

# Audio Control using Gestures

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**Abstract:** *In this paper we are growing a audio controller wherein we are using hand gestures as the input to control the system , OpenCV module is largely used on this implementation to govern the gestures. This device basically make use of the web camera to record or capture the images or videos and hence based totally on the input, the audio of the system is managed via this application. The main characteristic is to increase and decrease the volume of the system. The challenge is applied using Python and OpenCV. We can use our hand gestures to control the basic operation of a computer like increasing and decreasing volume. Consequently, people will not need to research machine-like skills which might be a burden maximum of the time. This type of hand gesture system provides a natural and innovative new way of nonverbal communication. These systems have a wide area of application in human computer interaction (HCI). The reason of this machine is to discuss about audio control using hand gesture recognition system based on detection of hand movement. In this the system consist of a high- resolution camera to capture the gesture taken as input by the user. The main goal of hand gesture recognition is to create a system which can pick out the human hand movement and use same input as the information for controlling the device and by using actual time gesture reputation particular customer can manipulate a pc by means of the use hand gesture in front of a system video camera linked to a computer. In this project we are growing a hand gesture volume controller system with the help of OpenCV, Python. In this system can be controlled by hand gesture without making use of the keyboard and mouse.*

**Keywords:** Hand gesture, OpenCV-Python, volume controller, media pipe package , NumPy package , Human computer Interface.

## I. INTRODUCTION

Hand gestures is the effective communication medium for Human Computer Interaction (HCI). Numerous input devices are to be had for interaction with computer, inclusive of keyboard, mouse, joystick and touch screen, but these devices does not provide easier way to communicate. In this, the system which is proposed will consists of desktop and laptop interface, hand movement can be used by the users need to wear data gloves also can use the web camera or separate cameras for recording the hand gestures.

The primary and most essential step toward any hand gesture recognition system is to put into effect any hand- tracking system .A few Sensor devices are commonly used in Data- Glove primarily based methods for digitizing hand and finger motions into multi parametric data. Other sensors used in this system will accumulate hand configuration and hand movements. The Vision Based method calls for a web digital camera, so that one can realize natural interaction between humans and computer without using any other devices.

The hard part in these systems is background images or videos which is recorded or captured during taking the inputs i.e., hand gesture via the person, also sometime lightning effect the quality of the input taken which creates the problem in recognizing the gestures. The technique to find a connected region within the image with some of the property such as color ,intensity and a relationship between pixels i.e. sample is called as segmentation. And have used some important packages which have OpenCv- python, TensorFlow, NumPy, media-pipe, imutils, scipy, numpy.

## II. EXISTING SYSTEM

Gesture Recognition using Accelerometer - The author has added an ANN utility used for the classification and gesture recognition. Wii far off is basically used in this system as this remote rotate within the X, Y, Z route. In order to

decrease the cost and memory of the system the author has used two levels to implement the system. In the first degree person is authenticated for gesture recognition. Gesture recognition method which is used by the author Accelerometer-Based primarily.

After that during second level of the system signal are processed for gesture recognition using automata(Fuzzy).After this the information is used for normalization using k-way means and Fast-Fourier algorithm. Now, the recognition accuracy has increases up to 95%.

Hand Gesture Recognition by using Hidden Markov Models - In this paper the writer has made a device to recognize the numbers from 0-9 the use of the dynamic hand gestures. The author has used two steps on this paper .In the initial stage preprocessing is accomplished and in second step classification is performed. Basically, there are two types of gestures Key gestures and HyperLink gestures. For recognizing motive the important thing gesture is used and the hyperlink gestures is used in non-stop gestures. In this paper ,Discrete Hidden Markov Model(DHMM) is used for the class motive. This DHMM is trained by means of an algorithm named Baum-Welch algorithm. Average recognition rates using HMM ranges from 93.84% to 97.34%.

Robust Part-Based Hand Gesture Recognition use of Kinect Sensor- In this author has used low cost cameras in order to make the things less expensive for the users. A kinect sensor is a sensor whose resolution is lower in comparison of different cameras but can detect and capture the big images and objects .To cope with the noisy hand gestures ,only fingers are matched with FEMD but not the entire hand . This system works perfectly and successfully in uncontrolled environments. The accuracy of 93.2% is achieved with the experimental result.

### III. RELATED WORK

In imaginative and prescient community hand gesture is a lively location of research, for the purpose of sign language recognition and human computer interaction. In this we have used some algorithms and some modules to stumble on the gestures of the person and these gestures are taken as the input in the system . Here, numerous modules are used like opencv-python, mediapipe, numpy etc for the purpose of tracking the gestures.

After taking pictures the input from the user the image is used in the hand tracking system to check the size and form of the gesture which is received in the system.

Hand tracking module plays a critical role in identifying the entered recorded in the system, after that classification and segmentation technique is used to classify the gestures in the system .Machine learning and deep learning is also used to identify the training data from the system and identify it according to the requirement of the system .After this the gestures are diagnosed from the trained data and on the basis of that data the gestures are diagnosed and is used for processing of the the system to implement the capabilities like increase and decrease in volume.

Here, we have performed the Hand Gestures recognition system to produce the better output, webcam is enabled while executing the program, also the type of gesture used is static to recognize the shape of the hand and it provides us the required output. In this project the volume is controlled based on the shape of hand. The system takes input and will capture the object ,detects after that hand gesture recognition is performed.

### IV. SYSTEM ARCHITECTURE AND METHODOLOGY

In this project we are using python technology to develop the project , the code is written and designed in python language the use of OpenCV and NumPy modules. On this project firstly we import the libraries which are to be used for further processing of the input and the output. The libraries that are used in this project which needs to be imported are OpenCV, mediapipe, math, ctypes, pycaw and numpy. We get video inputs from our primary camera.

Now, right here mediapipe is used to stumble on the video as the input from our camera and use mpyhand. hands module to detect the gesture .Then , in order to access the speaker we have used the pycaw and we have provided the range of the volume from minimum volume to maximum volume.

Subsequent step is to convert the input image to rgb photograph to complete the processing of the input captured. Then its turn to specify the factors of thumb in input and fingers.

Volume range id processed using the hand range in this process numpy is used to transform this technique and process the required output. NumPy package is fundamental package for computing in Python language. It is consist of numerous things like-

- Effective N-dimensional array
- Object broadcasting
- Equipment to combine C
- Fourier re-model, and random capabilities.

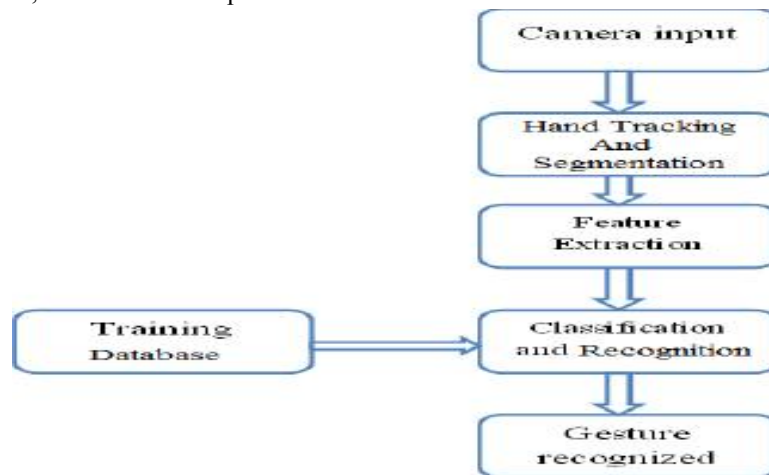


Fig. 1: System Architecture

#### 4.1 OPEN CV

Open CV is a library of python which tackle PC vision trouble. It is used to detect the face which is achieved using the machine learning .It is a very crucial library and is used in several tasks to detect the face and understand the numerous programming frames also it supports several programming languages. It also performs object detection and movement detection. It also support several type of operating system and can be used to detect the face of the animals also.

#### 4.2 NUMPY

NumPy is the module of the Python. The numpy word basically suggests Numerical Python and it's miles applied. This is the module which is basically written in c language and is said as expansion module . Numpy guarantee high quality execution pace. Numpy is mostly used for performing calculations, duties using certain capabilites it provides like multiply, divide, power and others.

#### 4.3 Image Filtering -Histogram

Histogram is a type of graph which represents the movement of the pixels power in the portrayal. In this we use to filter out the images using histogram and convert them into the rgb in order to process the image in our system . Therefore, the power of a pixel is in the range [0,255].

#### 4.4 MEDIAPIPE

MediaPipe is a module for processing video, audio and several types of related data across platform like Android, iOS, web, edge device and several Implemented ML pipeline.

Several types of functions are performed with the assist ofthis module , we have used this module in our project to recognize the hand gesture and detect the input from it.

- Face Detection.
- Multi-hand monitoring.
- Segmentation.
- Item Detection and Tracking

**V. RESULTS**

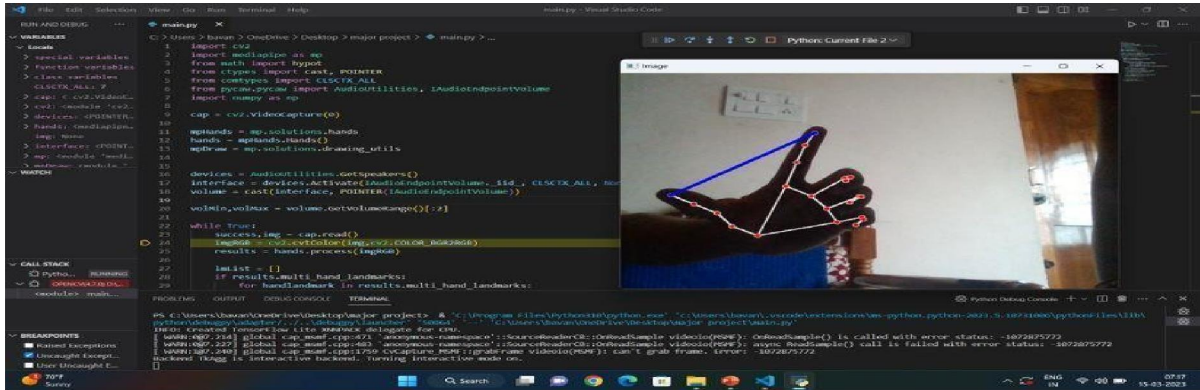


Fig. 1

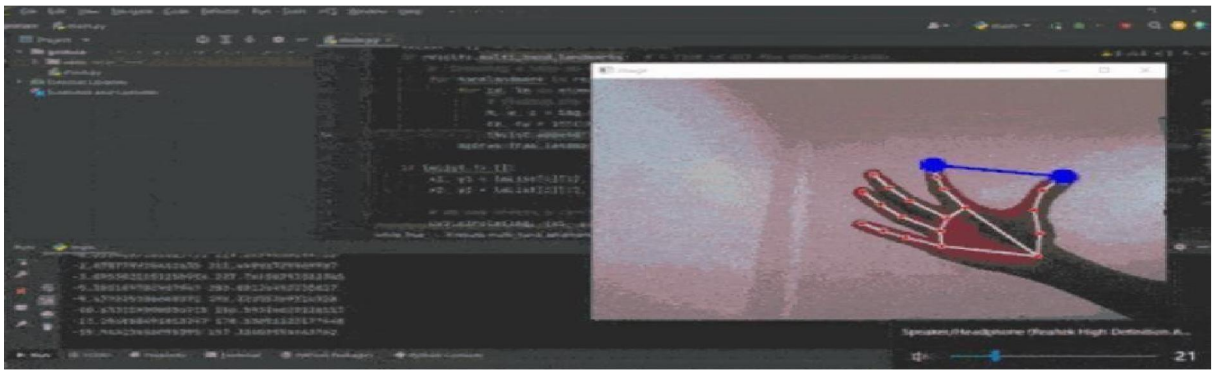


Fig. 2



Fig. 3

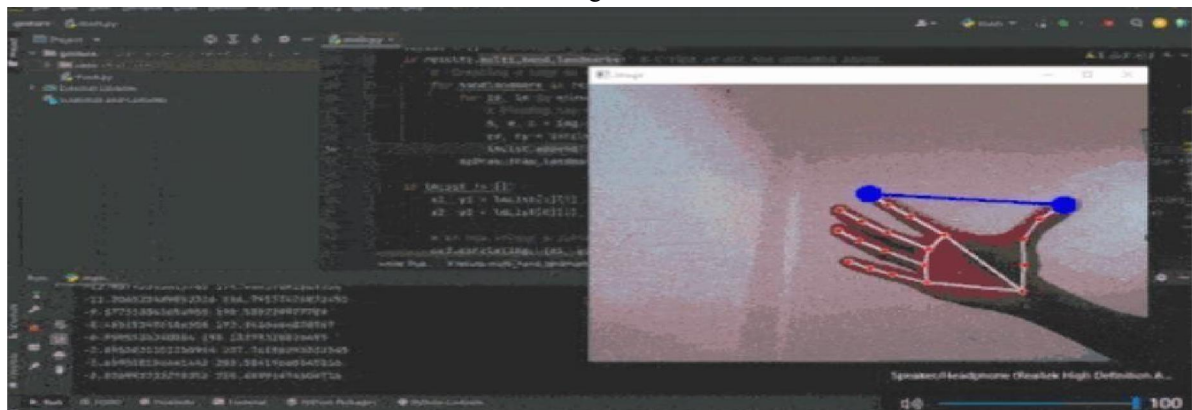


Fig. 4

## VI. CONCLUSION

This project is offering a program that allows the consumer to perform hand gesture for handy and easier manner to control the software .A gesture based volume controller doesn't require some specific type of markers and these can be operated in our real life on simple Private Computers with a very low cost cameras as this not requires very high definition cameras to detect or record the hand gestures. Specifically, system tracks the end positions of the counters and index finger of each hand.The primary motive of this type of system is basically to automate the things in our system in order to make the things become easier to control. So in order to make it realiable we have used this system to make the system less complicated to control with the assist of these applications.

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