



Virtual Mouse Using Hand Gesture

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Abstract - This Human Computer Interaction (HCI) has become one of the important projects in this new era and technology. Using the new technology many things have changed in this world, but there are still a few things which are still being used the same. One of the best examples one can give for this is the Computer System. A computer system in this era is still using the same computerized devices which were used before. But using HCI we can change these computerized devices by using the latest technology we have. This research work focuses on HCI using Hand Gesture movement for computerized devices like Mouse. Using this gesture, movement we will be eliminating the use of external and computerized hardware. We will be using free sources for development of the project and will be using the image processing and image acquisition process.

Index Terms - Human Computer Interaction(HCI), Hand Gesture, Image processing, Image Acquisition.

I. INTRODUCTION

Human Computer Interaction (HCI) is an interesting area of field. HCI (Human-Computer Interaction) is a fascinating area. Human-computer interaction (HCI) is a multidisciplinary area of research that focuses on computer technology design and, in particular, the interaction between humans (users) and computers. The creation of more collaborative and realistic interfaces is one of the major challenges in Human Computer Interactions. We are forced to use the devices that are pre-installed in our devices. The availability of a high-resolution pointing system with a single, isolated two-dimensional cursor is currently bound to computing environments. The modern graphical user interface (GUI), which is the latest standard interface on personal computers (PCs), is well-defined and provides an effective interface for a user to use different computer applications. Although computers have made tremendous advancements, the common human-computer interaction (HCI) still relies on input devices such as keyboards and mouse. Later as the Technology has been increased drastically wireless mouse was introduced so as to enable hassle free movement of the mouse and to improve the accuracy. No Matter how much the accuracy of the mouse increases but there will always be limitations of the mouse as the mouse is a hardware input device and there can be some problems as the mouse is a hardware device like any other physical object even the mouse will have a durability time within which is functional and after its durability time we have to change the mouse. Virtual Mouse using Hand Gesture is going to be a drastic change in the world of technology, where will be using our fingers to control the mouse. This technology will make the computer interaction to reach a new limit. This gesture movement will be programmed using the free sources so as to make an ease to every individual user. Sources such as OpenCv, Python etc. The virtual mouse will be using camera through which it will be detecting the fingers. The fingers will be in colour cap so as to track fast and to get a high level accuracy. The main objective of this project paper is to reduce the cost and to have a accuracy at a high level.

II. EXISTING SYSTEM

The existing system proposed a very high demanding cost and resources. Due to which there were not many user who could afford it. Also the environment used in the project was not friendly due to which not all user were able to handle it. The existing system is not very known as it has many drawbacks too look into the project.

III. PROBLEM DEFINATION

To develop a problem solution we first need to understand the problem that the user is facing difficulty while using the program. The solution of the existing problem is been eliminated in this.

Our flow of work is to process. 1.By using Open resources

2. No sensors
3. Low cost

IV. LITERATURE SURVEY

1. Angel, Neethu.P.S: The hand tracking has to be specifically adapted for each user. This system was implemented only in a restricted to the indoor environment. This system is prone to noise and sensitive to the change of the illumination.
2. J.L. Raheja, A. Chaudhary, K. Singal: Proposed using hsv algorithm but this uses special sensor kinect to capture image and processes it. User has to spend more money for the sensor.
3. Abhik Banerjee, Abhirup Ghosh: The presence of other coloured objects in the background might cause the system to give an erroneous response. If the resolution of the camera is too high then the system might run slow.

V. SYSTEM REQUIREMENTS

Hardware Requirements:

- System : Pentium IV 2.4 Ghz
- Webcam : Peripheral of at least 30 frames/second
- Resolution: 640*480
- Monitor : 15 VGA Colour.

Software Requirements:

- Operating System : Windows 7 and Above
- Coding Language : Python
- Tool Kit : Image Acquisition and Image Processing
- IDE : Pycharm and Anaconda

VI. PROPOSED METHOD

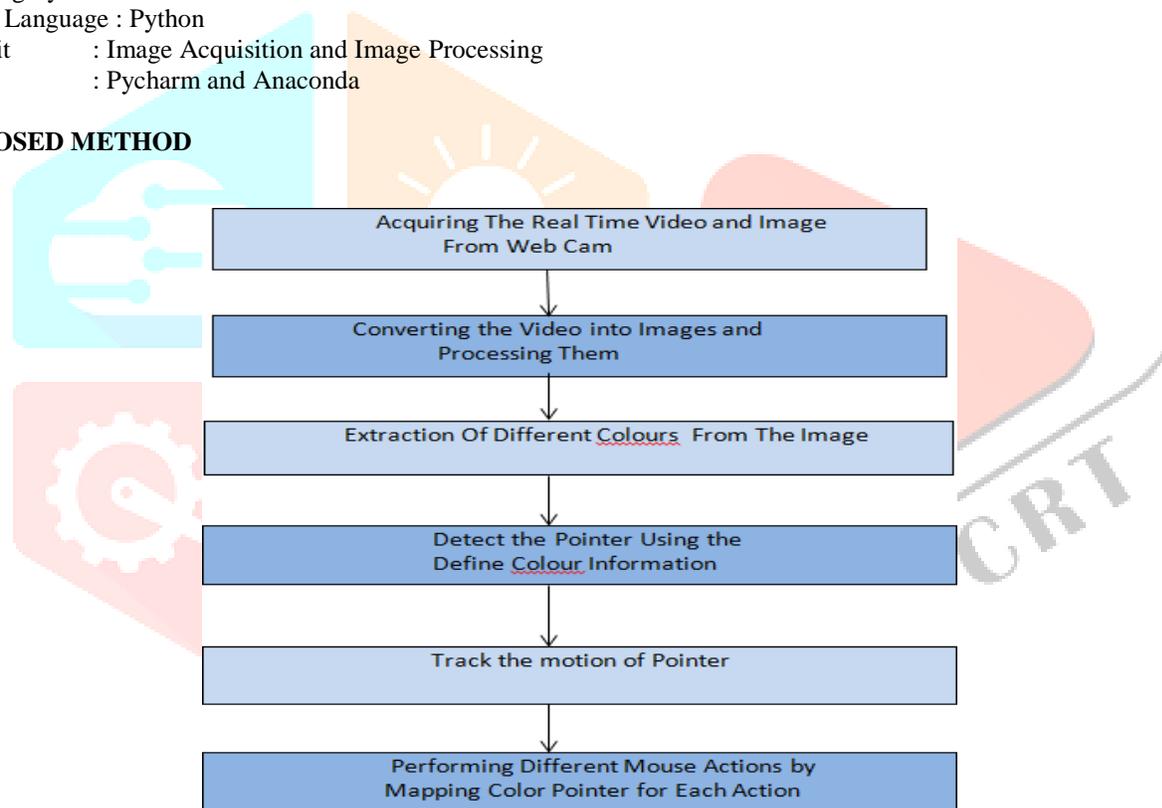


Figure 6.1: System Architecture

In the proposed method we are acquiring the real time images and videos from web camera through which will be converting the videos into images and will be processing them. The converted images will consists of different colors so the next step is to extract the color from the images. After the extraction process is done it will detect the points using the desired color mentioned that red, blue, yellow. This process is called the calibration mode and detecting the points. After the detection of points it will track the motion of the pointer moving on the screen. We can then perform the action of the mouse and this process will be done using the mapping color pointer for each action. It will perform actions like up, down, right, left, drag, click.

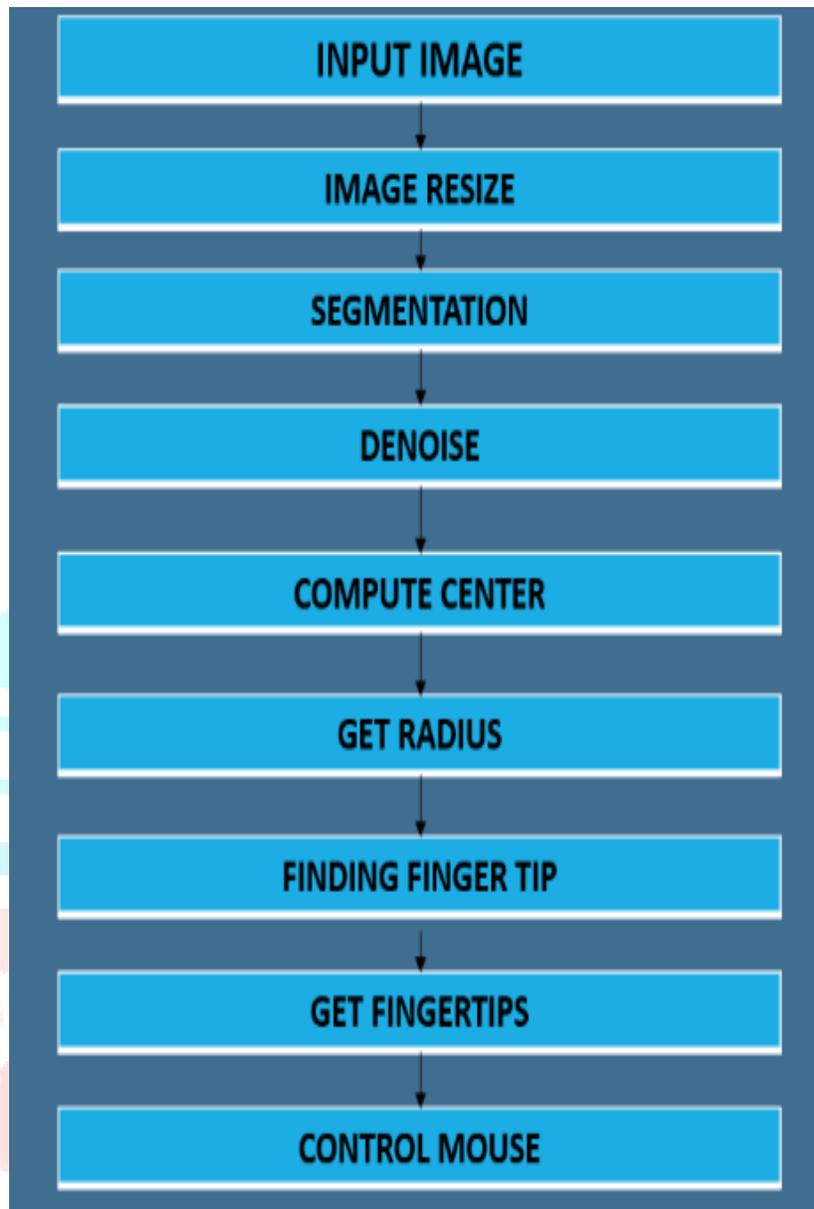
VII. FLOW MODEL

Figure 7.1 Flow Model

The flow model shows the working of the system with different functions. The system will first take the input of image from the web camera. It will also convert the video captured from the web camera and convert them into image. It will then resize the input image so that the segmentation can take place to calibrate the points on the image. It will denoise from the image and start showing the center radius of the image of the desired color. The radius points will be centered on the image of the color on the finger tip. The finger tips will now start moving according to the movement of the fingers. It will detect the points of the radius. We can now manipulate the cursor with fingertip movement.

VIII. IMPLIMENTAION

We all use new technology development in our day to day life. Including our devices as well. When we talk about technology the best example is a computer. A computer have evolved from a very low and advanced significantly over the decades since they originated. However we also use the same setup, which includes a mouse and keyboard.. Though the technology have made many changes in the development of computers like laptop where the camera is now an integrated part of the computer. We still have a mouse which is either integrated or an external device.This is how we have come across the implementation a new technology for Our mouse where we can control the computer by finger tips and this system is known as Hand Gesture Movement. With the aid of our fingers, we will be able to guide our cursor. For this project we have used .

Python as the base language as it is an open source and easy to understand and environment friendly. *Ananconda* is packaged python IDE that is shipped with tons of important packages. It is an friendly environment. The packages that are required here is *PyAutoGUI* and *OpenCV*. *PyAutoGUI* is a Python module for programmatically controlling the mouse and keyboard. *OpenCV* through which we can control mouse events. Red, Yellow, and Blue will be the three colors we use for our finger tips. It is a program that uses Image Processing to extract required data and then adds it to the computer's mouse interface according to predefined notions. Python is used to write the file. It uses of the cross platform image processing module *OpenCV* and implements the mouse actions using Python specific library *PyAutoGUI*.Real time video captured by the *Webcam* is processed and only the three colored finger tips are extracted. Their centers are measured using the system of moments, and the action to be taken is determined based on their relative positions. .The *first goal* is to use the function *cv2.VideoCapture()*.This function uses to capture the live stream video on the camera. OpenCV will create an very easy interface to do this. To capture a image we need to create an video capture object. We then covert this captured images into HSV format. The *second goal* is to use the function *Calibratecolor()*.Using this function the user will be able to calibrate the color ranges for three fingers individually. The *third goal* is to use the function *cv2.inRange()*.In this function depending on the callibrations only the three fingers are extracted. We remove the noise from the feed using the two stem morphism one is Erosion and second is Dilation. The next goal is to center the radius of the finger tip. So that we can start moving the cursor. ChooseAction() is used in the code to do this. The performAction() method uses the PyAutoGUI library to perform all of the following actions: free cursor movement, left click, right click, drag/select, scroll up, scroll down, and so on, depending on its performance. The Hand Gesture Movement is also available for use.

IX. RESULT

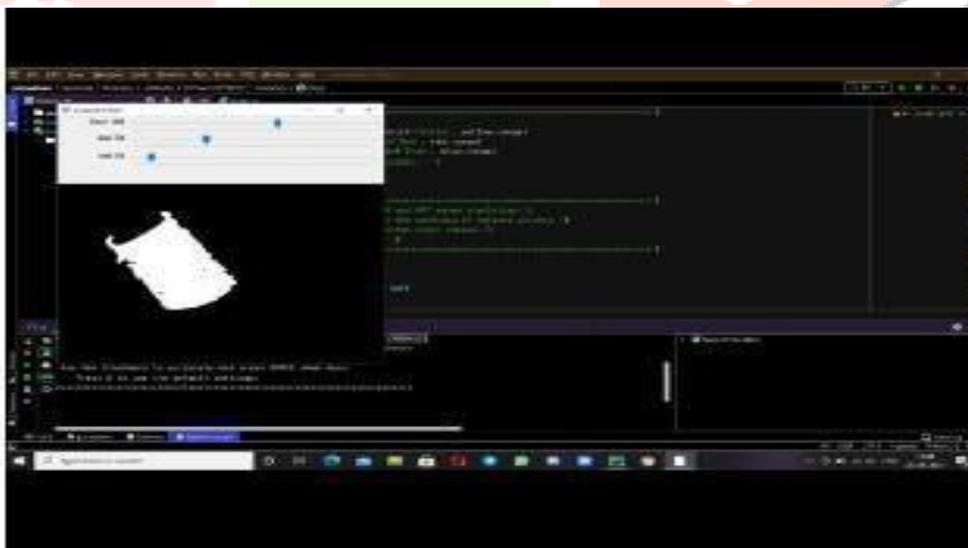


Figure 9.1 CALIBRATE BLUE COLOR

In the above figure the input image for blue color is calibrating to get the radius of the tip.

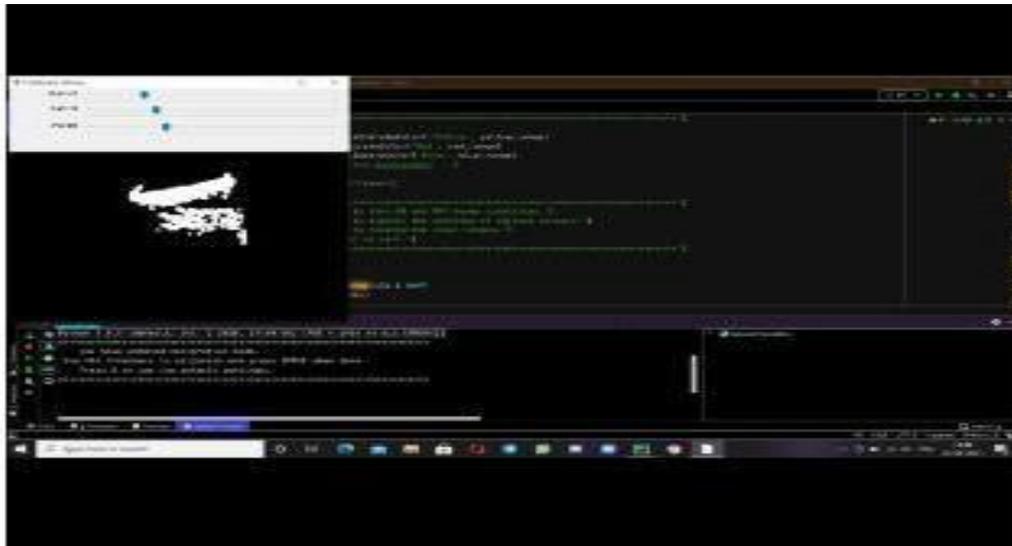


Figure 9.2 CALIBRATE YELLOW COLOR

In the above figure the input image for yellow color is calibrating to get the radius of the tip.

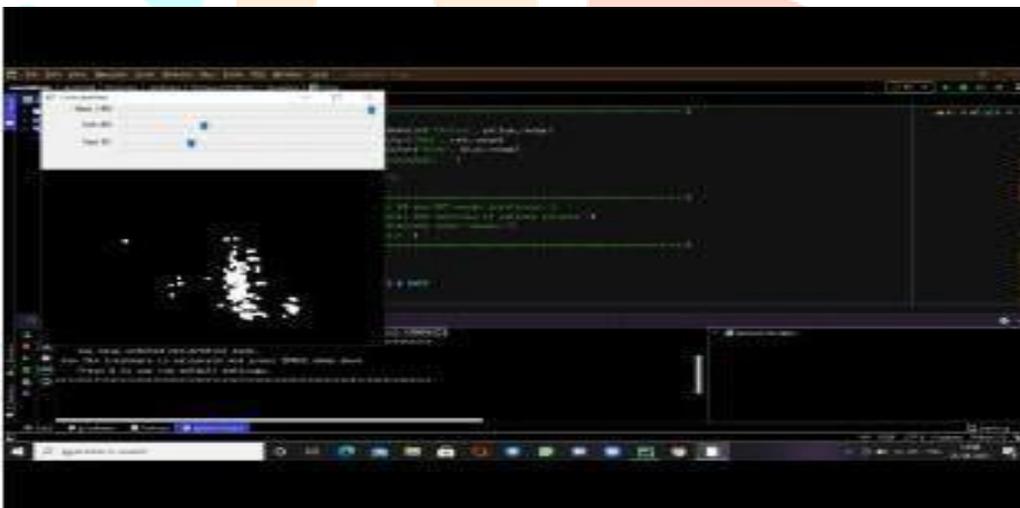


Figure 9.3 CALIBRATE RED COLOR

In the above figure the input image for blue color is calibrating to get the radius of the tip.

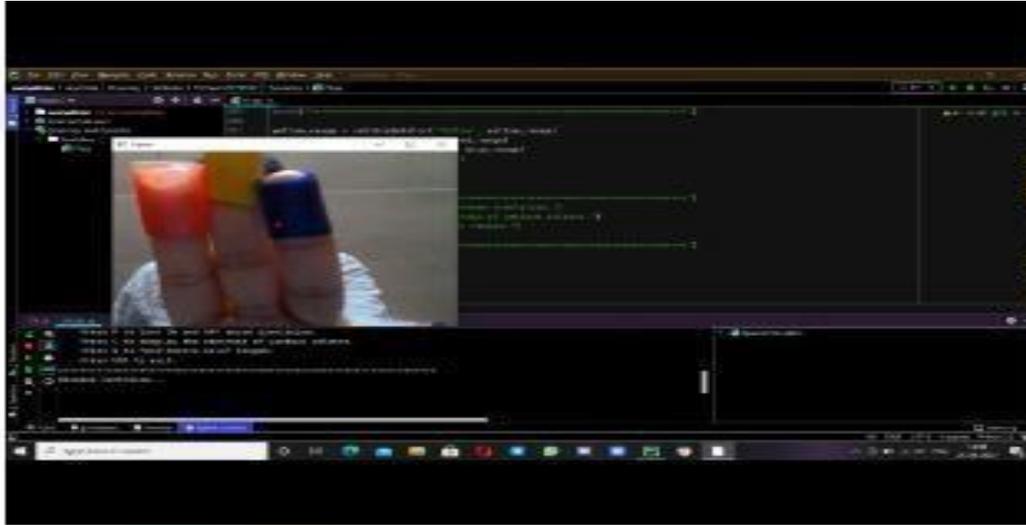


Figure 9.4 DETECTING CENTEROIDS

In the above figure after successful calibration of all the three colors it is now detecting the centroids of the finger and can move to control the mouse.

X. CONCLUSION

In this paper we have successfully implemented the cursor movement using the hand gesture. This is a project which uses the whole new technology making the human computer interaction in an easy and friendly way with a very minimal project cost.

XI. FUTURE SCOPE

The current project gives us the best results in a plain background and therefore in future will need to work on color background as well. The future work will include implementation of additional gestures which will enable the user to perform more functions with ease. The proposed system in this project uses only the right hand to perform gestures. Hence, improvement of the implemented technique in future can be possible using both hands for performing different gesture movement.

XII. REFERENCE

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