VIRTUAL MOUSE

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Abstract - *In today's technological era, many technologies are evolving day by day. In this project, three technologies are mainly used: object detection, image processing and color recognition. In this interface we have tried to control mouse cursor movements and click events using hand gestures based on color detection techniques acquired using web-camera. This method mainly focuses on increasing human-computer interaction and makes it easy in use in a cost effective manner. The application has been created on MATLAB environment.*

Key Words: **Virtual Mouse, Image processing, Color Detection, Mouse control, Human Computer Interaction, Hand gesture.**

1. INTRODUCTION

In this project, three technologies are mainly used: object detection, image processing and color recognition. In this interface we have tried to control mouse cursor movements and click events using hand gestures based on color detection techniques acquired using web-camera.

A virtual mouse is software that allows users to give mouse inputs to a system without using an actual mouse. To the extreme it can also be called as hardware because it uses an ordinary web camera. A virtual mouse can usually be operated with multiple input devices, which may include an actual mouse or a computer keyboard. Virtual mouse which uses web camera works with the help of different image processing techniques. A color pointer has been used for the object recognition and tracking. Left, right and double click events of the mouse have been achieved by detecting the number of pointers on the images. The hand movements of a user are mapped into mouse inputs. A web camera is set to take images continuously. The user must have a particular color in his hand so that when the web camera takes image it must be visible in the acquired image. This color is detected from the image pixel and the pixel position is mapped into mouse input. Depending upon the size of the image taken by camera, various scaling techniques are used because the pixel position in the image will not have a correspondence with screen resolution. In this paper, the mouse cursor movement and click events are controlled using a camera based on color detection technique. Here real time video has been captured using a Web-Camera. The user wears colored tapes to provide information to the system. Individual frames of the video are separately processed.

2. PROBLEM FORMULATION

Generally for personal use in computers and laptops we use a physical mouse or touchpads invented a long time ago and in this project requirement for external hardware is completely eliminated by using human computer interaction technology. The problem here is to develop a way so that humans can interact with a computer without having any physical connection with the computer. Many ideas were put forward but they all required physical movement of hardware. Another idea put forward was to use the principle of photoelectric effect. But for that a special hardware is needed and it is not economically feasible. So the final decision is to develop a virtual mouse which uses simple and cheap image processing techniques.

3. LITERATURE SURVEY

In this project an effective hand gesture segmentation technique has been proposed based on the preprocessing, background subtraction and edge detection techniques [1]. Pre-processing is defined as procedure of formulating data for another process. The main objective of the preprocessing process is to transform the data into a form that can be more effectively and effortlessly processed. In the proposed work, the pre-processing techniques are created on the basis of different types of combinations from the subsequent hand gesture image processing operations such as capturing image, removing noise, background subtraction, and edge detection.

A mouse, in computing terms is a pointing device that detects two-dimensional movements relative to a surface. This movement is converted into the

movement of a pointer on a display that allows to control the Graphical User Interface (GUI) on a computer platform. There are a lot of different types of mouse that have already existed in the modern days technology, there's the mechanical mouse that determines the movements by a hard rubber ball that rolls around as the mouse is moved. Years later, the optical mouse was introduced that replace the hard rubber ball to a LED sensor to detects table top movement and then sends off the information to the computer for processing. On the year 2004, the laser mouse was then introduced to improve the accuracy movement with the slightest hand movement, it overcome the limitations of the optical mouse which is the difficulties to track high-gloss surfaces. However, no matter how accurate can it be, there are still limitations exist within the mouse itself in both physical and technical terms. For example, a computer mouse is a consumable hardware device as it requires replacement in the long run, either the mouse buttons were degraded that causes inappropriate clicks, or the whole mouse was no longer detected by the computer itself.

Therefore, a virtual human computer interaction device that replaces the physical mouse or keyboard by using a webcam or any other image capturing devices can be an alternative way for the touch screen. This device which is the webcam will be constantly utilized by a software that monitors the gestures given by the user in order to process it and translate to motion of a pointes, as similar to a physical mouse.

Virtual mouse system based on Human computer interaction using computer vision and hand gestures. Gestures captured with a built-in camera or webcam and processed with color segmentation & detection technique. The user will be allowed to control some of computer cursor functions with their hands which bear colored caps on fingertips. Primarily, a user can perform left clicks, right clicks, and double clicks, scrolling up or down using their hand in different gestures. This system captures frames using a webcam or built-in cam and processes the frames to make them track-able and after that recognizes different gestures made by users and perform the mouse function. So the proposed mouse system eliminates device dependency in order to use a mouse.
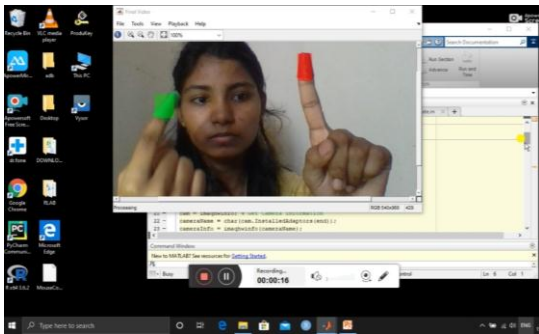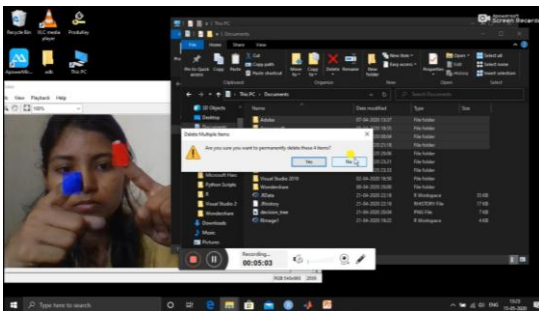
4. BLOCK DIAGRAM
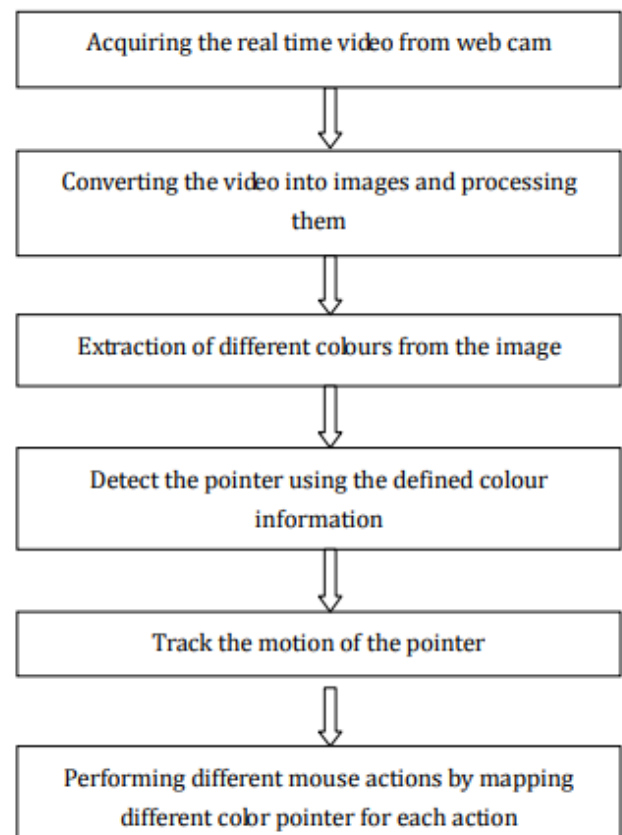
5. RESULT

5.1 Identifying Red color and performing curser movement
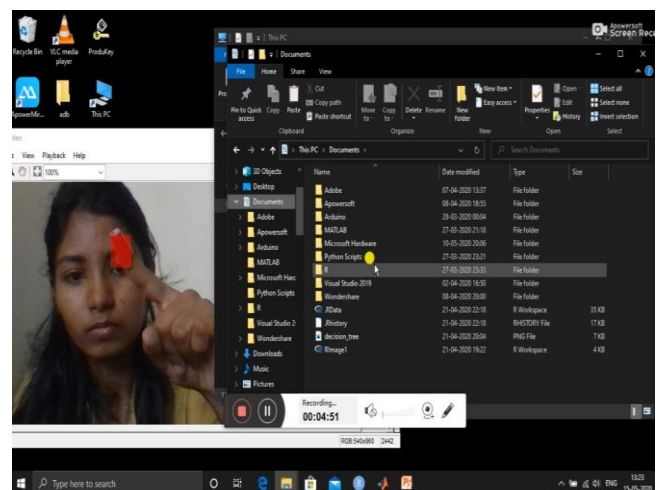
5.2 Identifying Green color and performing scrolling from top down

5.3 Identifying blue color and performed different click operation

6. CONCLUSIONS

The system architecture that has been proposed will completely change the way people would use the Computer system. Presently, the webcam, microphone and mouse are an integral part of the Computer system. This project will completely eliminate the necessity of mouse. Also this would lead to a new era of Human Computer Interaction (HCI) where no physical contact with the device is required.

An object tracking based virtual mouse application has been developed and implemented using a webcam. The system has been implemented in MATLAB software. We implemented all mouse tasks such as left and right clicking, double clicking, and scrolling.

REFERENCES

[1] "Hand Gesture Recognition Using Web Camera" Viraj Shinde, Tushar Bacchav, Jitendra Pawar, Mangesh Sanap, International Journal of Advanced Engineering & Innovative Technology, Volume 1, Issue 1, April-2014.

[2] Henzen and P. Nohama, "Adaptable virtual keyboard and mouse for people with special needs," *2016 Future Technologies Conference (FTC)*, San Francisco, CA, 2016, pp. 1357-1360, doi: 10.1109/FTC.2016.7821782.

[3] "Hand Gesture Recognition System Using Image Processing" Sagar P. More and Abdul Sattar, International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT) – 2016

[4] K. H. Shibly, S. Kumar Dey, M. A. Islam and S. Iftekhar Showrav, "Design and Development of Hand Gesture Based Virtual Mouse," *2019 1st International Conference on Advances in Science, Engineering and Robotics Technology (ICASERT)*, Dhaka, Bangladesh, 2019, pp. 1-5, doi: 10.1109/ICASERT.2019.8934612.

Website,

[5] www.mathworks.com

[6]Banerjee, Abhik & Ghosh, Abhirup & Bharadwaj, Koustuvmoni & Saikia, Hemanta. (2014). Mouse Control using a Web Camera based on Colour Detection. International Journal of Computer Trends and Technology. 9. 10.14445/22312803/IJCTT-V9P104.