**SYNOPSIS**

**Report on**

**AI VIRTUAL MOUSE**

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**ABSTRACT**

This project is about how new technologies can be used to develop a python application that enables the user to perform the task in a desktop machine without interacting with the mouse and by just the hand gestures. It will analyze the possible utility of one single piece of software as programming application by looking at examples of intelligent programs with natural language processing that are now available, with various categories of support.

Natural Language Processing is used to activate the ability to communicate socially, storing (and evaluating) information in the context of the user. New technology, it is suggested, may soon make the concept of using the internet. Experiments conducted on this system, combined with user testing, have provided evidence that a basic program with natural language processing algorithms in the form of a virtual mouse task performer application, with basic natural language processing and the ability to function without the need for another type of human input (or programming) may already be viable.

**INTRODUCTION**

With the development of technologies in the areas of augmented reality and devices that we use in our daily life,

these devices are becoming compact in the form of Bluetooth or wireless technologies. This paper proposes an

AI virtual mouse system that makes use of hand gestures and hand tip detection for performing mouse functions

in the computer using computer vision. The main objective of the proposed system is to perform computer mouse cursor functions and scroll functions using a web camera or a built-in camera in the computer instead of using a traditional mouse device. Hand gesture and hand tip detection by using computer vision is used as an HCI with the computer. With the use of the AI virtual mouse system, we can track the fingertip of the hand gesture by using a built-in camera or web camera and perform the mouse cursor operations and scrolling function and move the cursor with it.

While using a wireless or a Bluetooth mouse, some devices such as the mouse, the dongle to connect to the PC,

and a battery to power the mouse to operate are used, but in this paper, the user uses his/her built-in camera or a

webcam and uses his/her hand gestures to control the computer mouse operations. In the proposed system, the web camera captures and then processes the frames that have been captured and then recognizes the various hand gestures and hand tip gestures, and then performs the mouse function.

Python programming language is used for developing the AI virtual mouse system, and OpenCV which is the

library for computer vision is used in the AI virtual mouse system. In the proposed AI virtual mouse system, the

model makes use of the MediaPipe package for the tracking of the hands and for tracking the tip of the hands, and PyAutoGUI packages were used for moving around the window screen of the computer for performing. Functions such as left-click, right-click, and scrolling functions. The results of the proposed model showed a very high accuracy level, and the proposed model can work very well in real-world applications with the use of a CPU without the use of a GPU.

**TECHNOLOGY USED**

**Python**

Python is a high-level, interpreted programming language. It is a robust, highly useful language focused on rapid application development (RAD). Python helps in the easy writing and execution of codes. Python can implement the same logic with as much as 1/5th code as compared to other OOPs languages. Python provides a huge list of benefits to all. The usage of Python is such that it cannot be limited to only one activity. Its growing popularity has allowed it to enter some of the most popular and complex processes like Artificial Intelligence (AI), Machine Learning (ML), natural language processing, Data science, etc. Python has a lot of libraries for every need of this project such as Pytube,Pyttsx3,mediapie for downloading videos, selenium for web automation, for accessing the camera and for the computations, etc. Python is reasonably efficient. Efficiency is usually not a problem for small examples. If your Python code is not efficient enough, a general procedure to improve it is to find out what is taking most of the time and implement just that part more efficiently in some lower-level languages. This will result in much less programming and more efficient code (because you will have more time to optimize) than writing everything in a low-level language. Python allows the programmer to implement many major functionalities which can not be easily implemented by any other language without making the code or the program robust or redundant as it has included libraries which contain almost all the things that are needed while designing a major application.

The main purpose of using the language was it makes it easier to implement the code of the application and gives the required and needed functionalities for the application in an efficient way. The results are also accurate, and the modification can be done easily if there are any changes found during the testing phase.

**HARDWARE AND SOFTWARE REQUIREMENTS**

* Processor i5 and above
* 4 GB Ram and above
* Windows 8 and above

**MODULES**

1. **Accessing Camera**

The main function of the application will be done or achieved by the camera as it will act as the input source from where the application will take the command in the form of gestures and will perform the task.

1. **Hand Gesture recognition**

The application will try to recognize the hand movement from the functionality and the signs that are needed and will perform the task accordingly to that.

1. **Performing Tasks**

After the recognition of the gestures the app will perform the task by the task liking moving if the cursor selecting clicking on selected things selecting and the other tasks.

**FUTURE SCOPE**

Features such as enlarging and shrinking windows, closing window, etc. by using the palm and multiple fingers.

are our future scope for this project. In the future, we plan to add more features such as enlarging and shrinking windows, closing windows, etc by using the palm and multiple fingers. We can also open the browser or any drives (C: /D:/E: etc) with the help of hand gestures instead of moving the cursor.

The Virtual Mouse application is expected to replace the current methods of utilizing a physical computer mouse where the mouse inputs and positions are done manually. This application offers a more effortless way to interact with the computer system, where every task can be done by gestures. Furthermore, the Virtual Mouse application could assist the motor-impaired users where he/she could interact with the computer system by just showing the correct pattern of fingers to the webcam.

**FUNCTIONING OF THE PROJECT**

* Capturing real time video using Web-Camera
* Converting the video captured into HSV format.
* Each image frame is processed separately:
* Conversion of each frame to a greyscale image:
* Calibrate the colour ranges:
* Calculate the image's centroid by locating the image's region.
* Tracking the mouse pointer.
* Simulating the mouse actions.

**CONCLUSION**

In conclusion, it is no surprise that the physical mouse will be replaced by a virtual non-physical mouse in the

Human-Computer Interactions (HCI), where every mouse movement can be executed with a swift of your fingers everywhere and anytime without any environmental restrictions. This project had developed a color recognition program with the purpose of replacing the generic physical mouse without sacrificing the accuracy and efficiency, it is able to recognize color movements, and combinations, and translate them into actual mouse functions. Due to accuracy and efficiency playing a significant role in making the program as useful as an actual physical mouse, a few techniques had to be implemented.

**GANTT CHART**

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| – | **WEEK**  **1** | **WEEK 2** | **WEEK 3** | **WEEK 4** | **WEEK 5** | **WEEK 6** | **WEEK 7** | **WEEK 8** | **WEEK 9** | **WEEK 10** | **WEEK 11** | **WEEK 12** |
| Requirement analysis and feasibility check |  |  |  |  |  |  |  |  |  |  |  |  |
| Designing |  |  |  |  |  |  |  |  |  |  |  |  |
| Coding |  |  |  |  |  |  |  |  |  |  |  |  |
| Testing and maintenance |  |  |  |  |  |  |  |  |  |  |  |  |