

# HAND GESTURE BASED OPERATING SYSTEM CONTROL

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## ABSTRACT

With rapid development of 3-D applications virtual environments in computer systems the need for a new type of interaction device arises. In the other words, evolution of user interfaces shapes the change the Human-Computer Interaction (HCI). Hand Gesture concept in the human computer interaction, which has become popular recent years can be used to develop such an interaction device. paper presents an overview of real time, vision based hand gesture recognition system that works precisely on relatively small-restricted gesture space for single the user robot control, track a player's hand or body position to control movement and the orientation of interactive game , and human-computer interaction.

**Key words:** Hand Gesture, The human machine Interaction, vision based etc

## I. INTRODUCTION

Hand gesture recognition system is relatively new field. Now a day's much research is going on in the field of an Artificial Intelligence in Natural language processing. Hand gesture, body postures are included in natural language. The use of hand gestures provides an attractive alternative to the cumbersome interface devices for human-computer interaction the (HCI). Users generally use hand gestures for expression of their feelings and notifications of their thoughts. Hand gestures visual interpretation can help in achieving the ease and naturalness desired for HCI. Recent researches in the computer vision have established the importance of gesture recognition systems for the purpose of human computer interaction. The primary goal of the gesture recognition research is to create a system which can identify specific human gestures and the use them to convey information or for

device control. A gesture may be defined as a physical movement of hands, arms, face, and body with intent to convey information or meaning. A translator is required for a deaf person to interact with a normal person.

## II. LITERATURE SURVEY

First, In vision based approach, there are various techniques used for hand detection, training the gestures, background subtraction and finger tip the detection which are reviewed as below: The feature based hand detection techniques used by Viola And Jones detector and scale invariant feature transform based hand detection have been implemented. These algorithms provide result with high accuracy but these are more sensitive to background. The second approach is image Segmentation which uses HSV color space model rather than RGB color space to determine the color of human skin. This algorithm gives better the result for background separation and region boundary but it can't detect the object of skin color with similar color background.

The third approach is learning based gesture recognition in Adaptive Boosting algorithm that can integrate the information of same category of objects. It trains the network by combining all weak classifiers into a strong classifier. The Ada Boost learning algorithm selects the best weak classifier from a set of positive and negative image samples. This algorithm provides result with better accuracy and fast speed but sometimes training period is more to train the network. Another approach is for finding convex hulls. There are so many algorithms available for

palm detection. In this section some of existing algorithms will be discussed which are used in our proposed technique.

The Graham's Scan Algorithm, Divide and Conquer algorithm, Jarvis's March or Gift wrapping Algorithm, Quick hull algorithm and Chan's algorithm. Convex hull of any given set of points get computed by Graham Scan. To implement the system for hand tracking and simple gesture recognition in real time, there is no need to touch or carry a peripheral device by user. By comparative analysis, we can conclude that only one detection technique is not enough because different kinds of methods can deal with different problems during detection & recognition. There are various available machine learning algorithms that are AdaBoost, support vector machine technique, hidden Markov model, & principle component analysis for training classifiers.

### III. RELATED WORK

Gesture recognition system gets mostly classified into the mainly three steps after acquiring the input image from camera. These are: the Extraction Method, features estimation and classification or recognition as shown in the Figure 1.



.Figure 1. Gesture recognition system steps.

#### A. Extraction method and image pre-processing :

First process for recognizing hand gestures is segmentation. It is the process of dividing the input image into regions separated by the boundaries. The segmentation process depends on the type of gesture, if it is a dynamic gesture then locate and track the hand gesture but input images have to be segmented only if it is a static gesture. The hand should be located firstly to specify the skin color a bounding box is used, since it is easy and invariant to scale, translation, and rotation changes. In the segmentation process the color space is used but HSV color models are used for color spaces sensitive to lighting changes. This technique concentrates on normalized R-G color space get by using pigments of the pixel. Some preprocessing operations are applied such as background subtraction, edge detection and normalization to enhance the segmented hand image.

#### B. Features Extraction

Good segmentation process leads to a perfect features extraction process and it plays an important role in a successful recognition process. Segmented images of feature vectors can be extracted in different ways according to particular applications. For representing feature extractions various methods have been used. Some methods use the shape of the hand such as hand contour detection others detect only fingertips position or palm center.

### IV. APPLICATION DOMAINS

This section, as the gesture recognition can be used in many more areas; we present an overview of some of the application domains that employ gesture interactions.

(a) Virtual Reality: Gestures for virtual and the augmented reality applications have experienced one of the greatest levels of uptake in computing. Virtual reality interactions use gestures to enable realistic manipulations of the virtual objects using one's hands, for 3D display interactions or 2D displays simulate 3D interactions.

(b) Robotics and Tele presence: The robotic applications are typically situated within the domain of the space exploration and military-based research projects. The gestures used to interact with and control robots are similar to the fully-immersed virtual reality interactions, however the worlds are often real, presenting the operator with video

feed from the cameras located on the robot. Here, gestures can control a robots hand and arm movements to reach for and manipulate the actual objects, as well it movement through the world.

(c) Desktop and Tablet PC Applications: In the desktop computing applications, an alternative interaction for the mouse and keyboard are gestures. Many gestures for desktop computing the tasks involve manipulating graphics, or annotating and editing documents using pen-based gestures.

(d) Games: When, we look at gestures for computer games. Freeman et al. tracked a player’s hand or body position to control movement and orientation to the interactive game objects such as cars. Konradet a used gestures to control the movement of the avatars in a virtual world, and Play Station 2 has introduced the Eye Toy, a camera that tracks hand movements for interactive games.

(e) Sign Language: Sign language is an important case of communicative gestures. Since sign of the languages are highly structural, they are very suitable as test- beds for vision algorithms. At the same time can also be a good way to help the disabled to interact with computers.

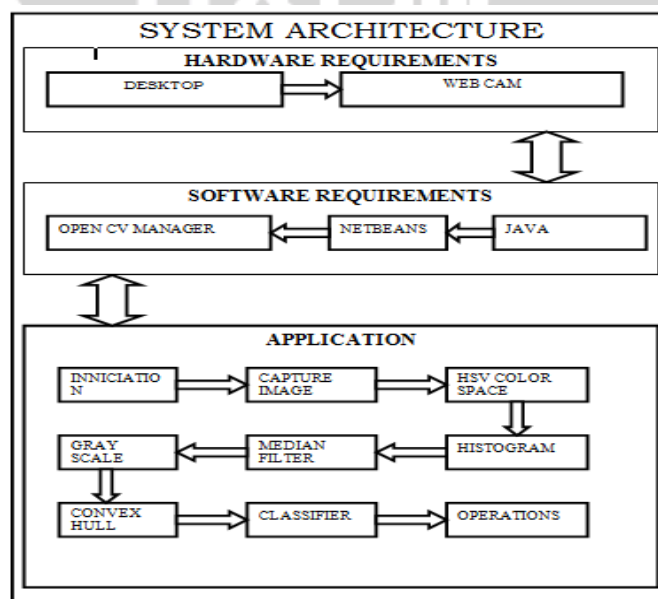
**V. PROPOSED SYSTEM**

Detection of a hand gestures and segmentation is done on the basis of Color, Shape, Motion, and Pixel Color: This stage mainly does of the work of hand detection and background removal from the image. The primary requirement before identifying classifying the hand signs to locate the hand in the frame, subtract the background and to be insensitive to lighting conditions. In order to be obtain the location of the hand, skin colour recognition is used. The algorithm used for skin colour identification is to convert the image obtained, which is an image in RGB colour space, YCbCr model or HSV model. a shape of the hand is used to detect the hand in many ways.

i) Contour-based shape representation and description methods are chain Code, Polygon, B-spline, Perimeter, Compactness, Eccentricity, Shape Signature, Handoff Distance Scale Space, Autoregressive, Elastic matching.

ii) Region-based the shape representation and description methods are Convex Hull, Media Axis, Area, Euler Number, Eccentricity, Geometric Moments Zernike Moment, Pseudo Zernike Moment , and Legendre Moments. Pixel value: Significant work has been carried out on the finding hands in grey level images based on their appearance and texture. It is based on the principle that highly accurate or strong classifier can be derived through the linear combination of many relatively inaccurate or\weak classifiers. In general, an individual weak classifier is required to perform only slightly better than random.

**VI. SYSTEM ARCHITECTURE/DATA FLOW DIAGRAM**



## VII. CONCLUSION

The main objective of this paper is the vision based method used for gesture recognition with the different approaches. The model based methods is the method which is very computational intensive and also, used for live analysis.i.e. real time. During implementation the static and dynamic methods can be implemented. OpenCV software is preferred as it is applicable for real time and execution is faster. Application can be in gaming, robotic control, computer/laptop interaction for deaf people, 3D interaction etc.

## VIII. ACKNOWLEDGMENT

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