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Gesture Control Gaming Platform

Dr.V. Manimekalai¹, Mr.S.Gowtham², Mr.M.Pravin²

Assistant Professor, Department of Computer Technology, Dr. N.P.G Arts and Science College, Coimbatore, India¹

Student, Department of Computer Technology, Dr. N.P.G Arts and Science College, Coimbatore, India²

ABSTRACT: Over the recent years, Computer Vision has started to play a significant role in Human Computer Interaction. With the development of information technology in our society, we can expect that computer systems will be embedded into our environment. These environments will impose needs for new types of human-computer-interaction, with interfaces that are natural and easy to use. The ability to interact with computerized equipment without need for special external equipment is attractive. With efficient use of available resources, it is possible to track motion of human hand and body in real time using a simple web camera. The aim of this project is to enhance the level of immersion in computer games by creating an application that will allow users to interact with the game only using their body. The proposed application will enable the user to play computer games without the need of either a keyboard or a mouse or any other expensive input devices. The users can play games through various gestures done using only their body. This is the main background of the project. Therefore, the project aims in replacing the traditional mouse and touch pads with human to interact with games which would allow more immersion of users and is also cheap to implement.

KEYWORDS: Game, Gesture Control, interact with computerized equipment, computer games, human to interact with games.

I. INTRODUCTION

Games are primarily played on computer system using various input devices of which keyboard and mouse are the most often used. While using these devices, it is just tapping the keys which make changes in the game accordingly. There also exist other input devices which actually translate a user's body movement in to actions in the game (Example Kinect). This makes the playing experience better and makes the user connected to the game. Also, these devices may be expensive to purchase for average user hence not everyone can use it. An alternative to playing games through traditional input devices is using gestures that system can understand. Hence this topic, "Gesture Recognition for Gaming" comprises of using Gesture recognition for playing games. The Aim of this project is to make a low-cost alternative to the existing systems that users can use on their computers without any hassle.

OBJECTIVE:

This project aims to develop an affordable gesture recognition system that enhances gaming experiences by allowing players to interact through hand movements detected via standard webcams, eliminating the need for specialized hardware. By leveraging machine learning models, such as convolutional neural networks (CNNs), the system accurately recognizes various hand gestures in real-time, enabling intuitive game control. Integrating this system with existing games provides a seamless transition from traditional input methods to gesture-based interactions, enriching user engagement. Optimizing the system for real-time processing ensures minimal latency, delivering immediate feedback to players' actions. Designed with affordability in mind, the system utilizes commonly available hardware and open-source software, making it accessible to a wide audience without significant investment. Overall, this project bridges the gap between conventional gaming inputs and natural, gesture-based interactions, offering an immersive and user-friendly gaming experience.

II. LITERATURE SURVEY

It seems the test user made each of the 46 gestures 10 times to provide data for principle component and cluster analysis. The user created a separate test from five iterations of the alphabet, with each gesture well separated in time. While these systems are technically interesting, they suffer from a lack of training [1].HUMAN COMPUTER INTERACTION (HCI) is the domain of computer science which deals with how users interact with their systems and how the user experience and the user interfaces can be optimized to improve user satisfaction [2]. The input channel used is the hand which is an object that is recognized by the interface through Computer Vision and its relative position is



mapped at every instance of the way [2]. Movement of the said object causes a change in the relative motion of the snake drawn on top of the image captured through the webcam. Thus the interface is quick and responsive object recognition and color detection in computerized pictures has gotten one of the most significant applications for enterprises to ease client, spare time and to accomplish parallelism [2][4]. This is certainly not another method, yet improvement in object recognition is still required so as to accomplish the focus on target to be all the more productively and precise. The principle point of considering and investigating computer vision is to recreate the conduct and way of human eyes legitimately by utilizing a computer and later on build up a framework that diminishes human effort [5]. Computer vision is such sort of research field which attempts to see and speaks to the 3D data for world items [2].

III. SYSTEM ANALYSIS

The background of the implementation lies in the idea to develop an interesting gaming application for the children in which they can get immersed and have a fabulous experience. The aim was to deliver the following features to the user an accurate object recognition to prevent false results. A Negligible response time to react to object movement. The game should be addictive and provide a strong addiction to succeed and stay in the game. Every object class has its own special features that help in classifying the object. Object recognition is that sub-domain of computer vision which helps in identifying objects in an image or video sequence. Computer vision is such sort of research field which attempts to see and speaks to the 3D data for world items. Its fundamental reason for existing is remaking the visual parts of 3D protests in the wake of breaking down the 2D data extricated. Genuine 3D objects are spoken to by 2D pictures. The procedure of item discovery examination is to decide the number, area, size, position of the articles in the input image. With more efficient algorithms, objects can even be recognized even when they are partially obstructed from the direct view. Various approaches to this task have been implemented in the past years. HCI is the domain of computer science which deals with how users interact with their systems and how the user experience and the user interfaces can be optimized to improve user satisfaction. Hence the newer generations must be revealed to the newer technologies & enjoyments.

IV. SYSTEM DESIGN

The input design of the system is a very clean and simple approach for the cause of simplicity & endless enjoyment. The user just needs to have a PC installed with a Webcam or just a Laptop that has a built-in Webcam. The input environment consists of only the User PC System, a properly installed Web Camera system & the Player (user) himself. Except of all this requirement, the user must have a game application (that supports keyboard game input) running alongside of the Hand Gesture Controlled Gaming application. The input to the system comprises of only the user's hand pivot positions & then the hand movement gestures. The rest of the entire system works in the background silently providing the user an endless enjoyable & addictive gaming experience.





The input to the system is the HCI Input i.e. the user's hand movement gesture. The input to the system is provided through a Webcam that captures continuous frames, creating a video, that tracks the center of the hand which moves away making a gesture. This same video frame is also displayed on the application UI. The webcam continuously captures frames, through which the motion of the user's hand gesture is tracked, & processed to map it to the keyboard cursor input for the alongside running game application.

V. DATAFLOW DIAGRAM

LEVEL 0



Fig-2:Dfd level 0

LEVEL 1



Fig-3:Dfd Level 1



VI. RESULTS & DISCUSSIONS

The major constraint of the system is that it must be operated in a well-lit environment. This is the main reason why the system cannot completely replace the computer keyboard, since it is very common for computers to be used in outdoor environments with poor lighting condition.

VII. CONCLUSION

The machine vision based keyboard cursor control using hand gesture system is developed in the Python language, using the Open CV library. The system is able to control the movement of a keyboard cursor by tracking the users hand for playing a game. The keyboard cursor functions will perform by using different hand gestures. The system has the potential of being a viable replacement for the computer keyboard, however due to the constraints encountered; it cannot completely replace the computer keyboard. The accuracy of the hand gesture recognition can be improved, if the template matching hand gesture recognition method is used with a machine learning classifier. Open CV mostly stretches towards real-time vision applications and takes advantage of MMX (Multimedia Extension) and SSE (Streaming SIMD Extensions) instructions when available.

VIII. FUTURE SCOPE

This application can be considered as a starter to the HCI application grounds, therefore large upgradations can be done to it. This application can be extended out to the mouse cursor control also using some more HCI concepts & Open CV Algorithms. Much more accuracy can be obtained with the help of Neural Networks based logics. Tracking performance can be improved to ensure better results. The accuracy of the hand gesture recognition can be improved if the template matching hand gesture recognition method is used with a machine learning classifier. This will take a lot longer to implement, but the accuracy of the gesture recognition will improve.

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