AIRCURSOR -VIRTUAL MOUSE

[1]Pavithra B S, [2]Sandhyarani Biradar, [3]Sahil Khurshid, [4]Rahul Kumar Singh
[1]Professor, [2,3,4]Students
Department of CSE
East West Institute of Technology
Bengaluru, India

Abstract— The challenge promotes a Human pc interplay (HCI) method where cursor movement can be managed using a digital camera in actual-time, an alternative to current techniques including guide keystrokes or repositioning of a physical pc mouse. instead, it makes use of digicam and computer visualization era to control various mouse activities and is able to carry out all of the tasks that a physical pc mouse can. This makes use of a digicam to constantly capture actual- time photographs of the finger using diverse gestures. The captured photos are then processed and signs are identified, after which those gestures are translated into significant mouse manage activities together with left click, proper click, brightness manipulate, and volume control. The intention of this assignment is to provide a modern comprehensive tool to guide the development and increase of pc vision technologies, whilst it is meant for lots people, especially the especially disabled.

key phrases—Human pc interplay (HCI), hand gestures, brightness manage, extent control.

I. INTRODUCTION

As we know, vision-based hand gesture recognition technology is an important part of Human pc interplay (HCI). In recent decades, keyboards and mice have played a significant role in human-computer interaction. However, due to the development of hardware and software, new types of HCI methods were needed. In particular, tech as such as speech recognition and sign recognition are receiving a measured attention in the field of HCI.

This. Gesture recognition determines the user's intent by recognizing a gesture or movement of body parts. In past, many developers have attempted to improve hand gesture recognition technology. Hand gesture recognition is of great value in many applications such as sign language recognition, augmented reality (virtual reality), sign language interpreters for the disabled, and robot control.

Hands are part of the physique that are used to manipulate physical objects. So, for this purpose those individuals most regularly use their hands to communicate and interact with machines. Mice and alphanumeric-keypad are the most basic input/output for computers and use of both if these devices require hands. The most important and immediate exchange between Individual and pc is through visual and auditory aids, but this communication is one-way. Computers of this age provide people with 1024*768 pixels at 15 frames per second, and in comparison, a good typist can type 60 words per minute, with each word containing an average of 6 letters. To help a bit, a mouse solves this difficulty, but has limitations. we use our fingers every day to complete tasks involving physical manipulation, we also use them for communication in some cases. Hand gestures support us in everyday communication to communicate our messages clearly. Hands are most important to mute and deaf people who depend on their hands and signs for communication, so hand gestures are vital to sign language communication.

II. LITERATURE SURVEY

The literature review covers a diverse range
study aimed at strengthening the teaching of computer programming, especially focusing on effective approaches in different contexts. The review begins with a comprehensive survey of the challenges and proposed models for the given topic in which they are using the color to determine the position of hands [1].

It then explores ways to track object moments rather than using a color detection method. Gestures are tracked using the computer vision libraries and HSV color detection [2]. In addition, the review delves into a paper that proposes It captures hand gestures via a web camera and uses a convex hull algorithm to detect contour defects [3].

The review further explores the various combinations of detected fingers/gestures that are mapped to mouse operations such as left-click, right-click, scrolling, etc. The limitation are in the dissimilarity of color detection accuracy depending on lighting conditions. Overall, it represents an accessible and inexpensive way of human-computer interaction by replacing the physical mouse with computer vision-based tracking [4].

Title	Authors	Year	Objectives	Advantages	Disadvantages
Design and Development of Hand Gesture Based VirtualMouse	1st Kabid Hassan Shibly Dept. of Computer Science & Engineering 3rd Md.Aminul _Islam Dept. of Computer Science & Engineering	2019	The aim is to develop and implement an alternative system for controlling the mouse cursor. An alternative method is hand sign identification using a digitalcamera and color detection method. The end result is that a system recognizes hand gestures and controls the mouse cursor using any computer's color detectionmethod.	- Low cost - Uses a simple web camera, requires no additional hardware - Flexibility - Allows you to perform all mouse operations like left click, right click, scroll, etc.	-Performance degrades in complex backgrounds - Accuracy drops to 40% for non-plain backgrounds. - Lighting Dependency– System performance varies significantly in different lighting conditions
Virtual Mouse Using Object Tracking	Manthan K.Bhatkar Ofrin P. Lopes Prof.-Monali Shetty. Christina-A. Daniel.	2020	Development of an affordable tracking system using hand signs and web camera object tracking. Enables natural interaction by tracking colorful objects on fingers. It uses computer_vision and Python for real-time tracking, while using RGB to HSV conversion for better accuracy. Focused on cursor and click control without the need for expensive hardware.	- Robust - Works well for plain backgrounds. Achieves 95%+ mouse movement accuracy on smooth background. - Ease of use - The painted item to track can be any object, for example colored hat. No need to remember complexgestures.	- Webcam Noise - Low resolution webcams can cause noise that negatively affects viewing. A minimum of 2MP webcamera is recommended. - Lighting must be consistent -Changes in lighting can disturb object tracking performance.
Gesture Recognition Based Virtual Mouse and Keyboard	Sugnik Roy Chowdhury Sumit Pathak M.D. Anto Praveena	2020	This approach will complicate and simplify tasks such as creating 3D models, viewing an imaginary part in the medical world during surgery, and best of all, without touching anything, it can also work in architectural designs and automated buildings.	- Real-time processing - Captures and recognizes gestures from live video - Extensible - More gestures can be easily added to extend the functionality	Gesture confusion– Similar gestures can sometimes be misinterpreted Small operating zone - The range of recognized hand movement is limited by the view of digital camera Gesture Fatigue - Repetitive gestures cancause fatigue with prolonged use
Virtual Mouse Control Using Colored Finger	Vantukala VishnuTeja Reddy1, Thumma Dhyanchand, Galla-Vamsi Krishna, Satish Maheshwara	2020	To expand a method to control an on-screen cursor and emulate mouse functions such as clicking and scrolling using fingertip tracking and handgesture recognition without the need for any physical mouse device.	- Enables hands-free control of the mice using a simple input from a webcam. - Eliminates the need for mouse hardware for basic control. - Uses a cheap and commonly available web camera. - Algorithms can work with color finger sleves on fingers or bare hands. - Provides accessibility for disabled users.	- Accuracy and reliability depend on lighting conditions. Works best between 500-600 lux. - Limited to basic mouse functions such as cursor control, clicking and scrolling. Advanced controls are not implemented. - Gesture detection can be computationally intensive. - Requires to remain in line of sight of the webcam.

III. PROPOSED SYSTEM

Most gesture recognition methods usually have three main phases. The first stage is object detection. The goal of this phase is to track objects in digital images or videos. At this stage, many environment and image problems need to be solved to ensure that the outlines of the fingers or area can be accurately extracted to increase the recognition accuracy. Common image problems include unstable brightness, noise, poor resolution and contrast. A better environment and camera equipment can effectively improve these problems. However, it is difficult to control when a gesturerecognition system works in a real environment or when it becomes a product. Thus, the image processing method is a better solution to solve these image problems to make a adaptive and robust gesture recognition system. The second stage is object recognition. Detected hand objects are recognized and identify gestures. At this stage, the tricky part is most researches have the differentiated features and the selection of effective classifiers. The third stage is the analysis of sequential gestures to identify user instructionsor behavior.

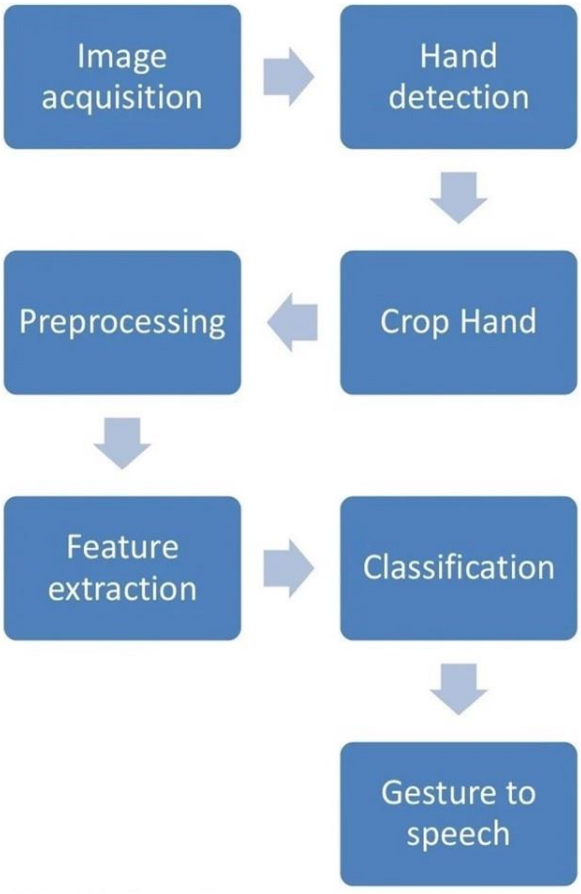

Fig 1: Proposed system steps chart

Inputs	Mouse events	Accuracy with a plain background (in %)	Accuracy With non-plain Background (in percantage)
2-color object (open-signs)	Movement	90	35
Close 2-color object (Closed sign)	Left Click	88	41
Close for five seconds (Closed-sign)	Double Click	87	42
Single color cap(open sign)	Right-Click	96	80
Swipe up Down	Scrolling forward or backward	75	40

Table 1: Expected Results of System

IV. CONCLUSION

The proposed work will help to completely remove the traditional. It only requires a digital camera to catch the I/P image. This would lead to a new age of human-pc interplay in which no physical contact with the device is required. Anyone can use the pc to easily control the computer using gesture commands.

The identification of signs resolves a glitch within reciprocating systems. Manual control offers a more intuitive, straightforward, versatile, and cost-efficient approach, eliminating the need to tackle hardware-related complications as they are not required. in previous studies, considerable effort is necessary to develop consistent and sturdy algorithms using a digital-camera with particular traits to overcome common issues and ensure a dependable outcome. Nevertheless, each abovementioned method has its own strengths and weaknesses, excelling in specific scenarios while potentially falling short in others.

With the outline of our system, we aim to present fresh opportunities for incorporating Augmented Reality into engineering-oriented companies, streamlining their intricate operations. This innovation will introduce a novel aspect to traditional maintenance procedures. The system grips ability for potential use in robotics, artificial intelligence, and sign-based computer control.

All in all, modern technology has come a long way in improving society's life productivity and lifestyle, not the other way around. Therefore, companies must not mix with past technologies and be reluctant to accept newer changes. Instead, it is advisable that they embrace changes to possess more efficient and productive lifestyle.

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