

AI VIRTUAL MOUSE: Engineering College Prospective

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I. Abstract

Many technologies are evolving day by day. As computer technology advances, the importance of human-computer interaction grows exponentially. Touch screen technology in mobile devices is currently popular. However, this technology is prohibitively expensive for use in desktop systems. Using a webcam, computer vision techniques can be used as an alternative to a touch screen and to create a virtual human-computer interaction device such as a mouse or keyboard. For example- wired mouse there is no extend limit. In wireless mouse Bluetooth hardware installed in the computer and Bluetooth dongle attached. But the proposed system as no such limitations and it is easily used in the current technology. In this study, a virtual mouse application based on finger tracking was designed and implemented using a standard webcam. Our concept is to use a camera and computer vision technology, as image segmentation and gesture recognition, to control mouse tasks (clicking and scrolling) and we show how it can perform everything current mouse devices can. The goal was to develop a virtual human-computer interaction device and an object tracking application to interact with the computer. In this paper, we present a novel approach for Human Computer Interaction (HCI) where cursor movement is controlled using a real-time camera.

Keywords: HCI, Hand Gesture, Web Camera, Background Subtraction, Python, OpenCV

II. Introduction

Since the computer technology continues to grow up, the importance of human computer interaction is enormously increasing. Touch screen technology in mobile devices are in trend at present. A virtual mouse is a device used to air-browse the functions of a system such as computer, laptop or a smart-pad with the functions corresponding to a mouse. However, this technology is expensive to be used in desktop systems. It is believed that gestures are the easiest way of interaction with anyone. So then why not apply it to the machines that we are using. Computer vision techniques can be an alternative way for the touch screen and creating a virtual human computer interaction device such as mouse or keyboard using a webcam. In this work, we are demonstrating real gestures. In this study, finger tracking based a virtual mouse application has been designed and implemented using a regular webcam. The motivation was to create an object tracking application to interact

with the computer and develop a virtual human computer interaction device.

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III. LITERATURE SURVEY

Human-computer interaction (HCI) is an area of research and practice that emerged in the early 1980s. Human-computer interaction (HCI) is a multidisciplinary field of study focusing on the design of computer technology and, in particular, the interaction between humans (the users) and computers. While initially concerned with computers, HCI has since expanded to cover almost all forms of information technology design.

HCI surfaced in the 1980s with the advent of personal computing, just as machines such as the Apple Macintosh, IBM PC 5150 and Commodore 64 started turning up in homes and offices in society-changing numbers. For the first time, sophisticated electronic systems were available to general consumers for uses such as word processors, games units and accounting aids. Consequently, as computers were no longer room-sized, expensive tools exclusively built for experts in specialized environments, the need to create human-computer interaction that was also easy and efficient for less experienced users became increasingly vital. From its origins, HCI would expand to incorporate multiple disciplines, such as computer science, cognitive science and human-factors engineering.

Gesture recognition is the mathematical interpretation of a human motion by a computing device. Gesture recognition is an active research field which tries to integrate the gestural channel in Human Computer Interaction. It has applications in virtual environment control, but also in sign language translation, robot remote control or musical creation.

Recognition of human gestures comes within the more general framework of pattern recognition. In this framework, systems consist of two processes: the representation and the decision processes. The representation process converts the raw numerical data into a form adapted to the decision process which then classifies the data.

IV. PROBLEM STATEMENT AND OBJECTIVE

1. Problem Statement

To develop a software solution to a problem, the first step is to understand the problem. 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.

2. Objectives

1. Create such application which is part of AI.
2. To design to operate with the help of a webcam.
3. User should able to easily install in their computer.
4. User should able to use feature of Drag & Drop.
5. Also, it must have Scrolling feature.

6. To design a virtual input that can operate on all surface.

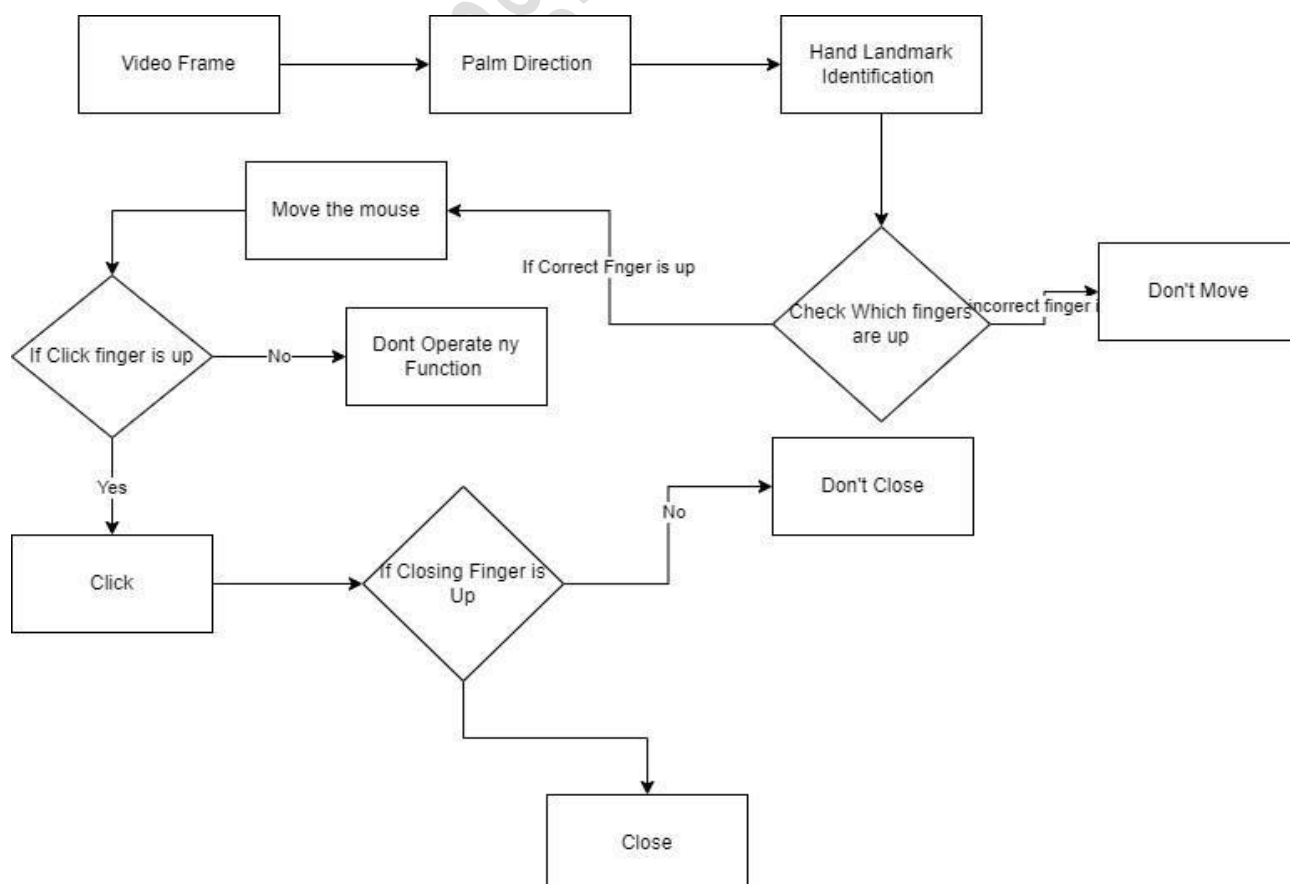
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7. To convert hand gesture/motion into mouse input that will be set to a particular screen position.
8. UI of application should be easy to use.
9. Program should run as fast as possible without any lag.
10. There should be no heavy task which can disturb user.

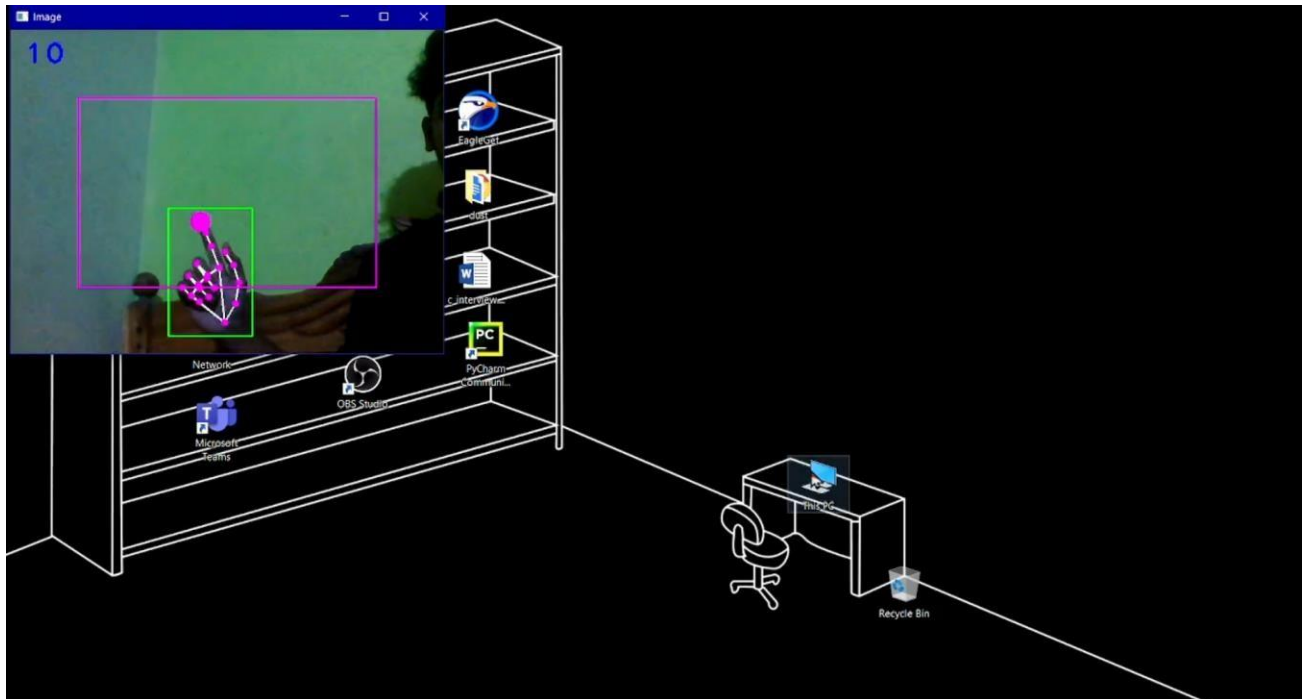
V. PROPOSED SYSTEM

- Capturing real time video using Web-Camera.
- Processing the individual image frame.
- Flipping of each image frame.
- Conversion of each frame to a grey scale image.
- Conversion of the detected image into a binary image.
- Finding the region of the image and calculating its centroid.
- Tracking the mouse pointer using the coordinates obtained from the centroid.
- Simulating the left click and the right click events of the mouse by assigning different Hand gesture.

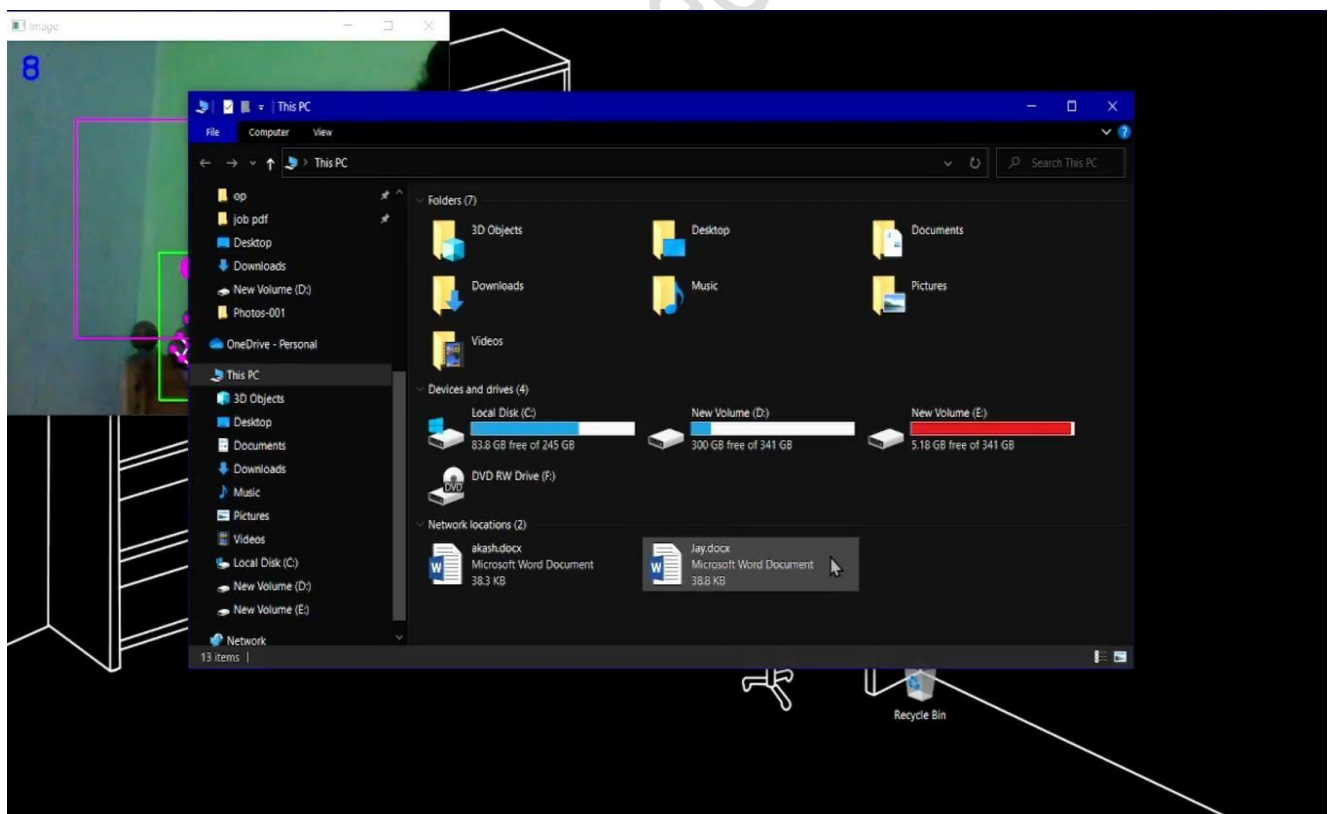
VI. ARCHITECTURE DIAGRAM



VII. INPUT & OUTPUT



Mouse Movement



Mouse Click Function

VIII. CONCLUSION

The main objective of the AI virtual mouse system is to control the mouse cursor functions by using the hand gestures instead of using a physical mouse. The proposed system can be achieved by using a webcam or a built-in camera which detects the hand gestures and hand tip and processes these frames to perform the particular mouse functions. From the results of the model, we can come to a conclusion that the proposed AI virtual mouse system has performed very well and has a greater accuracy compared to the existing models and also the model overcomes most of the limitations of the existing systems. Since the proposed model has greater accuracy, the AI virtual mouse can be used for real-world applications, and also, it can be used to reduce the spread of COVID-19, since the proposed mouse system can be used virtually using hand gestures without using the traditional physical mouse.

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