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# VIRTUAL MOUSE AND KEYBOARD USING HAARCASCADE ALGORITHM

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**Abstract:**

A tiny green box will appear in the center of the screen as the computer's webcam records footage of the person seated in front of the device. The objects displayed in that green box will be processed by the code, and if it matches, a red boundary will appear, indicating that the object has been recognized by the computer. The mouse pointer can then be moved by dragging the object. This will contribute to the computer's security as well as creating a virtual computing environment. In place of various objects, one hand gesture will be used to move the cursor here; a different gesture will be used for a right click and a different one for a left click. Similarly, a simple gesture can perform keyboard functions virtually that may have been performed on a physical keyboard. When the recognized gesture is noticed, a red border appears; otherwise, the box will just display a green box.

**Keywords :**Haar Cascade Algorithm Virtual Mouse, Virtual Keyboard, Computer Vision

## 1. Introduction

The utilization of computer vision to construct an interface free from physical devices is a noteworthy development in human-computer interaction, as demonstrated by the concept of a virtual mouse and keyboard that employs the Haar Cascade algorithm. Hand gestures are interpreted by this technology as inputs for cursor control and keyboard command execution. It does this by using the Haar Cascade algorithm, a machine learning-based technique created for real-time object detection. Through the analysis of real-time video streams, the system recognizes particular motions that correspond with mouse clicks and keystrokes.

When using this method, people with physical limitations or sterile settings are good examples of situations typical input devices are impractical. Even in diverse user situations and lighting circumstances, the system can function reliably and effectively thanks to the usage of Haar Cascades. It takes a webcam to record video, process it to identify hand movements and positions, and then convert those movements into commands that a computer can comprehend in order to put this technology into practice. By improving accessibility and providing a fresh interface for digital systems, this creative application of computer vision technology portends a more flexible and inclusive technological environment

Machine learning (ML) is a subfield of computer science and artificial intelligence (AI) that focuses on using data and algorithms to make AI more accurate over time by mimicking human learning

## 2.Literature Survey

### 2.1 Paper Name: Gesture Recognition Based Virtual Mouse and Keyboard

Author: Sugnik Roy Chowdhury, Sumit Pathak, M.D. Anto Praveena.

Abstract:Today's computer vision has advanced to the point where a basic image processing algorithm can identify the owner of a machine. At this point in its development, individuals use this vision for a variety of daily tasks, such as automatic cars, face recognition, and color identification. This project uses computer vision to create a hand gesture-based optical mouse and keyboard. The computer's camera will recognize various hand gestures, and the mouse or cursor will move in accordance with those movements. It will even employ distinct gestures to click to the left and right.

### 2.2 Paper Name: Virtual Mouse Control Using Colored Finger Tips and Hand Gesture Recognition

Author: Jing-Hao Sun, Ting-Ting Ji, Shu-Bin Zhang.

Abstract:A way to manipulate the on-screen cursor without requiring a physical connection to a sensor is presented. This activity involves tracking colored caps on the fingertips and identifying them. Colored caps can be substituted with other hand gestures to get the same effect. Single left click, double left click, right click, and scrolling are among the several mouse-controlled actions.

Limiation :When switching from physical to virtual input devices, users could encounter a learning curve. Getting used to new gestures, layouts, or features could be difficult at first and take some getting used to.

### 2.3 Paper Name : I-Keyboard: Fully Imaginary Keyboard on Touch Devices Empowered by Deep Neural Decoder

Author: Kadir Akdeniz1 , Zehra Çataltepe1,2

Abstract:We suggested the I-Keyboard with DND in this article. For the first time, an entirely imaginary

keyboard without the need for calibration was attempted to be realized using I-Keyboard. Users don't need to worry about the placement or shape of the keyboard to begin typing anywhere on the touch screen in an eyes-free manner. Furthermore, there is nothing users need to learn before they can type.

2.4 Paper Name: Virtual Mouse Control Using Colored Finger Tips and Hand Gesture Recognition

Author: Bilgisayar Mühendisliği Bölümü

Abstract: Amyotrophic lateral sclerosis (ALS) and stroke patients are unable to communicate or express their basic wants and desires on a daily basis. They can still move their heads and use their eyes, thus eye trackers can be used to converse with them. This study makes fresh recommendations for how to make eye tracker software faster and more user-friendly. First, there's letter prediction to increase speed; second, there's a novel design that means eye trackers don't require blinking, allowing for more comfortable and extended writing sessions.

2.5 Paper Name: Design and Development of Hand Gesture Based Virtual Mouses

Author: Kadir Akdeniz

Abstract: Using a live camera, the virtual gesture control mouse is a powerful tool for guiding the mouse pointer and carrying out its function. We used the mouse to perform tasks including left, right, double click, and scrolling in addition to selecting icons. This system uses motion detection and picture comparison to move the mouse indicator and choose the icon.

## 2.Proposed Model

In order to overcome the drawbacks of conventional virtual input devices, a virtual keyboard and mouse system has been proposed. It makes advantage of technological innovations to give flexibility, better precision, and an improved user experience. Incorporate haptic feedback systems to replicate the tactile sensation of real keys. Users will feel as though they are pressing keys, which improves the typing experience. With effective language switching and predictive text tools, offer seamless support for multilingual input. Depending on the user's preferred language, the virtual keyboard changes.

### 3.1 Feature Collection

To maximize the efficiency and precision of gesture recognition, feature selection in the virtual mouse and keyboard system that use the Haar Cascade algorithm is essential. To effectively detect hand movements, our method selects the most pertinent Haar-like features from a large collection. The characteristics that are chosen could be edge features, line features, or four-rectangle features; these features each indicate distinct variations in pixel intensity that correlate to the forms and movements of the hands. The system minimizes computing load and improves real-time response capabilities by concentrating on these important elements. This deliberate selection makes sure that the gesture recognition procedure is dependable and quick, which is necessary for fluid user engagement.

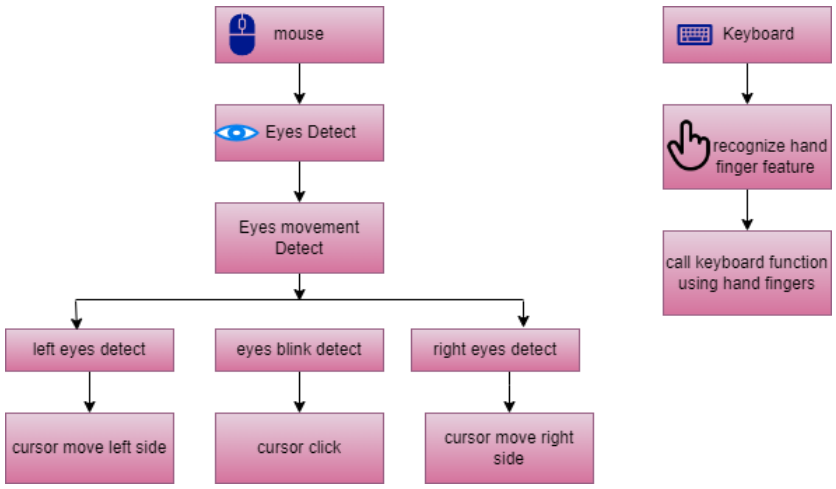


**Fig.1 Flow of Proposed System**

### 3.2 Mathematical Model

Let S be the Whole system

S : (I,P,O)

I-input

P-procedure

O-output

Input(I) I = (Input as Live camera )

Where, Live camera : for capturing Hand Co-ordinates.

Procedure (P)

P =(I, Using I System perform operations)

Output(O) O=(System detect the operate Virtual Mouse and Keyboard.)

### 3.3 Algorithm

### Haar Cascade

An object recognition technique based on features called Haar Cascade is used to identify objects in pictures. For detection, a cascade function is trained using a large number of positive and negative images. The method may operate in real-time and doesn't require a lot of processing power. We are able to train our own cascade function for unique items like as vehicles, bikes, and animals. Since Haar Cascade only recognizes the same shape and size, it cannot be utilized for facial identification. The cascading window and cascade function are used in the Haar cascade. It attempts to determine each window's attributes and categorize as favorable or negative. Positive if the window might be a component of an object; negative otherwise.

We'll be working on facial detection here. To train the classifier, the method requires a large number of both positive and negative images, including those with and without faces. Then we have to extract features from it. Haar characteristics, as illustrated in the graphic below, are used. They are exactly like our convolutional kernel. Each feature is a single value derived by subtracting the sum of pixels under the white rectangle and the sum of pixels under the black rectangle.

4.Results


**Fig.2 Home Page**

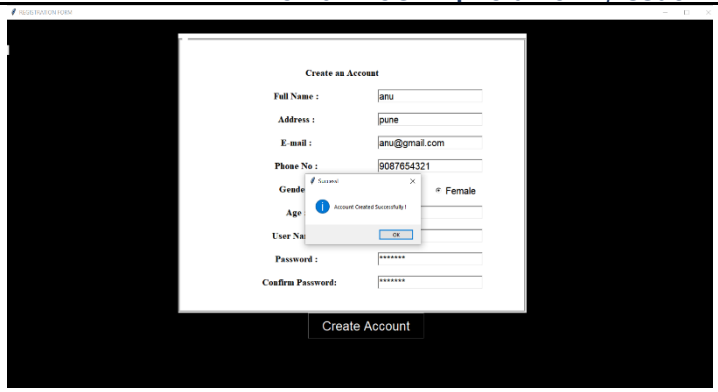


**Fig.3 Registration Page**

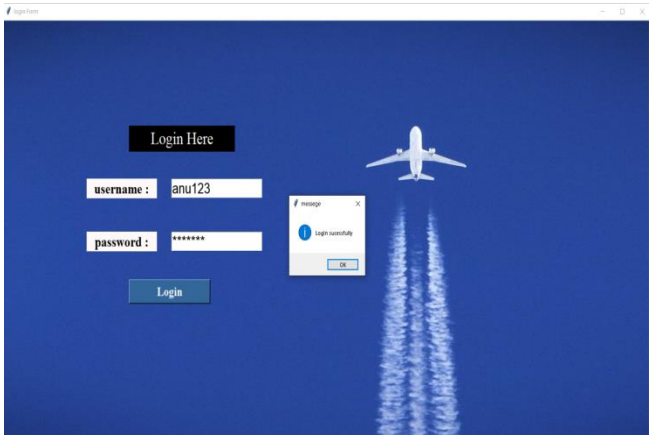


**Fig.4 Login Page**


**.Fig.5 Main Page**

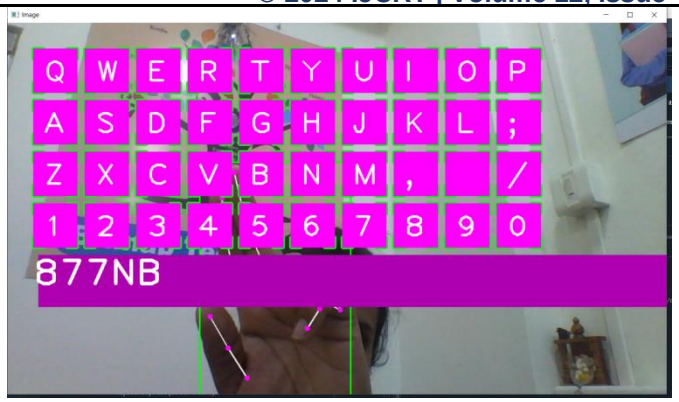


**Fig.6 Output**

**Conclusion and Future Scope**

In this paper, a hand gesture recognition system is proposed as a replacement for the keyboard and mouse. This includes, among other things, the ability to move the mouse and click, drag, and print characters from the keyboard. The process of separating a hand's color or image from its surroundings is called skin segmentation. Discontinue the arm approach, which effectively tackles the problem of projecting the full body into the camera. In order to operate keyboard and mouse operations and produce a realistic user interface, the proposed approach may, in general, detect and recognize hand movements. It's possible to do remote medical operations, 3D printing, and architectural design.

The panel's 3D orientation in order to enhance 3D items in reality. The projected screen's touch events. hand with several fingers. Our goal also includes incorporating speech recognition into the keyboard.

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