an affordable cost. However, conventional keyboard and mouse interfaces decrease the level of immersion because the manipulation method does not resemble actual actions in reality, which often makes the traditional interface method inappropriate for the navigation of 3D maps in virtual environments. From this motivation, we design immersive gesture interfaces for the navigation of 3D maps which are suitable for HMD-based virtual environments. Project innovates plant species classification using Deep Learning and leaf vein features, aiming to automate identification, accelerate research, aid conservation, and foster education in botany and technology. [11] We also describe a simple algorithm to capture and recognize the gestures in real-time using a Kinect depth camera. We evaluated the usability of the proposed gesture interfaces and compared them with conventional keyboard and mouse-based interfaces. Results of the user study indicate that our gesture interfaces are preferable for obtaining a high level of immersion and fun in HMD-based virtual environments.

2022, Since the last years and until now, technology has made fast progress for many industries, in particular, the garment industry which aims to follow consumer desires and demands. One of these demands is to fit clothes before purchasing them on-line. Therefore, many research works have been focused on how to develop an intelligent apparel industry to ensure the online shopping experience. Most of these works focus on the virtual try-on task to develop Image-based virtual fitting systems which present various challenging issues since persons can appear in different poses and views. In recent years, many studies have developed by using deep learning methods to face the challenges of pose variation, occlusion and illumination changes. Thus, we reviewed, in this paper, a large range of research works focused on using deep learning methods in image-based virtual fitting solutions by summarizing their challenges, their main frameworks and the popular benchmark datasets used for training. Hence, an overview of different evaluation metrics is presented with some examples of performance comparison, and lastly, some promising future research directions are discussed.

Immersive gesture interfaces for 3D map navigation in HMD-based virtual environments" 2023, In this paper, we present an upgraded version of the 3D modelling system, De SIGN v3 The system uses speech and gesture recognition technology to collect information from the user in real-time. These inputs are then transferred to the main program to carry out required 3D object creation and manipulation operations. The aim of the system is to analyse the designer behaviour and quality of interaction, in a virtual reality environment. The system has the basic functionality for 3D object modelling. The users have performed two sets of experiments. In the first experiment, the participants had to draw 3D objects using keyboard and mouse. In the second experiment, speech and gesture inputs have been used for 3D modelling. The evaluation has been done with the help of questionnaires and task completion ratings. The results showed that with speech, it is easy to draw the objects but sometimes system detects the numbers incorrectly. With gestures, it is difficult to stabilize the hand at one position. The completion rate was above 90% with the upgraded system but the precision is low depending on participants.

"Lossless Multitasking: Using 3D Gestures Embedded in Mouse Devices" 2019, Desktop based operating systems allow the use of many applications concurrently, but the frequent switching between two or more applications distracts the user, preventing him to keep focused in the main task. In this work we introduce an augmented mouse, which supports the regular2D movements and clicks, as well as 3D gestures performed over it. While the keyboard and mouse conventional operation are used for the main task, with 3D gestures the user can control secondary tasks. As a proof of concept, we embedded a Leap Motion Controller device inside a regular mouse.

Author described detailed Survey On Creating Digital Health Ecosystem with Life wellness Portal Inc.

III.LIMITATIONS OF EXISTING WORK

By the comparative study of the proposed system, we have been recognized following limitations of the system as:

- Accuracy
- Environmental factors
- Hardware requirements
- Limited hand gestures

IV.PROBLEM STATEMENT

The aim is to develop a project on the basis of gesture for virtual mouse and keyboard using input images.

V. PROPOSED SYSTEM

A. Architecture

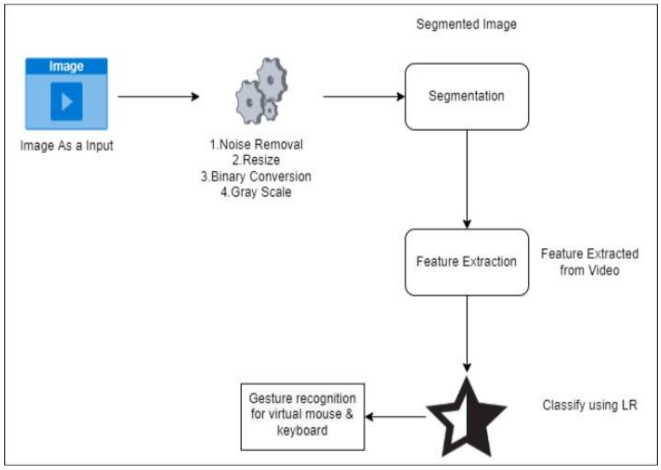


Figure 1: Architecture

B. Hardware And Software Requirements

1) Hardware:

- I3 or I5 Processor
- RAM: Minimum 4 GB
- Hard Disk: up to 1 TB
- Webcam

2) Software:

- Operating System: Windows 7/8/10/11, Linux
- Python
- Pycharm

VI. RESULT &DISCUSSION

Our project successfully implemented gesture recognition technology via webcam to control keyboard and mouse functions, enhancing accessibility and user convenience. The system demonstrated commendable accuracy and responsiveness in recognizing predefined gestures, facilitating intuitive hands-free interaction. User feedback indicated increased efficiency and empowerment in navigating tasks. Challenges included variability in lighting conditions and background clutter, requiring algorithm fine-tuning. Future improvements could involve integrating machine learning for adaptability and exploring advanced computer vision algorithms for robustness. Overall, our project highlights the potential of gesture-based interaction systems in enhancing accessibility and usability in various domains.

VII.RESULTS/OUTPUTS

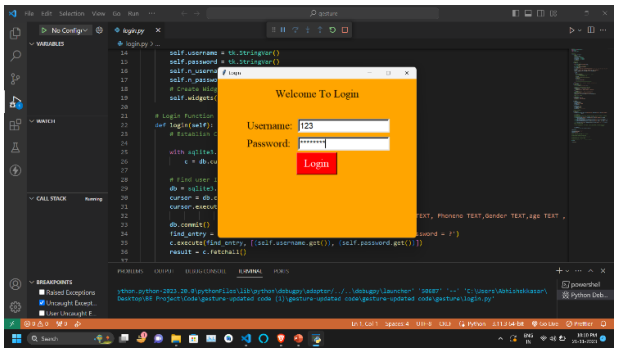
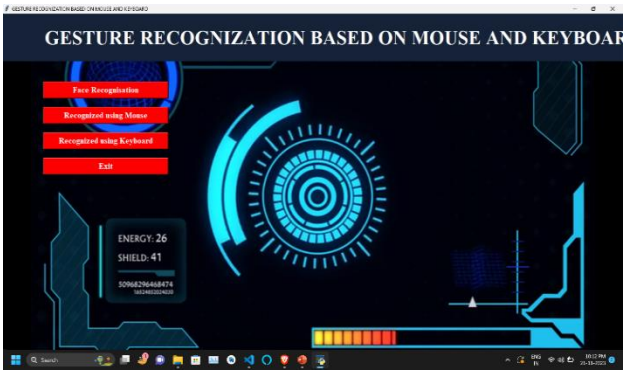


Figure 2 :



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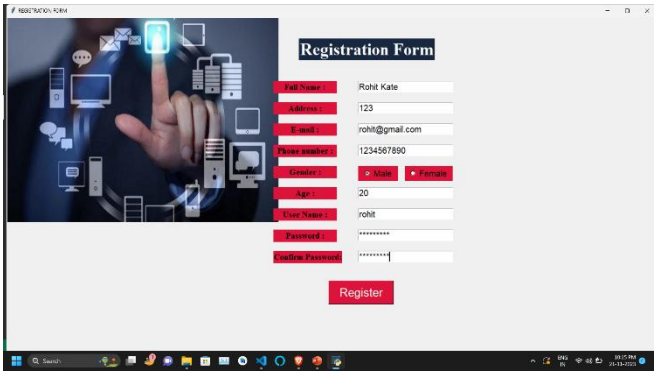

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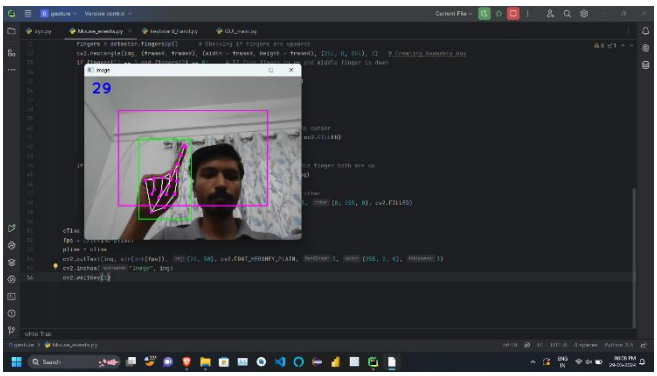

Figure 5:

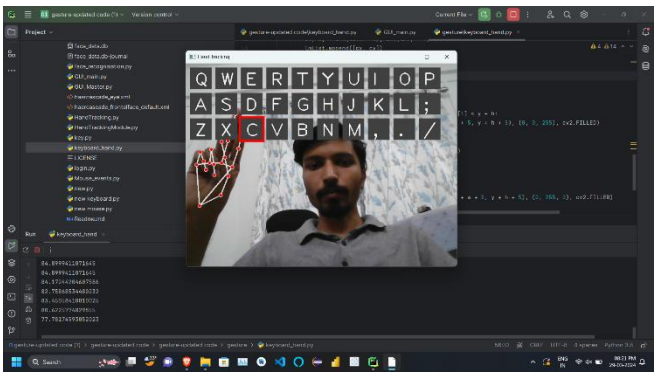

Figure 6:

VIII. CONCLUSION

Gesture-based virtual mouse and keyboard systems represent a promising technological advancement with a wide range of practical applications. These systems offer touchless and intuitive interaction, making them valuable in various domains, from accessibility and healthcare to gaming and education. As we continue to innovate in the field of human computer interaction, these interfaces have the potential to transform the way we interact with technology, enhancing convenience, accessibility, and user experiences across diverse industries. The future holds exciting possibilities for the continued development and integration of gesture-based.

IX. REFERENCES

[1]. Gesture Recognition Based Virtual Mouse and Keyboard (2020) The system works well for the simple pointing and pinching gestures, there is still room for many improvements. Currently the system uses a static background, the real-world.

[2]. A new 3D Viewer system based on hand gesture recognition for smart interaction (2020) By using Pose estimation Algorithm we are improve the Accuracy of Our system

[3]. Immersive Gesture Interfaces for 3D Map Navigation in HMD-Based (2018) By using Pose estimation Algorithm we are improve the

[4]. Qualitative Analysis of a Multimodl Interface System using Speech/Gesture (2018) By using Pose estimation Algorithm we are improve the Accuracy of Our system

[5]. Detecting Centroid for Hand Gesture Recognition using Morphological Computations (2017) Using machine Learning Technique solve problem

[6]. Lossless multitasking: Using 3D gestures embedded in mouse devices (2016) By using Python Programmin g language we are develop Desktop application

[7]. Kale, R, Shirkande, S. T, Pawar, R, Chitre, A, Deokate, S. T, Rajput, S. D., & Kumar, J. R. R (2023). CR System with Efficient Spectrum Sensing and Optimized Handoff Latency to Get Best Quality of Service. International Journal of Intelligent Systems and Applications in Engineering, 11(10s), 829–839.

[8]. Nalawade, V. S., Jadhav, O. D., Jadhav, R. M., Kargal, S. R., &Panhalkar, N. S. (2023). A Survey On Creating Digital Health Ecosystem with Lifewellness Portal Including Hospital and Insurance Company with Cloud Computing and Artificial Intelligence.

[9]. Swapnali, L., Megha, J., Ranjeet, S., Belsare, P. P., & Ashwini, G. B. (2017). A Cryptographic Key Generation on a 2D Graphics Using RGB Pixel Shuffling and Transposition. In Proceedings of the International Conference on Data Engineering and Communication Technology: ICDECT 2016, Volume 2 (pp. 189-196). Springer Singapore.

[10]. Ekatpure, J. N., Jadhav, P., Gavali, R., Kale, P., & Padasalkar, S. (2023). Pharmaceutical Data Optimisation Using Quantum Machine Learning.

[11]. Ekatpure, J. N., Kamble, Y. P., More, P. T., & Patankar, S. S. (2023). A Survey On Leaf Vein Morphometrics: A Deep Learning Approach to Plant Classification.