**SYNOPSIS**

**Branch: -** B-Tech 6th sem (CSE)

**Name of Students**

1) Samyak Vinod Moon (16005046)

2) Shubham Prabhakar Surjuse (16005047)

**Title: -** Virtual Mouse Using Hand Gesture

**Aim: -** To create a Virtual Mouse using Hand Gesture in Real Time

**Objective: -**

1. Taking Color as Input from the Webcam

2. Recognizing the Color From the Input

3.Detecting the Contours

4.Applying Morphology for Smoothening Image

5. Creating a Pointer Using Mathematical Calculation

**Proposed System**

In our work, we have tried to control mouse cursor movement and click events using a camera based on colour detection technique. Here real time video has been captured using a Web-Camera. The user wears coloured tapes to provide information to the system. Individual frames of the video are separately processed. The processing techniques involve an image subtraction algorithm to detect colours. Once the colours are detected the system performs various operations to track the cursor and performs control actions.

We Require two hardware Components. First is WebCam That will help to detect the contour that ultimately help to build the mouse pointer. Second is a simple Scrolls, red in color that will be detected By the Camera. This Project is made with the help of four Libraries, that are OpenCv, NumPy, WXpyThon and PyNput. One more Library Known as PyInstaller Library is Also used in order to convert the This python project in .exe i.e. Application Format.

For the user to control the mouse pointer it is necessary to determine a point whose coordinates can be sent to the cursor. With these coordinates, the system can control the cursor movement. The output of function is a matrix consisting of the X(horizontal)and Y(vertical)coordinates of the centroid. These coordinates change with time as the object moves across the screen. Centroid of the image is detected Its co-ordinates are located and stored in a variable

By this mathematical equation we can find out the position of an mouse pointer.

Mouse.position = (sx-(mouseLoc[0]\*sx/camx),mouseLoc[1]\*sy/camy)

sx, sy= mouse coordinates

camx, camy= mouse coordinates on camera

MouseLoc= current mouse location

A real time hand gesture tracking technique which can track the moving hand and then extract the hand shape from complex background. It is a simple and reliable method developed as a real-time image processing subsystem. This method is robust and reliable in complex background. For tracking the moving hand and then for extracting the hand shape fast and accurately, the tradeoff between the computation complexity and robustness need to be considered.

A single web camera is used to capture a series of images. Image acquisition is the creation of photographic images, such as of a physical scene or of the structure of an object. The term is often assumed to imply or include the processing, compression, storage, and display of such images.

An improved color based segmentation technique was applied to segment the skin areas in a picture and use of skin-based segmentation in face recognition. An essential part is skin-colour pixels assumed in finding appearances in colored images and chromaticity estimations of distinctive colour spaces could be productively utilized for the information picture or image. The pictures that are taken form the camera is in the format of RGB that are converted in to HSV values and then other operations are performed. Segmentation of the color image was done into skin and non-skin areas are the first stage of face detection. They divided image segmentation in to four kinds pixel, edge, region and model based on specific application and working environment. The diversity of color spaces provides the ability to select the proper color space that can be utilized well under different environment conditions.

**Conclusion: -**

In this project, an object tracking based virtual mouse application has been developed and implemented using a webcam. The system has been implemented in environment using Image Processing Toolbox