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1. Introduction

1.1 Motivation

The mouse is one of the important inventions in computer world which improved human machine interactivity. In present scenario, wireless and Bluetooth embedded mouse technology is developed but it is not that ideal to use as this technology is not completely hands free. In Bluetooth technology the mouse developed requires power such as battery power or connecting devices like dongle.

By adding these extra components to the mouse the cost increases and it is also not user friendly to use. So, in the proposed model these limitations are removed and interaction is made user friendly as well as cost is also reduced. This model is actually a virtual mouse system using hand gestures with the help of computer vision.

1.2 Definition

The primary aim of this project is to improve human and computer interaction by developing an effective and alternative way of controlling the cursor and its various functions such as left click, right click, scroll up, scroll down and selection. With the help of this model a user can easily interact with the system/computer without the use of an external device. It also allows the user to interact with system from a considerable distance. And because of this improvement the essential hardware required for the computer/laptop is also reduced.

This model makes use of the webcam to capture the video feed, which is used for image processing, and now a days webcam is an essential device/hardware for a laptop/computer and therefore it is not considered as an extra hardware.

1.3 Objective

The objective of this project is to improve the usability and experience of the users by providing a better machine and human interaction. The Image/Video feed from the webcam is used to track and detect gestures and mapping those unique gestures to different mouse events.

Retrieve the image data from the webcam and convert it to a usable format and use it as input. The image must be filtered to identify different colors. Make contours and find the mean positions of those contours. Track those mean positions to recognize the gestures. Map those gestures to different mouse actions and use them.

2. LITERATURE SURVEY

2.1 Existing System

S.no Year Name Authors Algorithms used and Drawbacks

1 2020 Virtual Mouse Using Object Tracking

Prof. Monali Shetty , Christina Daniel, Manthan Bhatkar

Hvm,Svm algorithms are used.Time taken to detect is nearly 20 sec

2 2020 Gesture Recognition Based Virtual Mouse

Sugnik Roy Chowdhury, M.D. Anto Praveena

Convex Hull algorithm is used.Accuracy is 75-85%

Continuous finger movement results in stress in fingers

3 2019 Design and Development of Hand Gesture Based Virtual Mouse Kabid Hassan Shibly, Samrat Kumar Dey
Computer Vision is used.

Less accuracy and system recognition of colours is poor.

4 2019 Virtual Mouse Control by Webcam for the Disabled

Reyhan Seher, Mazlum unay

Eye ball Tracking using matlab. Eye blinking may occur random

5 2019 Cursor Control Using Eye Ball Movement

Vandana Khare, S.Gopala Krishna

Pupil movement detected using open source computer vision. The eye movement converted into voltage and time graph, normal webcam can't be used.

Table 2.1 Existing System

2.2 Proposed System

The model/system that we proposed is a cursor control model using image processing, which takes hand gestures that are being captured from a webcam as an input in HSV format and by detecting the centers of the color contours thereby detecting the gestures, it performs mouse events and mouse movements. We use three standard colors which are represented on three fingers of a hand to detect the gestures.

Python, PyAutoGui and OpenCV (cv2) library is used to implement this model for Hand gesture tracking. This system is easy to use and it is also easy to remember the gestures that are provided to perform different operations. And once the Model is deployed on the system, we can use this version of the mouse all the time.

3. SYSTEM ANALYSIS

3.1 Functional Requirements Specifications

After analysing the project objective, we have come up with following modules:

- Color Calibration:

With the help of Computer vision (Opencv2), we recognised three standard colors and converted them into HSV format using cv2.convert() function and calibrated the colors. Users can dynamically adjust hue, saturation, value of the colors.

- Centroid Detection:

From the output of the color calibration module, we calculate a mean point which represents contour of each color. With these centroid points we detect the type of gesture position made by user.

- Multiple Gesture Recognition:

By the position and movement made by the user various gestures are recognised, if any gesture is not recognised by the system model then it considers it as free movement of the mouse cursor with help of only one color.

- Mouse Events and Movement:

Based on the gestures recognised by the model equivalent mouse events are performed with the help of 'Pyautogui', a python library.

3.2 Software Requirements

- 64-bit Operating System: Windows 7 or Higher
- Jupyter Notebook/ Google Colab
- Python version >3.0
- PyAutoGUI
- OpenCV

3.3 Hardware Requirements

- A Good Webcam
- RAM preferably >8GB for faster processing
- GPU
- Memory space >500GB

3.4 Environmental Specifications

- A well lit room with mostly light and pale colors.
- No other objects should be present in front of the webcam (particularly red, yellow blue colored objects) except colors on the user's hand.

4. SYSTEM DESIGN

4.1 Architecture of Proposed System

Fig 4.1 : Architecture Diagram

4.2 UML Diagrams

Sources	Similarity
report.docx - ABSTRACT This project is a mouse simulation various functions such as left click, right click, scroll up, scroll down and selection. It helps user interact with the computer from a considerable distance without ... https://www.coursehero.com/file/80255895/reportdocx/	13%