

# Hand Gesture Recognition and Finger Count

Abhik Swarnakar  
FYMCA  
Department Computer Application  
MIT-WORLD PEACE UNIVERSITY

Ashish Pal  
FYMCA  
Department Computer Application  
MIT-WORLD PEACE UNIVERSITY

Rajesh Kumar  
FYMCA  
Department Computer Application  
MIT-WORLD PEACE UNIVERSITY

Dr. Anuradha Kanade  
Assi. Prof. School Of Computer Science  
MIT-WORLD PEACE UNIVERSITY

Sonu Kumar Soni  
FYMCA  
Department Computer Application  
MIT-WORLD PEACE UNIVERSITY

**Abstract-**This paper, focus on advance study of gesture control based robot. The first part of the paper provides an overview of the current state of the art regarding in recognition of hand gestures as these are observed and recorded by typical video cameras. We derive a set of motion features based on smoothed optical flow estimates. a user centric representation of these features obtained using face detection, and an efficient classifier is learned to discriminate between gestures. A number of hand gesture recognition technologies and applications for human vehicle interaction We are going to recognize hand gestures from a video sequence. Language used is Python. This technology possess a great deal of potential in all kinds of control, detection, automation, navigation and interaction applications like visual surveillance, a car, an aircraft, an electric circuit or home use appliances

**Keywords----***Human Computer Interface CV, Hand Signal, Outline, Convex-Hull, Convexity Defects.*

## I.INTRODUCTION

The requirement of computers and computing devices is increasing day by day. They have become an indispensable part of our lives. The increasing requirement of such computing devices and gadgets increase the necessity of devising more natural computer interfaces.

Computer vision started back in 1960's at the universities that were pioneering artificial intelligence. Later in the next decade the studies and researches in the field of computer vision became rigorous. The field of computer vision applications involves realizing the existing systems in the form of varied combinations of software and hardware, and increasing the processing speed and precision of the existing systems using vision based interaction and control.

New technologies are evolving for making systems that are artificially intelligent. One of the popular technologies in this field is Cyber glove technology. Cyber glove was created by virtual technologies in 1990. Cyber glove is an input device that is worn on the hands like a glove and forms a basis for human computer interaction. The glove is enabled with various kinds of sensors and tracking devices, number of sensors

ranges between 18-22. It has got different types of sensors that detect the bending of fingers also different types of motion tracking devices such as magnetic tracking device or inertial tracking device. The movements are predicted by the software accompanied by the glove. This technology was a revolution in the virtual world but was too costly to be afforded by many and so it was more popular among technological freaks only. No doubt this unprecedented flex sensor technology gives the best virtual reality experience but due to the cost of high end sensors, makes it unfeasible to be used in daily lives for interaction with computer systems. [1]

Our work deals with designing a more natural form of interface that uses no input devices or sensors for the movement or gesture capture. It is economic as it bears no extra cost of any kind of glove. We work on using hand gestures for the interfacing. It is easy to use and needs no prior training to know how to operate. It can be afforded by not one but many.

## II.APPLICATIONS

A Hand Gesture Recognition System recognizes the Shapes and or orientation depending on implementation to task the system into performing some job. Gestures is a form of non-verbal information. A person can make numerous gestures at a time. As humans through vision perceive human gestures and for computer we need a camera, it is a subject of great interest for computer vision researchers such as performing an action based on gestures of the person.

### A. Virtual presence:

Sometimes in a situation like machine, electricity failure, emergency hostiles condition or some remote areas which are inaccessible to humans, it could very dangerous for human operators to be physically appear to operate the machines or in the working conditions

### B. Bomb disposal:

Minedisposal is safer when human beings are replaced by the robot arm which will work on the same concept of this system. It leads to decrease in the risk of life of a human and it also inspires the efficient handling of the state.[2]

### III. TECHNOLOGIES UESD

#### CV2 MODULE-

OpenCV (Open Source Computer Vision) is a library of programming functions mainly aimed at present-time computer vision. First developed by Intel, it was future supported by Willow Garage then Issues (which was future developed by Intel). OpenCV also supports the deep knowledgeframes.

#### NUMPY MODULE-

It is not another programming language but a Python addition unit. It provides fast and capable operations on arrays of homogeneous data. It covers python into a high-level language for workingmathematical data, like to MATLAB.

#### MATH MODULE-

In MATLAB, we can use packages to make the maintenance and organization of MATLAB files easier. They help to create a namespace for the specific set of files contained within them. Packages are special files that can cover class folder,files, function, and class definition files, and other letters.

### IV. IMPLEMENTATION

#### A)Fact-finding –

The first move is to capture the copy from camera and to define a area of Interest in the surround, it is important as the image can contain a lot of variables and these variables can result in unwanted results and the data that needs to be processed is cheap to a large amount. To capture the image a web-camera is used that continuously captures surrounds and is used to get the raw data for giving out. The input

picture we have here is uint8. The Procured image is RGB and must be processed before that is before-processed before the workings are divided and response is made.

#### B) Facts Pre-Processing:

Pre-processing method can be completed 2-steps process:

- Divided
- Morphological clarifying

First Process is the Divided in process. It is done to change over grey-scale picture into the binary picture so we can have just twoArea of Interest in photo. That is, one will be hand and another one is related.

There are two main approaches to segmentation:

1)Pixel-based or local methods having: -

- a. Edge detection
- b. Boundary detection.

2)Region-based approach: -

- a. The region merging
- b. The region splitting
- c. Threshold method

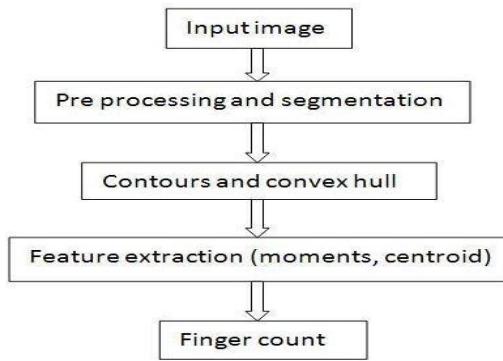


Fig 1 – Process of Application

### V. WORKING DIAGRAM

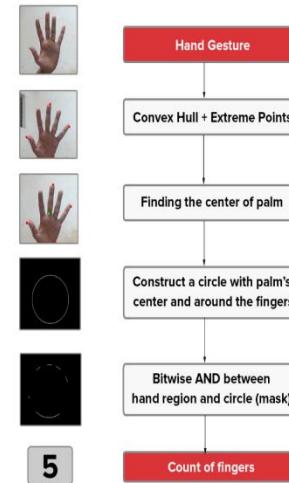


Fig. 2 – Working Diagram

### VI. HAND DETECTION

#### Contours

Contours are the curves joining all the continuous points along the limit, having same color or intensity. The contours are a useful tool for shape analysis and object detection and recognition. The contour is drawn along the boundary of the hand image which is found after Threshold

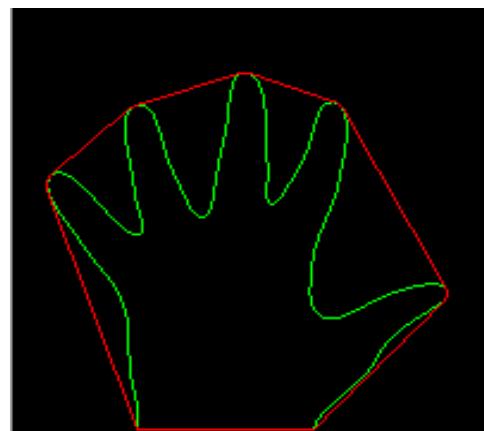


Fig. 3 – Hand Detection

### Convex Hull and Convexity Defects

We now find the convex points and the fault points. The convex points are generally, the tip of the fingers. But there is other convex point too. So, we find convexity faults, which is the secret point of deviance on the contour. By this we can find the number of fingers extended and then we can perform different functions according to the number of fingers extended. [3]

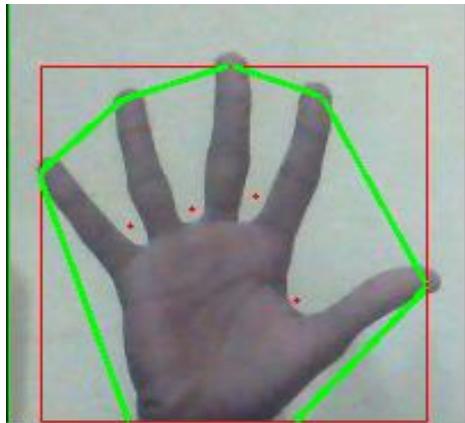


Fig. 4 – Hand and Figure Detection

**COUNT 1**

Fig. 5 – Hand Figure Count 1

**COUNT 2**

Fig. 6 – Hand Finger Count 2

**COUNT 3**

Fig. 7 – Hand and Figure Count 3

**COUNT 4**

Fig. 8 – Hand Finger Count 4

**COUNT 5**

Fig. 9 – Hand Finger Count 5



Fig. 10 – Hand Finger for ‘All the Best’

## VII. CONCLUSION

With the help of observations that we have, we can conclude that the results should be depend upon:

1. Background of pictures should be plain to get exact analysis of recognition of gestures.

1. Extra random keep an eye on minutes is helpful for checking whether the forms of the layout picture and the picture of individual have same shape.

2. For maintaining the performance, the database should contain the template images of small dimension.

We observe the following output by implementing algorithm [4]

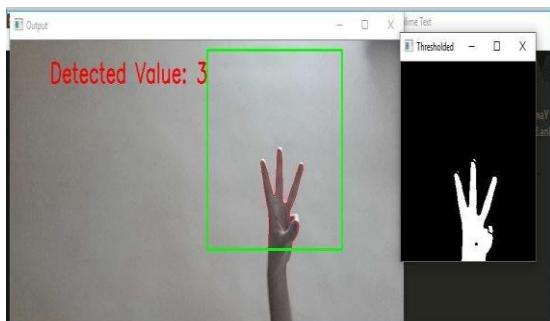


Fig. 11 – Hand Finger Count 3

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