JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

GESTURE SURF: EFFORTLESS WEB EXPLORATION

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Abstract : With its innovative approach to virtual navigation, the Gesture Surf: Effortless online Exploration system uses Python automation and computer vision to provide fluid online surfing. By offering a substitute for conventional input devices like a mouse and keyboard, this system seeks to improve user comfort. It is especially helpful in situations where regular devices are not accessible or are malfunctioning, or when users would rather engage hands-free. The system uses hand gestures that are taken with a webcam and processed by OpenCV and Python's Media pipe module to make web interface navigation simple for users. The system tracks hand motions, interprets gestures, and carries out operations like opening new tabs and clicking links using Python, OpenCV, Numpy, autopy, and PyautoGui. This abstract highlight the possibilities of a gesture-enabled browser navigation system by outlining its development and functioning. for easing the physical strain that comes with using conventional input devices over extended periods of time and streamlining human-computer interaction.

INTRODUCTION

The virtual navigation system is a novel approach that provides ease of access to the user. It'll prove to be useful in scenarios where the input devices are unavailable or they're not functional and even when the user cannot use them in certain situations like oily hands, etc. It will be driven by Computer Vision and Python Automation. This Virtual Navigation System will be primarily navigation-oriented and fundamentally focused on web browsing.

This doesn't necessarily solve some problem but it is an additional feature which can be used as per user convenience. The existing input devices i.e. mouse, keyboard are great and precise ways to communicate with computers, but if the task is something like browsing for longer duration it might cause sore eyesight and also affect the nerves which might cause numbness or pain and you have to sit straight which causes back pain.

If we use this system instead of the traditional system it'll be a much freer experience. We intend this application to be used in conjunction with voice assistant, this way you don't need to touch either the keyboard or mouse. This doesn't necessarily solve some problem but it is an additional feature which can be used as per user convenience Gesture Enabled Browser Navigation System makes human computer interaction simple by making use of Hand Gestures only. The computer requires almost no direct contact. All input output operations can be virtually controlled by using static and dynamic hand gestures.

The proposed system only requires a webcam and good processor for ideal performance, the webcam should be able to track the user's hand. The project's implementation is done with Python and OpenCV. The hand gesture is the most effortless and natural way of communication. The output can be seen as a change in the system after performing certain gestures. The position of the hand is calculated by the Media pipe module of Google. Then appropriate hand gestures are assigned depending upon their ease to perform operations like creating a new tab, etc.

Python programming language is utilized for empowering the AI virtual mouse structure, what's more, OpenCV can't avoid being that the library for versatile PC vision is utilized at ranges the AI virtual mouse framework. Inside the projected AI virtual mouse utilizing hand signal, the model purposes the python Media-pipe bunch for the journey for the hands and for pursue of the tip of the hands, what's more, numpy, and Py auto Gui packs were utilized for propelling the screen of the PC for performing verbalizations limits like left click, right snap, and examining limits.

LITERATURE SURVEY

"Virtual mouse Control using Colored Fingertips and Hand Gesture Recognition" by Vantu kal Reddy, Thumma Dhyan Chand Galla Vamsi Krishna, Satish Maheshwaram suggests usage of Hand gesture recognition and image processing to recognize the gestures made by hands which can further be assigned to perform specific actions. Tools like python, Py auto Gui, but specifically OpenCV were used to develop the model. Here the advantageous thing being the use of Neural Networks and Hand Gesture

recognition for model optimization. While it was a well functioning model, it used to use colored fingertips for recognizing hand gestures and its movements which turned out to be the limitation of the proposed model.

"Hand Gesture - Virtual Mouse For Human Computer Interactions, 2018" by Sheri Mohammed , V H Preetha proposed the virtual mouse concept with the usage of Mat lab s/w and two cameras for the purpose. This model gets 90% correct detection under enough lighted environment for both cameras. But using two cameras in a costlier approach for the following project.

Monali Shetty, Christi Daniel, Manthan Bhatkar, Ofrin Lopes: proposed "Virtual Mouse using Object Tracking" the system made by them is based on the Object tracking method that has been used to track the colored objects that help to operate on this system using the laptop webcam. In the proposed system only the basic features of the mouse such as mouse pointing, selection, and deselection using left-click can be controlled. The accuracy of this system turns out to be 95% in plain background, however it is lower for backgrounds with noise such as with more than 1 person, wall with more than one colors, etc. to be precise the accuracy for non-plain backgrounds drops as drastically as 40%.

In this system, "Design and Development of Hand Gesture Based Virtual Mouse" proposed by Abid Hassan Shibly, Samrat Kumar Dey, Md. Aminul Islam and Shahriar Iftekhar Shaurav. HCI technology is used. The main functions they have focused on are mouse movement, left button click, right button click, double click and scrolling up or down. The latest technology is used in this system so we can say that it has an edge over existing systems. In this system, the users can pick any color from multiple colors. There are a few color bands defined & the users can pick any color from the colors according to the backgrounds and the lighting conditions. This may vary in a different background.

PROPOSED WORK

This project demonstrates how to construct a browser control system. The proposed system is made up of nothing ore than a normal-resolution webcam that can follow the user's hand in two dimensions. Python and OpenCV will be used to build the system. Hand gestures are the most natural and effortless manner of communicating.

The camera's output will be displayed on the monitor. This system intends to make browser navigation a much freer experience. Our idea is to employ a camera and computer vision technology to manage mouse tasks (clicking and scrolling) and also assigning specific gestures for actions like creating a new tab, closing tab etc. and we demonstrate how it can do all that existing mouse devices can.

The existing system takes a toll on arms and wrist whereas this system intends to eliminate the arm and wrist pain caused by operating the mouse. This application isn't necessary but an additional feature that provides ease of access to the user. It'll prove to be useful in scenarios where the input devices are unavailable or due some underlying reason they're not functional (malfunction). The proposed system is basically an upgraded version of Virtual Mouse with browser navigation capabilities.

We propose this novel approach that uses a video device to control the system using Hand Gestures. As this project mainly focuses on Computer Vision and automation, the programming part is fairly straightforward due to the availability of varied libraries in python. Creating a system capable of recognizing and combining finger-based hand movements in order to perform an action or command on a computer system.

But this exceptional feature comes at the cost of higher power consumption. This may even prove revolutionary in the near future because of its effortless use cases. The webcam must be of decent quality and fps rate. If the camera quality is low, it might hinder the performance of the system. Similarly, Hardware resources should be of the minimum requirements for stable performance of the module.

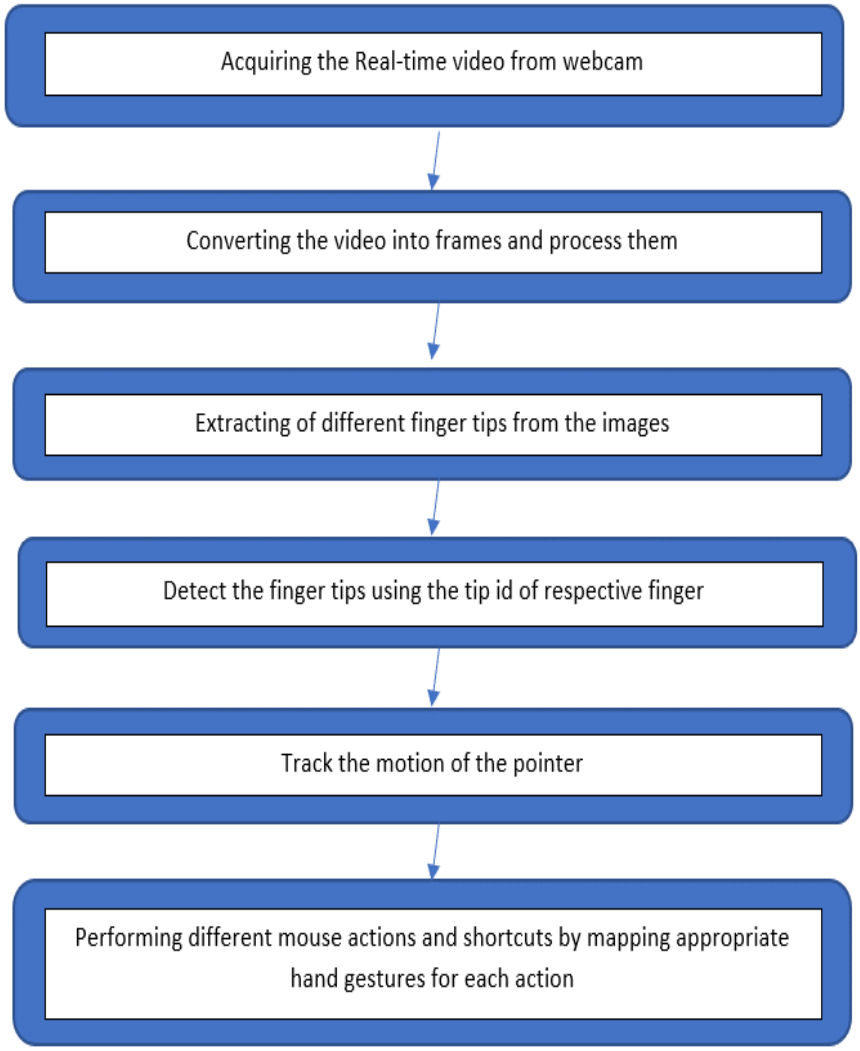


Fig:- Architecture of System

Data Flow Model :-

A flow model shows how the system works as in how the various functions are tied together to achieve the intended goal.

- The system first inputs images of the user from the system camera, it could be a laptop's built-in 720p HD camera or an external webcam.
- It then converts the video of the user into frames, now the conversion various from system to system. Also on the same system different environmental details play a role resulting in lower/higher fps rate.
- The coordinate position of the 21 points of a single hand is calculated.
- We then set a particular action for cursor movement, left click, right click and assign browser shortcuts to various gestures.
- A 640*480 windows pops up while running the system while displaying the input video stream along with details like the action performed in the browser.

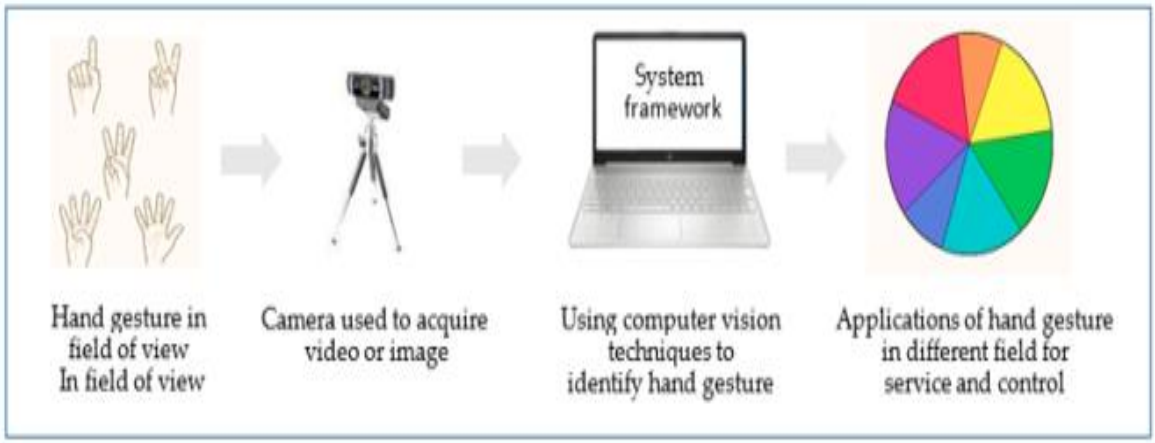
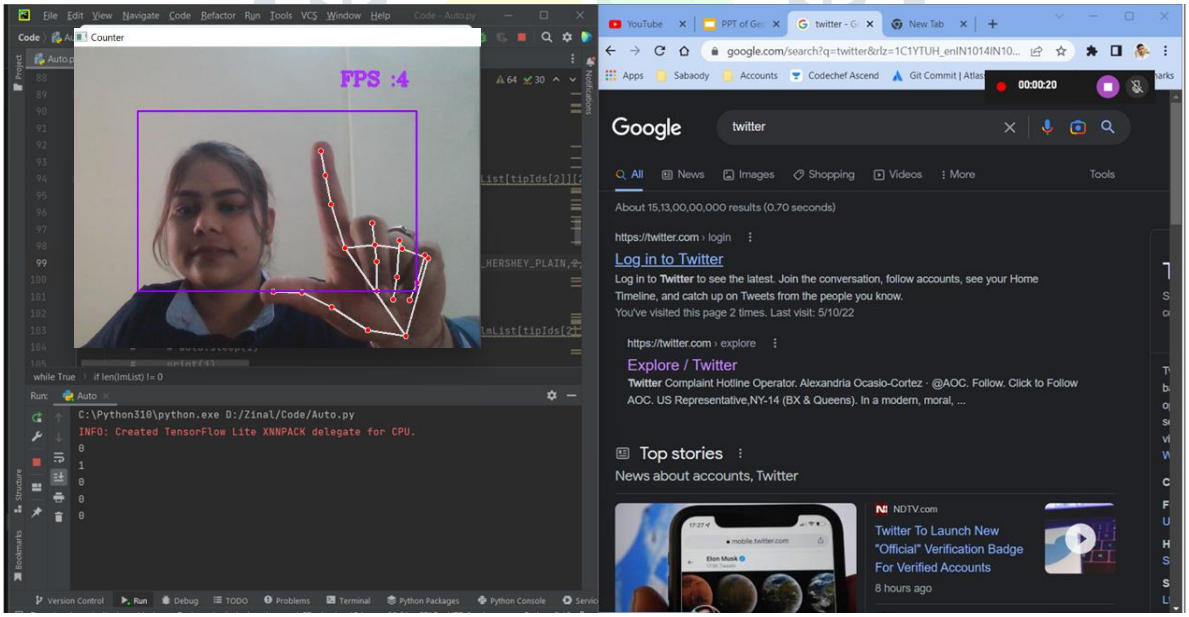


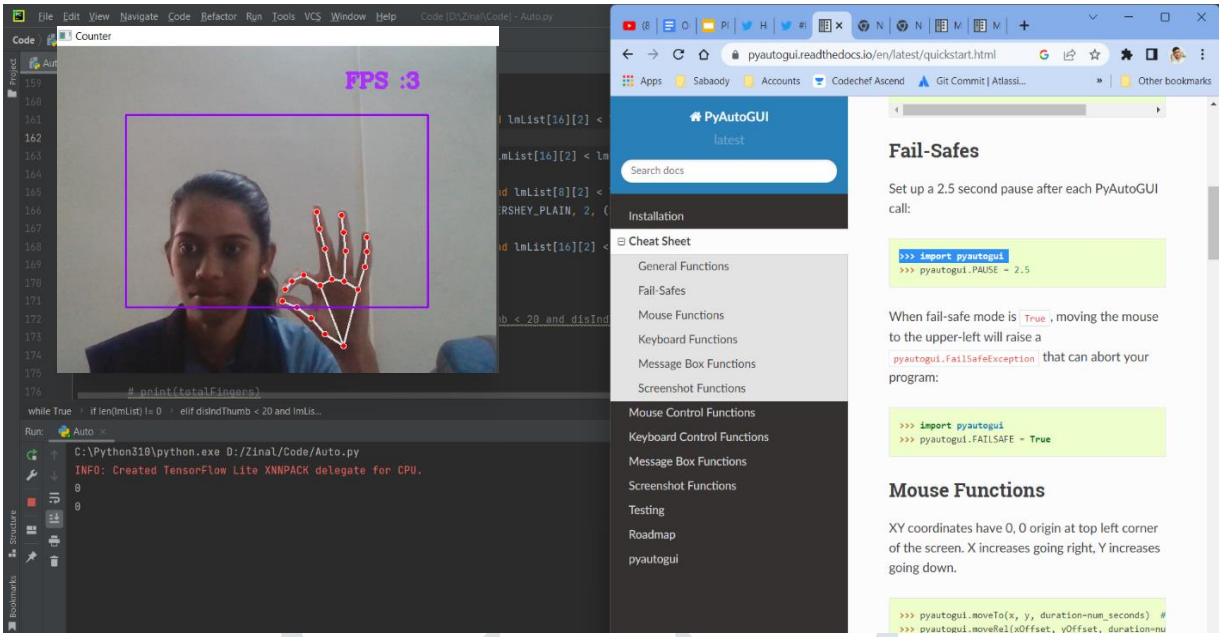
Fig . Data Flow Model

APPLICATION SCREENSHOT:VISUAL INSIGHTS

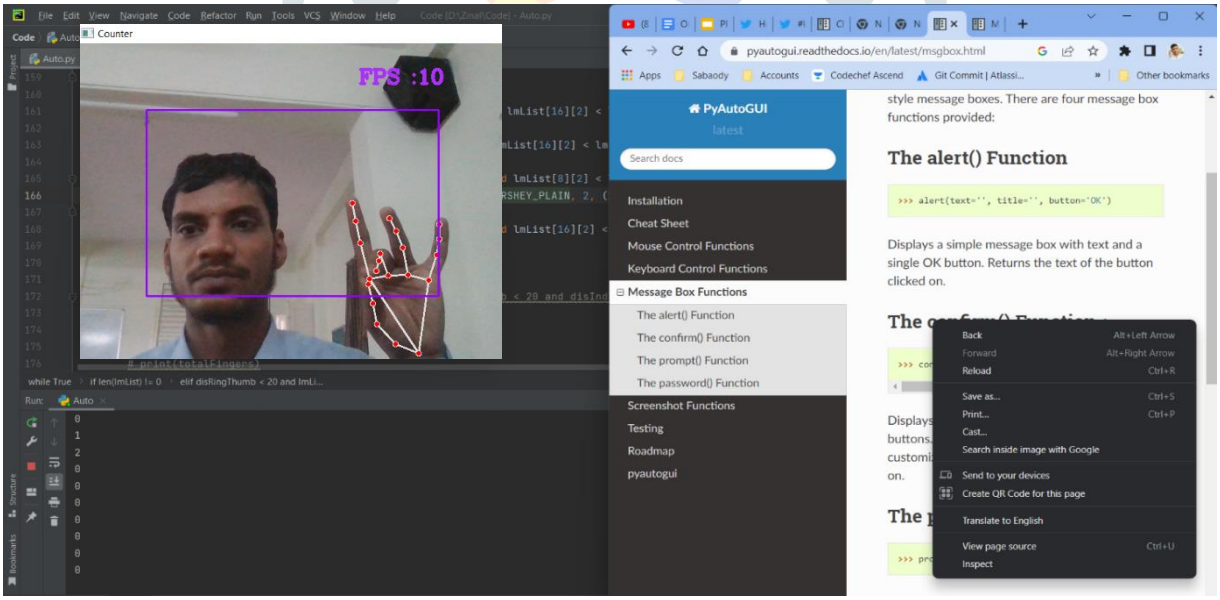
1. **Cursor movement:-**



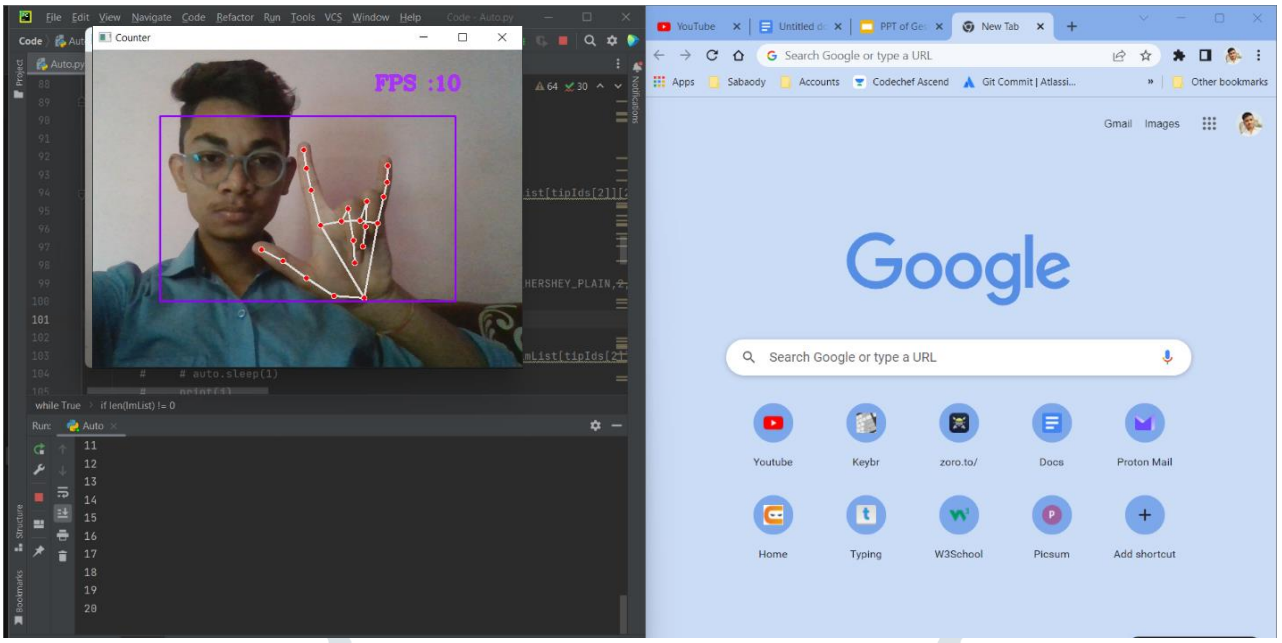
2. **Left Click:-**



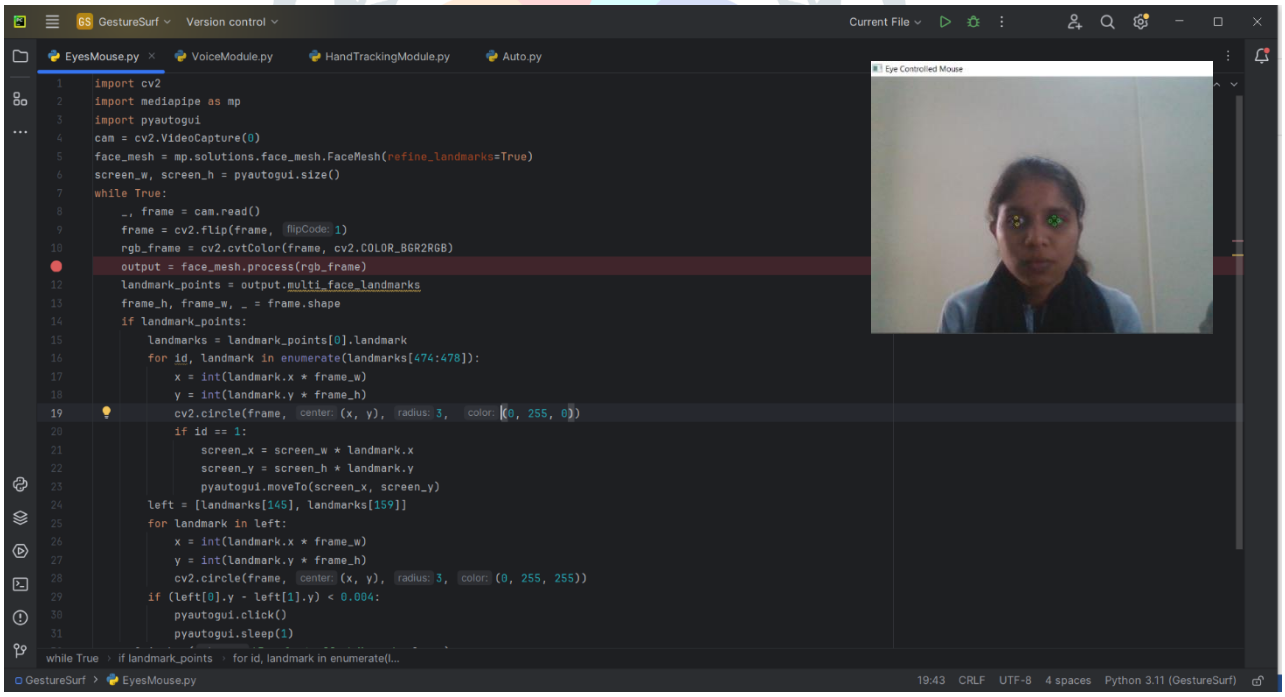
3. **Right Click:-**



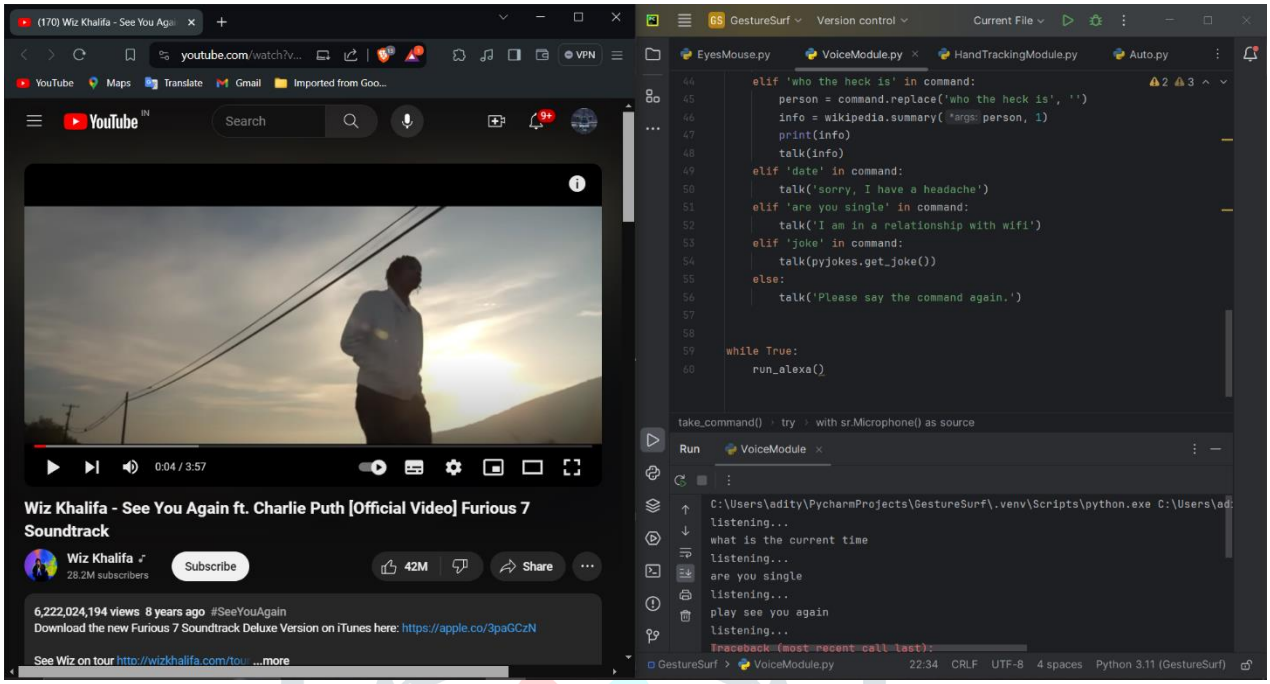
4. New Tab:-



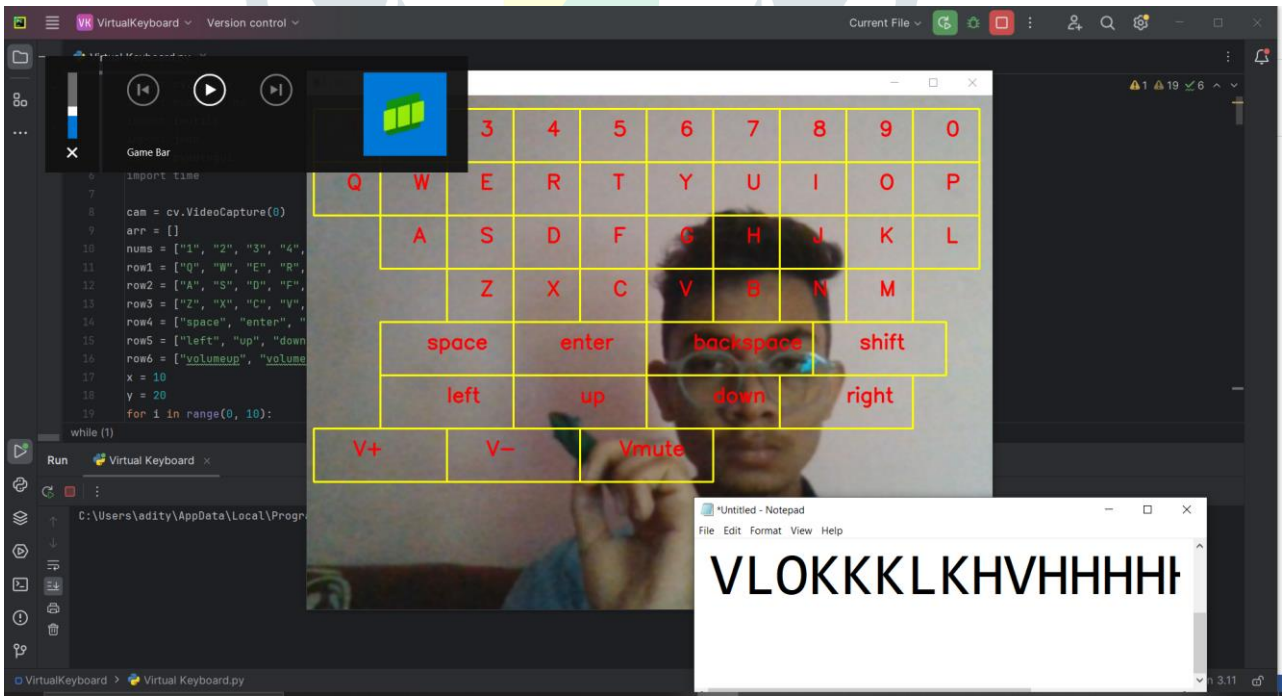
5. Eye Cursor:-



6. **Voice Assistant:-**



7. **Virtual Keyboard:-**



CONCLUSION

Gesture recognition provides the best human-machine interaction. Gesture recognition is also important for the development of alternative modalities of human-computer interaction. This allows humans to interact with machines in a more natural way. It can be used in various applications for example sign language recognition, robot control, etc.

Controlling things by hand is more natural, easier, more flexible and cheaper, and there is no need to fix problems caused by hardware devices, since none is required. We need to put much effort into developing reliable and robust algorithms with the help of using a camera sensor that has a certain characteristic to encounter common issues and achieve a reliable result.

In a nutshell, it can be summarized that the future scope of the project is to provide the mouse virtually for all kinds of apps like browsing, presentation, video players, etc. solely for the purpose of "Ease of Access" as an additional feature.

This project aims to enhance web browsing experiences by allowing users to navigate web content using hand gestures captured by a camera. Through the use of computer vision techniques and real-time gesture recognition.

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