



Virtual Mouse Using Hand Gesture

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Abstract: This project represents a concept of controlling our video display with the assistance of hand gestures, which relies on one in each of the studies of Human Computer Interaction. This project shows that we are able to control our screen by moving our fingers which will work as cursor. To make this happen, all we need a working webcam and three main algorithms that are, mediapipe, OpenCV and autopy. Mediapipe is employed for hand tracking, OpenCV for image processing and drawing and at last autopy for controlling the mouse movement and its functioning.

Index Terms: OpenCV, Mediapipe, Autopy.

interaction (HCI) still relies on input devices like keyboards and mouse. Later because Technology has been increased drastically wireless mouse was introduced so on enable hassle-free movement of the mouse and to enhance the accuracy. In oppose, what proportion the accuracy of the mouse increases but there'll always be limitations of the mouse because the mouse is a hardware device and there may be some problems because the mouse may be a hardware device like all other entities even the mouse will have a durability time within which is functional and after its durability time, we've to alter the mouse. Virtual Mouse using Hand Gesture goes to be a commendable change within the world of technology, where are employing our fingers to manage the mouse. This technology will make the computers interactions succeed in a brand new limit. This gesture movement is going to be programmed using the free sources soon make an ease for each individual user. Sources like OpenCV, Autopy, and Python etc. The virtual mouse is using the camera of its own system through which it'll be detecting the fingers. The main objective of this project paper is to cut back the price and to own accuracy at a high level besides of this we trying to help those people who are physically challenged and unable to use their hands on physical mouse so we try to give them an easy method to go their task easily and effortlessly.

INTRODUCTION

In modern era of computing, Human-Computer Interaction (HCI) is a noteworthy area of the field. HCI may be a multidisciplinary area of research that focuses on engineering design and, specifically, the interaction between humans (users) and computers. The creation of more collaborative and realistic interfaces is one of the most important challenges in Human-Computer Interactions. We are forced to use the devices that are pre-installed in our devices. The supply of a high-resolution pointing system with one, isolated two-dimensional cursor is currently absolute to computing environments. The modern algorithms provide the best solution of human interaction with computer day by day. Although computers have made tremendous advancements, the common human-computer

EXISTING SYSTEM

The existing system proposed an awfully high demanding cost and resources. Because of this, there have been not many

users who could afford it. There are many software or application are present on the internet which claims that they can control the mouse without touching it but on the ground check reality they do not the same as they say instead of they use controlling of mouse virtually by using coloured tape on the finger or using colour monitoring techniques that inappropriate for anyone to manage those kinds of stuff. And at the end, none can get the final accurate outcome or fail to provide the smoothing in the movement of virtual mouse that creates hindrance in using it and disturb the movement of that mouse. Also, the environment utilized in the project wasn't friendly because of which not all users were ready to handle it. The present system isn't very called its many drawbacks to inspect that one.

PROBLEM DEFINITION

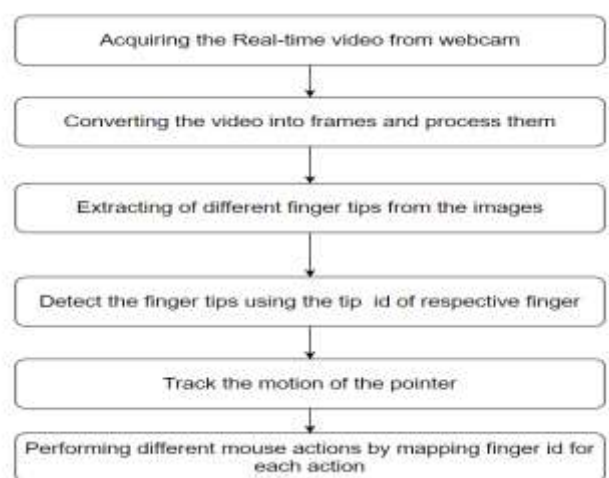
Even today, many of us still find interacting with computers and hardware to be an unpleasant experience, despite the event of input devices over decades. Computers and hardware should be tailored to our natural modes of communication: visual communication and speech. In our purposed project, we've designed a system that has the power to regulate our display screen with the assistance of our hand gestures, which allows a pleasing interaction, and which is free and easy to use. Our purposed Virtual Mouse can be used to overcome problems in the real world such as situations where there is no space to use a physical mouse and also for persons who have problems with their hands and are not able to control a physical mouse. And talked about current world scenario the COVID-19 situation, it is not safe to use the device by touching them because it may result in a possible situation of the spread of the fungus or viruses by touching the devices.

SYSTEM REQUIRMENTS

- Hardware Requirement
- System: Intel corei5
- Processor: Intel(R) Core(TM) i5-10300H CPU @2.50GHz
- Installed RAM: 8.00 GB
- System type: 64-bit OS, x64-based processor
- Webcam : 720p HD Webcam
- Resolution: 1920 X 1080
- Software Requirements
- Operating System: Windows 11
- Coding Language: Python
- Tool Kit: Image Acquisition and Image Processing
- IDE: Pycharm

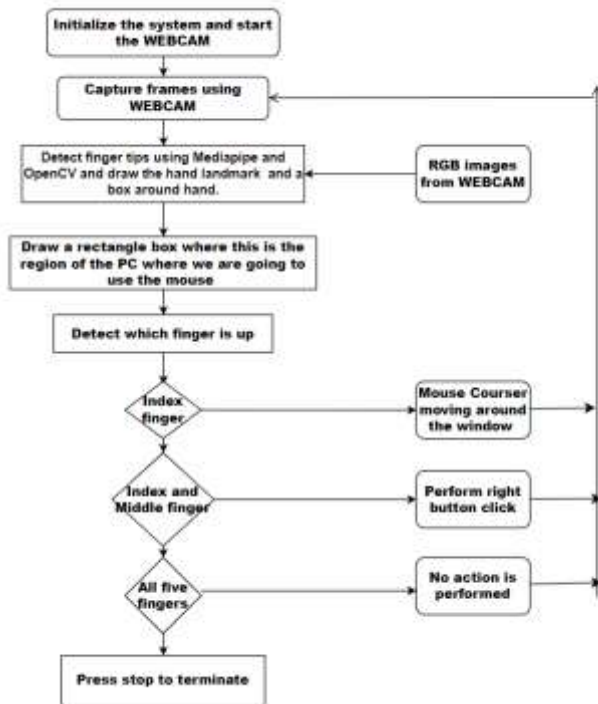
PROPOSED METHOD

In the proposed method we are acquiring the important time images and videos from web camera through which is able to be converting the videos into images and can be processing them. The converted images will consists of different finger tips that the next step is to extract that tips from the photographs. After the extraction process is finished it'll detect the points using the specified id of corresponding finger tips. This process is termed as the detection mode and detecting the points. After the detection of points it'll track the motion of the pointer moving on the screen. After that we are able to perform the action of the mouse.



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 system camera; it'll also convert the video captured from the web camera into frames. It'll then resize the input image so that the segmentation can happen to detect the points on the image. It'll de noise from the image and begin showing the middle radius of the image of the specified finger tips. The radius points are going to be centered on the image of the finger tip. The finger tips will now start moving in keeping with the movement of the fingers. It'll detect the points of the radius; we will now manipulate the cursor with fingertip movement.



IMPLEMENTATION

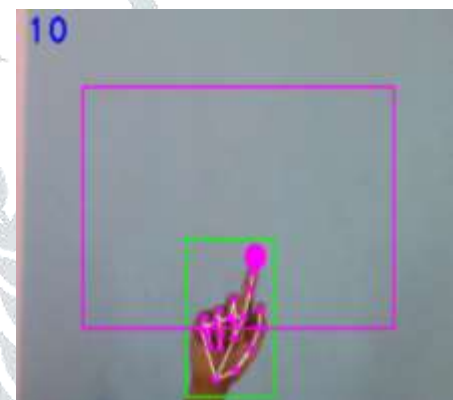
We all use new technology development in our everyday life. Including our devices similarly after we speak about technology the most effective example may be a computer. A computer has evolved from a really low and advanced significantly over the decades since they originated. However we also use the identical setup, which have a mouse and keyboard.. Though the technology have made many changes within the development of computers like laptop where the camera is now an integrated a part of the pc. We still have a mouse which is either integrated or an external device. This is how we've got encounter the implementation a brand new technology for our mouse where we can control the pc by finger tips and this method is thought as Hand Gesture Movement. With the help of our fingers, we will be ready to guide our cursor.

For this project we've used Python because the base language as it is an open source and simple to grasp and environment friendly. The packages that are required here is Autopy and OpenCV. Autopy is a Python module for programmatically controlling the mouse and keyboard. OpenCV through which we can control mouse events. Processing to extract required data so adds it to the computer's mouse interface in keeping with predefined notions. Python is employed to write the file. It uses of the cross platform image processing module OpenCV and implements the mouse actions using Python specific library

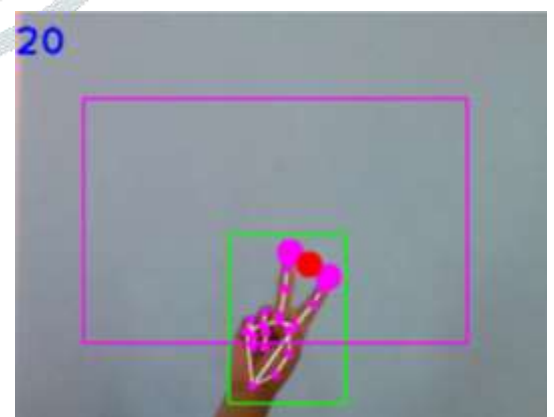
Autopy .Real time video captured by the Webcam is processed and only the two finger tips are extracted with the use of those two fingers we can use our mouse. Their centres are measured by using the system webcam finger tips moments, and therefore the action to be taken is decided supported their relative positions and their respective distance give us the idea how far we should . 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 a very easy interface to try to this. To capture a image we want to form an video capture object. We then covert this captured images into HSV format.

RESULT

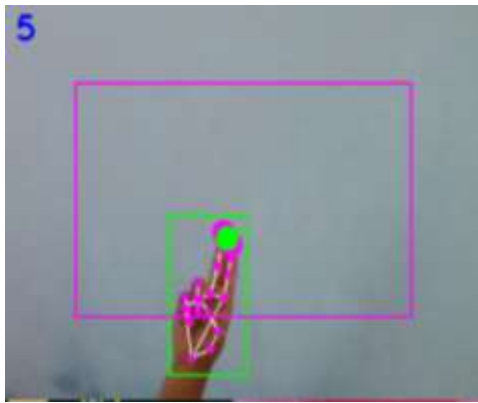
- ✚ The below image show the index finger tip which help to move the cursor in all over the screen.



- ✚ The below image to show that how to pause the cursor before click on any object.



- ✚ The below image show that how to click on the any point of the screen.



APPLICATION

The AI virtual mouse system is beneficial for several applications; it will be reduce the space for using the physical mouse, and it is employed in situations where we cannot use the physical mouse

- ✚ Amidst the COVID-19 situation, it's not safe to use the devices by touching them because it's going to lead to a possible situation of spread of the virus by touching the devices, that the proposed AI virtual mouse may be accustomed control the PC mouse functions without using the physical mouse.
- ✚ 2D and 3D images may be drawn using the AI virtual system using the hand gestures.
- ✚ AI virtual mouse are often accustomed play virtual reality- and augmented reality-based games without the wireless or wired mouse devices.
- ✚ Persons with problems within their hands can use this method to regulate the mouse functions in the computer.
- ✚ In the sphere of robotics, the proposed system like HCI may be used for controlling robots.
- ✚ In designing and architecture, the proposed system will be used for designing virtually for prototyping.

CONCLUSION

In the end, we conclude that we learn a lot of things during the development of the projects like how to work with open

computer vision and its library, dynamic applications, databases, and python language.

In a nutshell, it can be summarized that the future scope of the project circles is to provide mouse virtually those students who are physically disabled and also that students who want to get rid of the physical mouse.

FUTURE SCOPE

The future work will include implementation of additional gestures which can enable the user to perform more functions with ease. The proposed system during this project uses only the proper hand to perform gestures. Hence, improvement of the implemented technique in future will be possible using both hands for performing different gesture movement.

- ✚ We can give more advanced virtual mouse including more facilities.
- ✚ Implement some extra features from time to time for enhancing the software quality

The above-mentioned points are the enhancements that can be done to increase the applicability and usage of this project. We have left all the options open so that if there is any other future requirement in the system by the user or students for the enhancement of the application then it is possible to implement them. In the last, we would like to thank all the persons involved in the development of the application directly or indirectly. We hope that the project will serve the purpose for which it is developed thereby underlining the success of the process.

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