



# CURSOR CONTROL USING GRS (GESTURE RECOGNITION SYSTEM)

Girish Birajdar<sup>1</sup>, Deepak Bhat<sup>2</sup>, AkshatGunjal<sup>3</sup>, Prof. Dipashri S.<sup>4</sup>

1,2,3 Students, Dept. of Information Technology Engineering, M.G.M. College of Engineering and Technology, Kamothe, Maharashtra, India

4 Asst Prof. Dept. of Information Technology Engineering, M.G.M College of Engineering and Technology, Kamothe, Maharashtra, India

**Abstract:** Gestures is one of the methods that can be used by the humans to communicate with each other. Humans not only use vocal language but also gestures to express themselves. Gesturing is a method of communication that can be understood by both humans and computers. Computers have advanced enough to understand human gestures using Gesture Recognition System. The main motive of a GSR (Gesture Recognition System) is to understand human gesture and control the device accordingly. For this system to work, we require a webcam attached to computer for capturing the gesture. And to make this system work, we used real-time had tracking algorithm, extraction algorithm and feature extraction.

**Key Word:** Gesture, Python, GRS (Gesture Recognition System), Mouse

## 1. INTRODUCTION

In order to convey our message non verbally, body movements are made and these movements are called Gestures. The movement can be used to agree or disagree during interaction or convey any other message. But how can a gesture be used to encode some information on it? What is the system requirements for implementing a GRS? The answers to all the above questions is discussed in this report. We have also covered, through the course of this paper, some really important aspects of gesture recognition system and one of the most interesting part, that is the future scope of GRS.

## 2. PROBLEM STATEMENT

Mouse has proven to be most important and useful factor in communication with our computer. But it can be quite difficult for an handicapped person to use a mouse. In some cases it might be nearly impossible or completely impossible to use mouse.

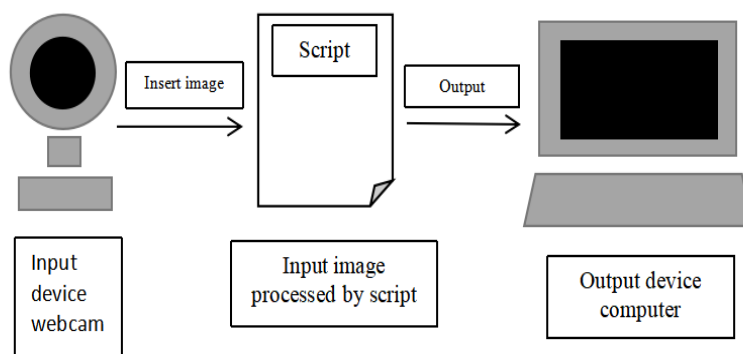
So in order to address this issue, we created a system that will help in controlling the mouse using GRS.

While explaining the uses, working and importance of GRS, another problem will be explained and solved using GRS. The problem is using mouse during travelling. Therefore this GRS is not only for disabled human, but also for the times where using mouse will be difficult.

## 3. PROPOSED SYSTEM

We need to create a relation between hand gesture and a hardware system using a set of codes which could be implemented using **PYTHON SOFTWARE**.

In Python, we will integrate web camera to read hand gestures and then we will use these detection codes, frame by frame, to process the signals further controlling hardwares such as **Mouse** or even **Traffic lights**.



### 3.1. HARDWARE BEING USED:

**Web Cam-**Web cam is the most important element in hand GSR because it is interfacing hand signals with Python software. This web camera captures every seconds of a hand gesture. These captured gestures are further processed using python and in this method, the hardware is controlled.

### 3.2. SOFTWARE BEING USED:

#### Python :

To develop this system, a program is written that can read hand gestures in python language.

This is how the software works:

- a) The video gets stored into a variable.
- b) An infinite loop is kept running to detect gestures in every single frame.

### 4. SYSTEM ANALYSIS

After creating software, the next step is controlling the actual hardware. This is achieved by integrating the micro controller with software and writing a set of conditional commands to operate it.

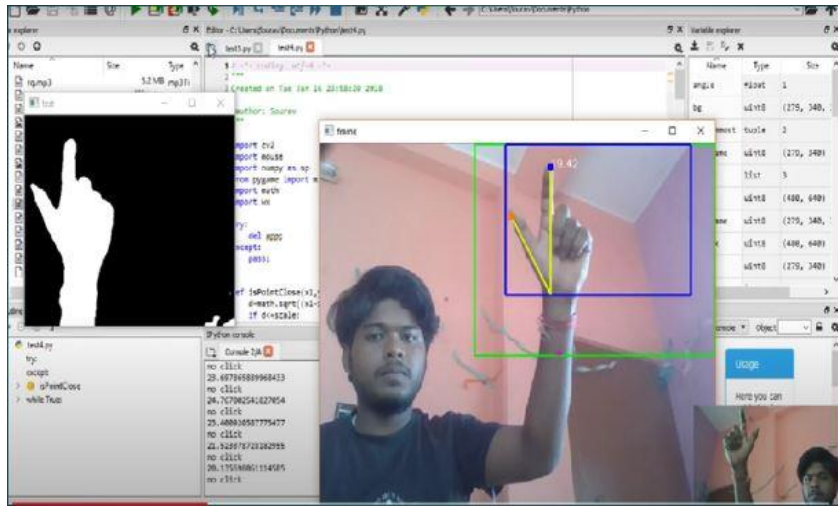
The first step will be written for the mouse through the hand gestures. A set of commands is written and every command is followed by a comment that explains the working and function that each step performs in this system.

#### 4.1. WORKING OF PYTHON

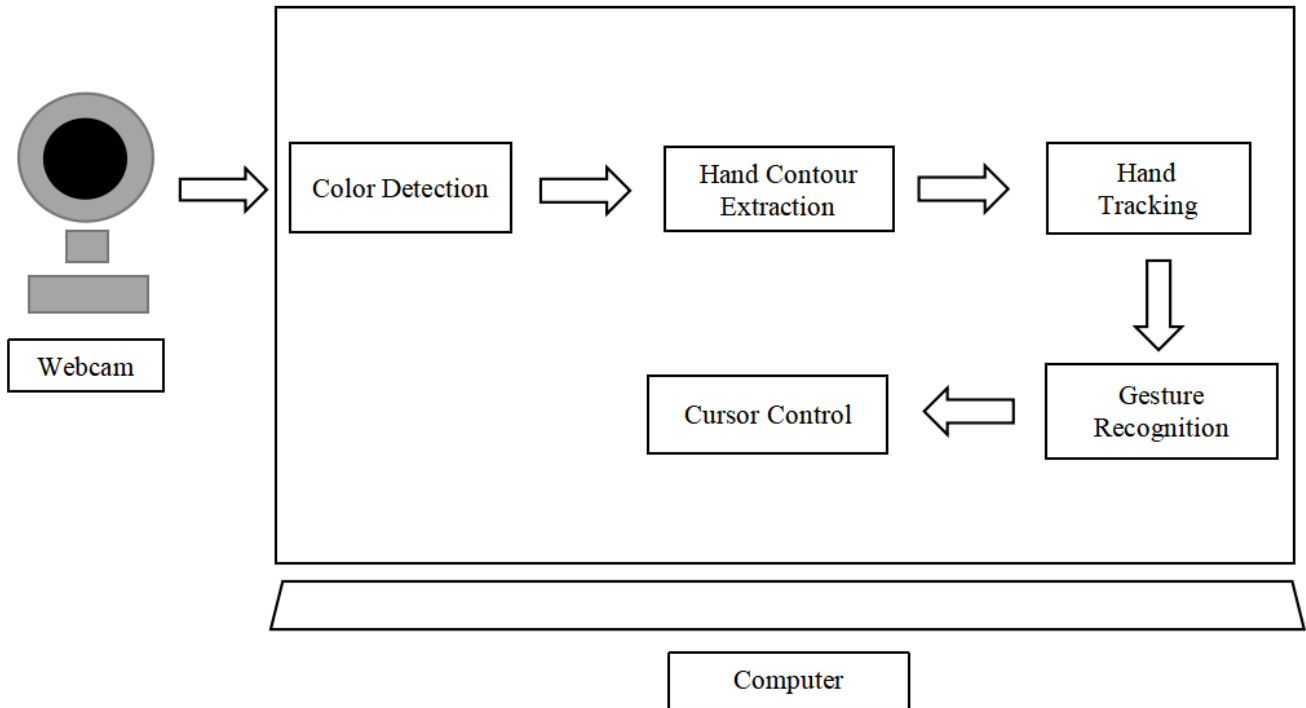
The following steps show how to develop the algorithm:-

- (i) First the program captures the image using webcam.
- (ii) The camera then extracts and recognizes the hand from the given image.
- (iii) The position of this hand is stored in the system using a regular coordinate-system.
- (iv) Then when the second frame is captured, the position of hand from the second frame is captured and gets stored into the system.
- (v) The position of the fingers are compared with other frames and then the cursor moves accordingly.
- (vi) To create click action, the angle between the two fingers is measured and if it is less than  $15^\circ$ , the system understands it as a left-click. In this method, the working of the mouse can be done with fingers.

### 4.2. OUTPUT SCREEN



### 5. SYSTEM ARCHITECTURE



The system can be divided into five main components. In this way, the method used in each component of the system will be explained separately.

There are following groups:

1. Color Detection
2. Hand Contour Extraction
3. Hand Tracking
4. Gesture Recognition
5. Cursor Control

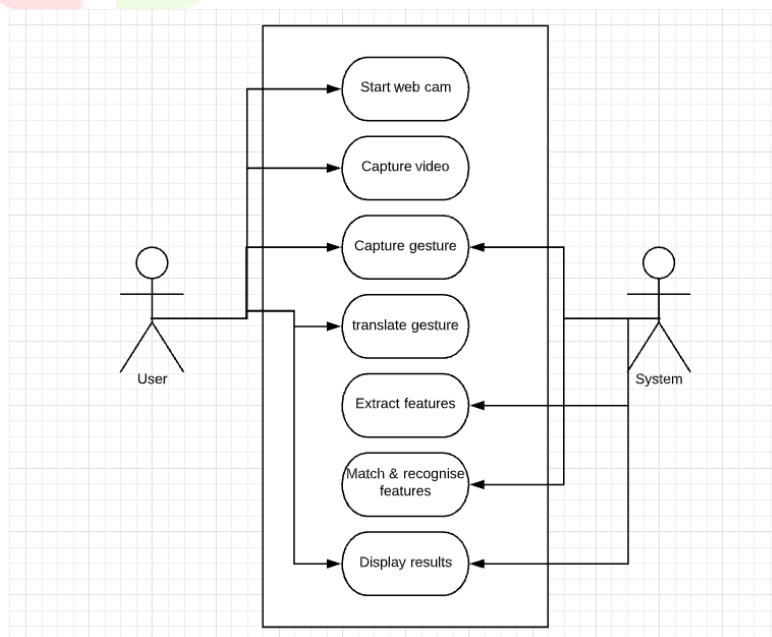
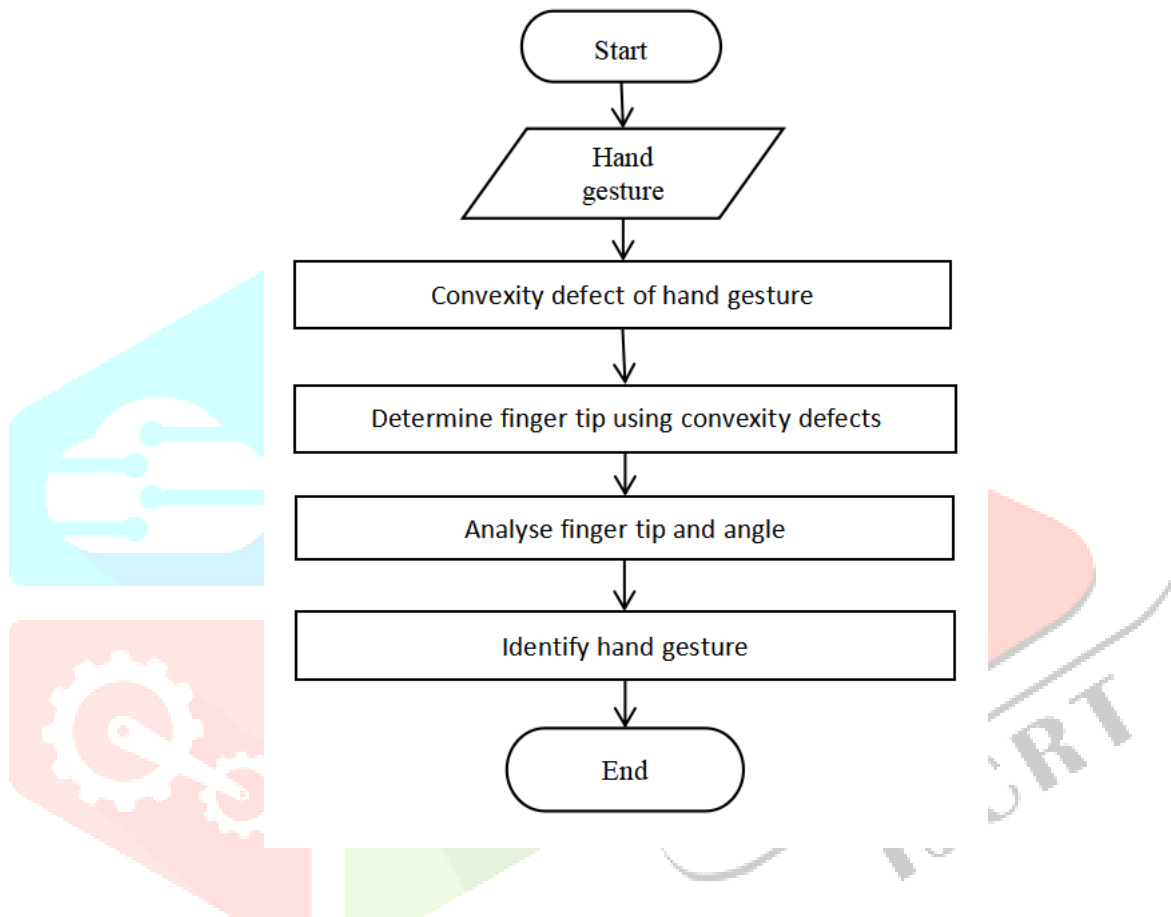
**1. COLOR DETECTION :** Color detection’s task is to detect the color pixels of the tapes bearing on the finger tip in an image. It includes a wide range of image processing applications such as face detection, hand tracking and hand gesture recognition. This will create a grayscale image (back projected image), where the intensity shows the possibilities that the pixel is a color tape pixel. This method is adapted since the histogram model is obtained from the users color caps, under the preset lighting condition.

**2. HAND CONTOUR EXTRACTION :** An order finding edge detection is used by the OpenCV to find the contours in the image. In this contour extraction process, the main job is to extract the hand contour so that shape analysis can be done on it to determine the hand gesture.

**3. HAND TRACKING:** The cursor is controlled by the tip of the index finger. The centre of the palm must first be found, to identify the tip of the index finger.

**4.GESTURE RECOGNITION :** The GRS method used in this proposed design is a combination of two methods, the method designed by Yeo and method designed by Balazs. It can be seen that the convexity defects for the hand contour must be calculated first. The convexity defects is calculated using the OpenCV inbuilt function “CV Convexity Defects”

**FLOWCHART**



**Fig- USE CASE DIAGRAM**

## 6. Advantages and Disadvantages

### 6.1. Advantages

1. Device can have easy interaction.
2. Use of Mouse, keys, remote controls or buttons can be reduced.
3. Speed and sufficient can be used for recognition system.
4. Great performance system with complex background.

### 6.2. Disadvantages

1. Foreign object might overlap with the hand.
2. Wrong object extraction will appear if the object is larger than the hand.

## 7. CONCLUSIONS

We have successfully presented a method to replace a mouse for old ,left handed, handicapped as well as non handicapped people. This method is quite efficient and does not require much besides the red bands and a web cam.

## 8. REFERENCES

- Hand gesture recognition using a real time tracking method and hidden Markov model sq Feng-Sheng Chen, Chih-Ming fu, national Sing Hua University, ROC received 15 January 2001; received in revised form 2 January 2003; accepted 20 March 2003.
- Pankaj Bahekar, Nikhil Darekar, Tushar Thakur and Shamla Mantri, "3D Gesture Recognition for Human-Computer Interaction", CiiT International Journal of Artificial Intelligent Systems and Machine Learning, January 2012
- Hojoon Park. "A Method for Controlling Mouse Movement using a Real-Time Camera", Master's thesis 2010.
- Pragati Garg, Naveen Aggarwal and Sanjeev Sofat, "Vision Based Hand Gesture Recognition", World Academy of Science, Engineering and Technology, pp.1-6 (2009).