

New Generation Cursor and Video Control System

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Abstract - This paper proposes an innovative method to interact with computer system. The proposed system is based on image processing technology. The objective is to create a virtual mouse system and a mechanism for controlling video play-pause option automatically with the help of face detection. The system uses web camera to interact with the computer in a more user friendly manner. Various mouse actions such as cursor movement left click and right click operations are performed based on the colour which is detected by the system.

Keywords - Hand gesture, Human Computer Interaction, Color Detection, Web camera, Background, Face detection.

I. INTRODUCTION

Computer technology has tremendously grown over the past decade and has become a necessary part of our everyday life. A mouse is an electronic device used to interact with the computer. However, there are some drawbacks of this input device. It requires a flat surface and space to operate. Once a mouse is damaged it is usually discarded as an electronic waste which has adverse human health effects and leads to environmental pollution. A different approach to control computer cursor should be used that uses minimum hardware.

The system is based on image processing. Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. The objective of this paper is to create an innovative way to control a computer system. The proposed virtual mouse system uses a web camera to interact with a computer in a more user friendly manner. Additionally the systems detects user's face from the webcam and continuously monitor it. If the user goes out of frame, then video pauses. The video automatically resumes when the user's face is detected again. By this way user need not pause the video to do some other activity.

II. RELATED WORK

In the computer industry some researchers tried to control the cursor using various techniques such as hand gestures, colour objects. However these are used different methods such as Pranav Mistry's Mouseless - a novel input device that provides the familiarity of interaction of a physical computer mouse without actually requiring a real hardware mouse.[1]. Another approach was developed by Chu-Feng Lien [2].He used solely the finger-tips to

manage the mouse pointer and click on. His clicking methodology was supported image density, and needed

the user to carry the mouse pointer on the specified spot for a brief amount of your time. In reference a real-time, non-invasive, vision system which performs hands-free cursor control by having users point their nose where they wish to place the cursor on a monitor screen.[3]. In this study colour tapes has been used for the object tracking. Cursor Movement, Left and right click operations performed by RGB tapes achieved through image processing. And also execute concurrently video play or pause using face detection.

III. PROPOSED WORK

Proposed system is developed as an application which allows the user to control computer cursor using Red, Green and Blue coloured tapes. It performs operations such as Right Click, Left Click, Scrolling, Zoom in and Zoom out.



Fig. 1 Colour detection.

Additionally the system also detects user's face from the web camera and continuously monitors it while the user watches a video. If the user goes out of the frame, then video pauses. The video automatically resumes once the

user's face is detected again. By this way user need not pause the video to do some other activity. (fig.2).



Fig.2 Face Detection

The architecture consists of three modules i.e. Image acquisition module, Colour detection module, and Face detection module. Image acquisition module deals with capturing of an image using a webcam for image pre-processing. Colour detection module deals with detection of RGB coloured objects using image subtraction algorithm. Face detection algorithm deals with detection of user's face in order to play/pause a video.

IV. TOOLS AND LIBRARIES

1. Introduction to Python

Python is an interpreter, high-level, general-purpose programming language, created by Guido van Rossum and first released in 1991. Python language is chosen as its syntax is easy to learn, so both non-programmers and programmers can start programming right away. Python looks more like a readable, human language than like a low-level language.[7].

2. Introduction to Open CV

Open CV (Open Source Computer Vision) is a library of programming functions for real time computer vision. It is mainly used for developing advanced image processing and computer vision applications.[8] The system implemented by using following technologies.

3. Hardware

Table 1 Hardware

Processor	Intel Core i3
RAM	4 GB
System architecture	64 bit
CPU clock	2.00 GHz
Web camera	VGA

4. Software

Table 2 Software

Operating System	Windows 10
Libraries	Open CV
Language	Python 2.7
Editor	Sublime Text Editor

5. Libraries

imutils	Image processing functions such as translation, rotation, resizing.
pyautogui	Used to programmatically control the mouse & keyboard.
wx	Used to programmatically control the mouse & keyboard.
numpy	Num Py is the fundamental package for scientific computing with Python.
time	This module provides various time-related functions.
vlc	This module provides vlc player functions
Easygui	EasyGUI is a module for very simple, very easy GUI programming in Python.
msvcrt	These functions provide access to some useful capabilities on Windows platforms.
Tkinter	Tkinter is Python's de-facto standard GUI
tkFileDialog	tkFileDialog is a module with open and save dialog functions.

V. METHODOLOGY

The system consists of three modules. The description of the three modules is as follows.

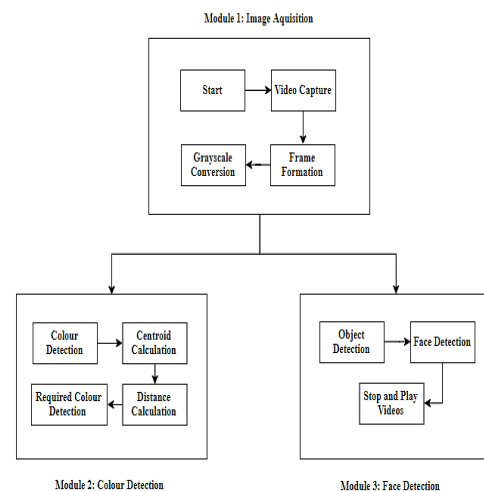


Fig. 3 System Architecture.

1. Image Acquisition

In this module, the system captures image from a web camera. Processing takes place on image frames extracted from the video. The system flips the image because captured image is a mirror image. Later the system converts this image into gray scale as the complexity is reduced in a gray scale image. (fig. 3)

2. Colour Detection

This is the most important step in the whole process. The system detects the red, green and blue colour object by subtracting the flipped colour suppressed channel from the flipped Gray-Scale image using Open CV libraries. (Fig. 3).

3. Face Detection

Human face detection provides a way for user to view any video in computer. Initially the system detects user's face from the webcam and continuously monitors it. If the user goes out of frame, then video pauses. The video resumes when the user's face is detected again. By this way user need not pause the video to do some other activity. (fig. 3).

which is regularly extremely exorbitant. Our thought process was to make this innovation in the least expensive conceivable way.

VIII. FUTURE WORK

For future development, it will require further research in Human-Computer Interaction (HCI). This includes voice command module which can use voice commands to perform various actions such as opening a folder, creating a folder or deleting a folder. Additional research and investments into hardware components such as infrared camera and colored LED lights would help to improve the efficiency of the system.

VI. RESULTS

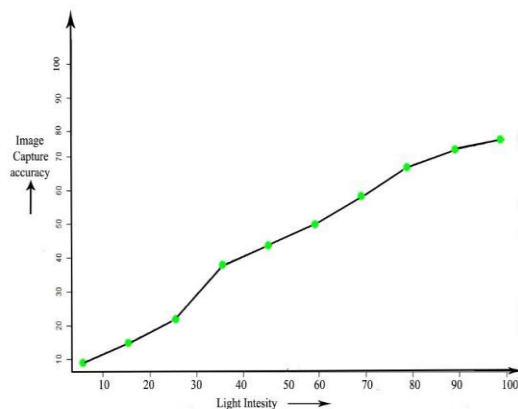


Fig. 4 Image capture accuracy.

The fig 8.1 indicates light intensity versus picture capture accuracy graph which demonstrates picture capturing precision which will rely on the light intensity as the light intensity grows the picture capturing accuracy increases. In this system, we utilized bright color with the goal that the system will recognize colors despite the fact that light intensity is low.

VII. CONCLUSION

A system is developed to control a computer cursor in real time using web camera with the help of image processing technology. Mouse actions such as cursor movement, left click and right click are performed using different coloured tapes. The system is developed using python language and Open CV library. Furthermore, the system contains a face detection module which helps to ease the video viewing experience for the user. It play/pause the video based on whether the user is looking towards the video. The system provides a new way to interact with the computer system. This technology has a wide number of applications in the field of virtual reality, computer gaming, medical science, computer simulation. The majority of the applications require extra equipment

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