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COMRADE-Volume Control with Hand Detection and Voice Control

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ABSTRACT: As the world is being developed with the new technologies, discovering and manipulating new ideas and concepts of taking everything online are rapidly changing. Hand detection is a crucial pre-processing procedure for many human hand related computer vision tasks, such as hand pose estimation, hand gesture recognition, human activity analysis, and so on. Voice control, also called voice assistance, is a user interface that allows hands-free operation of a digital device. This app is just an easiest & comfortable way to do high or low down volume range while seeing any videos/movies/online lectures because while seeing any videos/movies/ online lectures. In this report we would explain the design of anVolume Control with hand detection and voice control software with module based system.

KEYWORDS: software; application; users; Hand Posture; Hand Gesture; Human Computer Interaction (HCI); hand based module; Pycharm; openCv; Volume recognitionetc.

I. INTRODUCTION

Gesture recognition helps computers to understand human body language. This helps to build a more potent link between humans and machines, rather than just the basic text user interfaces or graphical user interfaces (GUIs). In this project for gesture recognition, the human body's motions are read by computer camera. The computer then makes use of this data as input to handle applications. The objective of this project is to develop an interface which will capture human hand gesture dynamically and will control the volume level.[1]

This application is just going to be an easier way to low/high the volume range while watching any videos/movies/online lectures. We first look into hand detecting and then we will use the hand landmarks to find gesture of our hand to change the volume. This project is module based which means we will be using a previously created hand module which makes the hand detecting very easy. MediaPipe Hands is a high-fidelity hand and finger tracking solution. It uses machine learning (ML) to infer 21 key 3D hand information from just one frame. We can use it to extract the coordinates of the key points of the hand.[1] The work of Voice Control is just to respond with user only regarding to low/high the volume range & guide them how to detect their hand in front of screen by giving instructions.

The camera in our device is used for this project. It detects our hand with points in it so as it can see the distance between our thumb finger tip and index finger tip. The distance between the points 4 and 8 is directly proportional to the volume of device.

Here are a few reasons why we should have a COMRADE Namely:

- As the world is being developed with the new technologies, discovering and manipulating new ideas and concepts of taking everything online are rapidly changing.
- Hassle free
- Fun to use
- More interactive

II. RELATED WORK

Hand gesture recognition system received great attention in the recent few years because of its manifoldness applications and the ability to interact with machine efficiently through human computer interaction Using this you can control your PC/Laptop volume by Hand Gestures (pinch-in, pinch-out) created with Python. We first look into hand tracking and then we will use the hand landmarks to find gesture of our hand to change the volume. This project is

module based which means we will be using a previously created hand module which makes the hand tracking very easy.

a) Use Case of Main Page:

1) Use case: Start Brief Description: The user will start the application.

2) Use case: Hand Gesture Brief Description: It will approach System AI to open hand gesture page.

3) Use case: Voice Detection Brief Description: It will approach System AI to open voice detection page.

b) Use Case of Hand Gesture: 1) Use case: Input trigger word Brief Description: It will approach the AI to enable the voice detection.

2) Use case: Input Command word Brief Description: It will approach the AI to perform the given command.

III. PROPOSED METHODOLOGY

The essential aim of building hand gesture recognition system is to create a natural interaction between human and computer where the recognized gestures can be used for controlling a robot conveying meaningful information. How to form the resulted hand gestures to be understood and well interpreted by the computer considered as the problem of gesture interaction Human computer interaction (HCI) also named Man-Machine Interaction (MMI) refers to the relation between the human and the computer or more precisely the machine, and since the machine is insignificant without suitable utilize by the human.

Hand Gesture is an active area of research in the vision community, mainly for the purposes of sign language recognition and human – computer interaction. Most of the hand tracking work to date has focused on 2D interfaces. Use gesture control to change the volume of a computer. First we look into hand tracking and then we use hand landmarks to find gestures of our hand to change volume. Distance between index finger and thumb is used to change volume level and ring finger is used to set the volume if ring finger is down/close volume will be set to volume which is on virtual volume bar.

Using this you can control your PC/Laptop volume by Hand Gestures (pinch-in, pinch-out) created with Python. We first look into hand tracking and then we will use the hand landmarks to find gesture of our hand to change the volume. This project is module based which means we will be using a previously created hand module which makes the hand tracking very easy

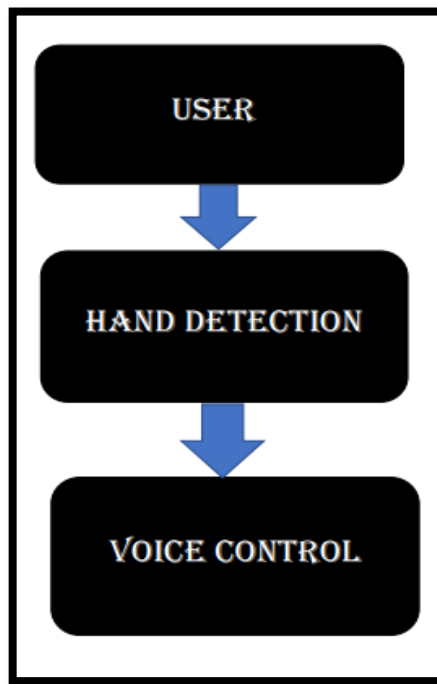
IV. DISCUSSION AND EXPERIMENTAL RESULTS

We decided to set up a meeting to discuss the project and the desired results in detail before getting started. The first meeting is an opportunity to get to know your fellow team members, brainstorm ideas and create a plan for the project. While planning, all the members came on google meet and discuss what would be the functions might be suitable for our application. Next, we figured out deadlines for each phase of the project. Work backward from the final due date to set timelines for each task. Everyone member thoughts were taken into account. Once the features were discussed, we attempted for the coding part. One of our team member was chosen to the complete coding and and after accumulating the assigned responsibilities, might further pass on to other members to check the coding part.

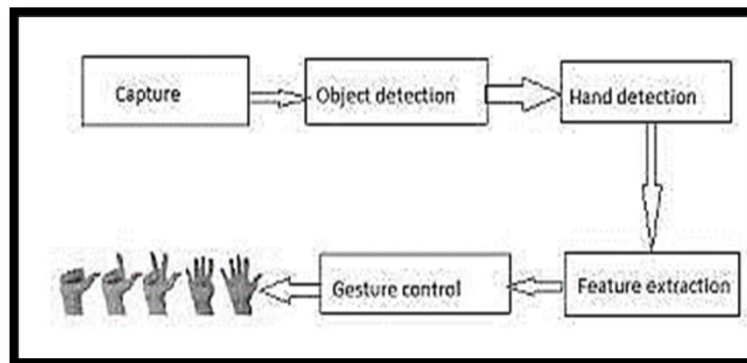
Although, due to unexpected instances, we had to discard some features as we faced difficulties in the coding of that features. There were also adjustments made for some pages that have been originally meant to be designed in a special manner. The team member did a part of the coding, collected coding from rest individuals completed the project and recorded it.

All the individuals have been made aware about the deadlines for each phase of the project. Work backward from the final due date to set timelines for each task was made.

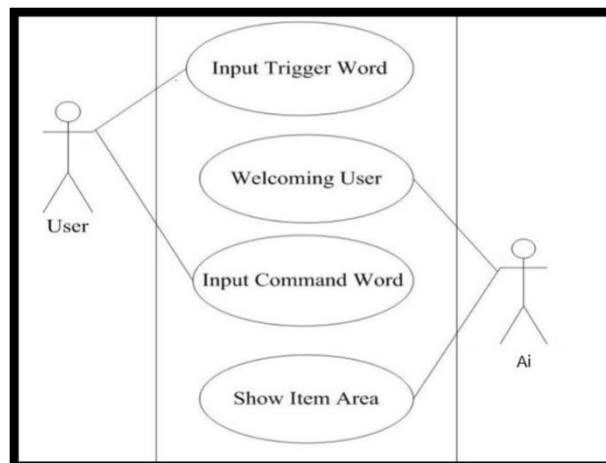
Here are the Block Representation, user case diagram and module based Hand Gesture and Voice Control of the software.



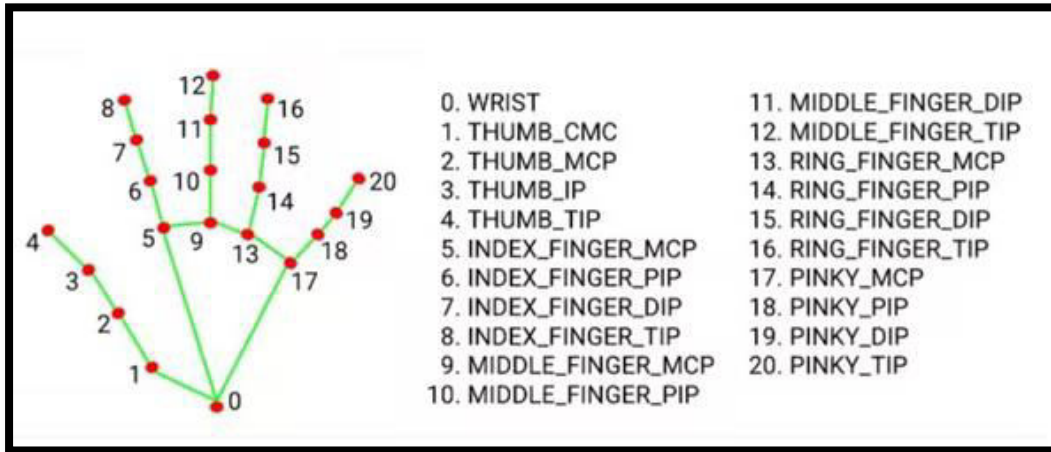
1.1 Block Representation



1.2 User Case Diagram For Hand Detection



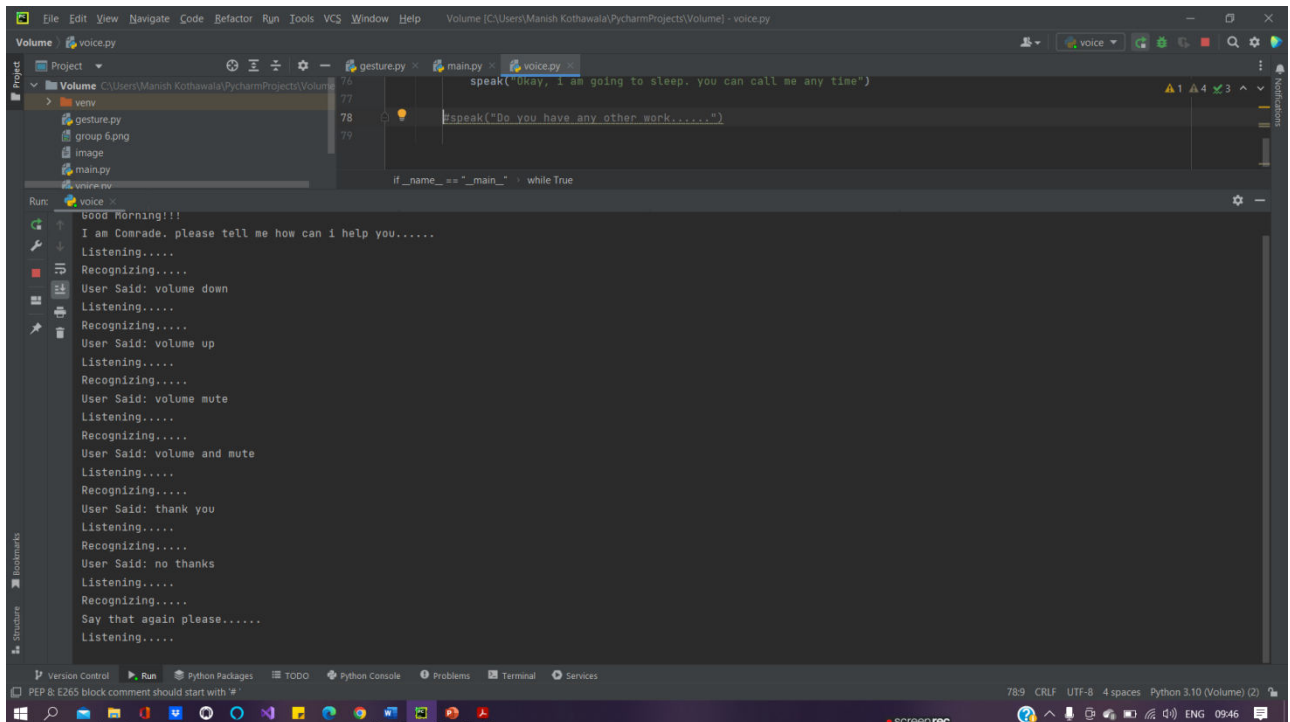
1.3 User Case Diagram For Voice Control



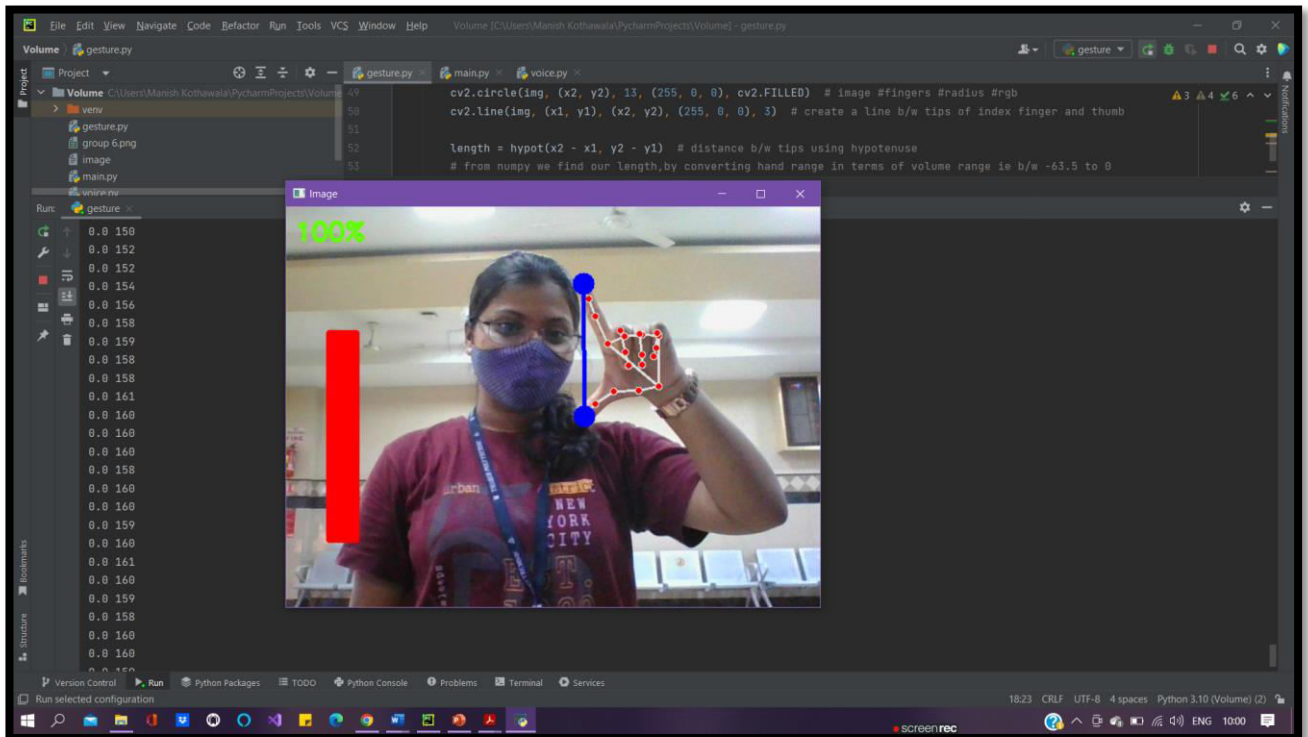
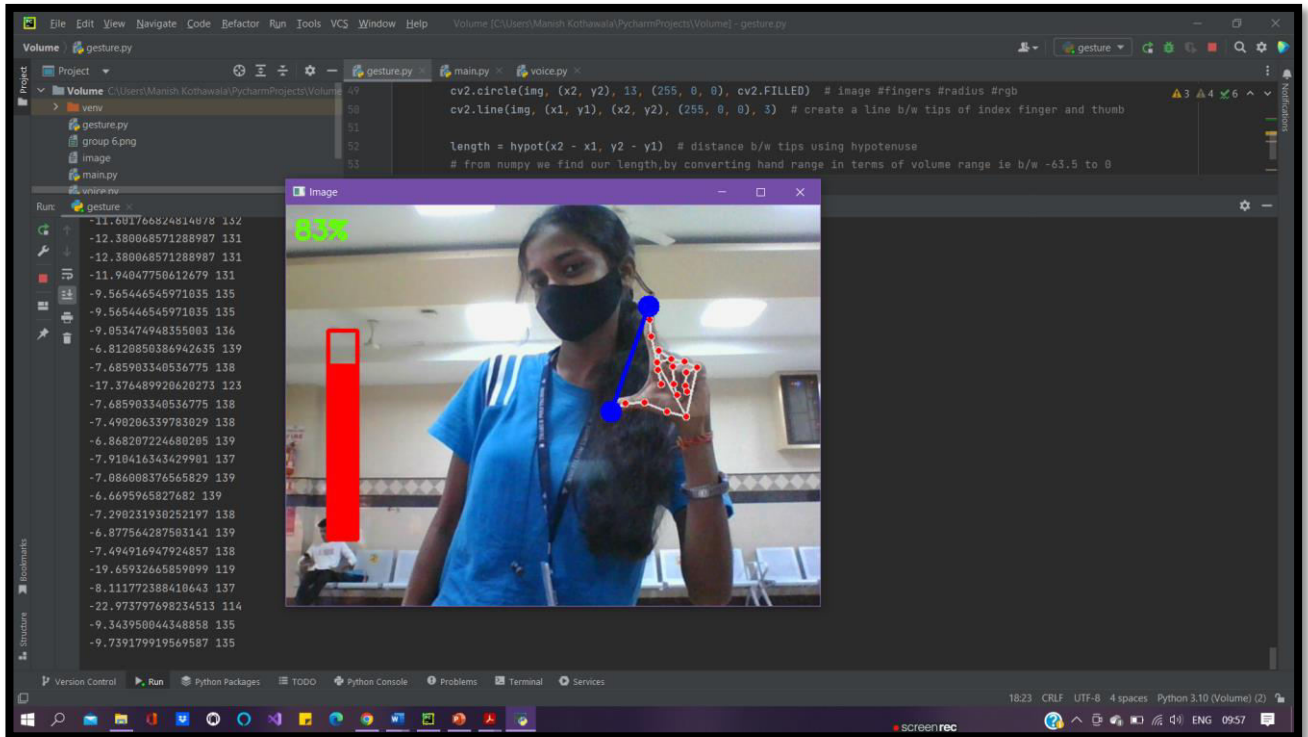
1.4 module based Hand Gesture

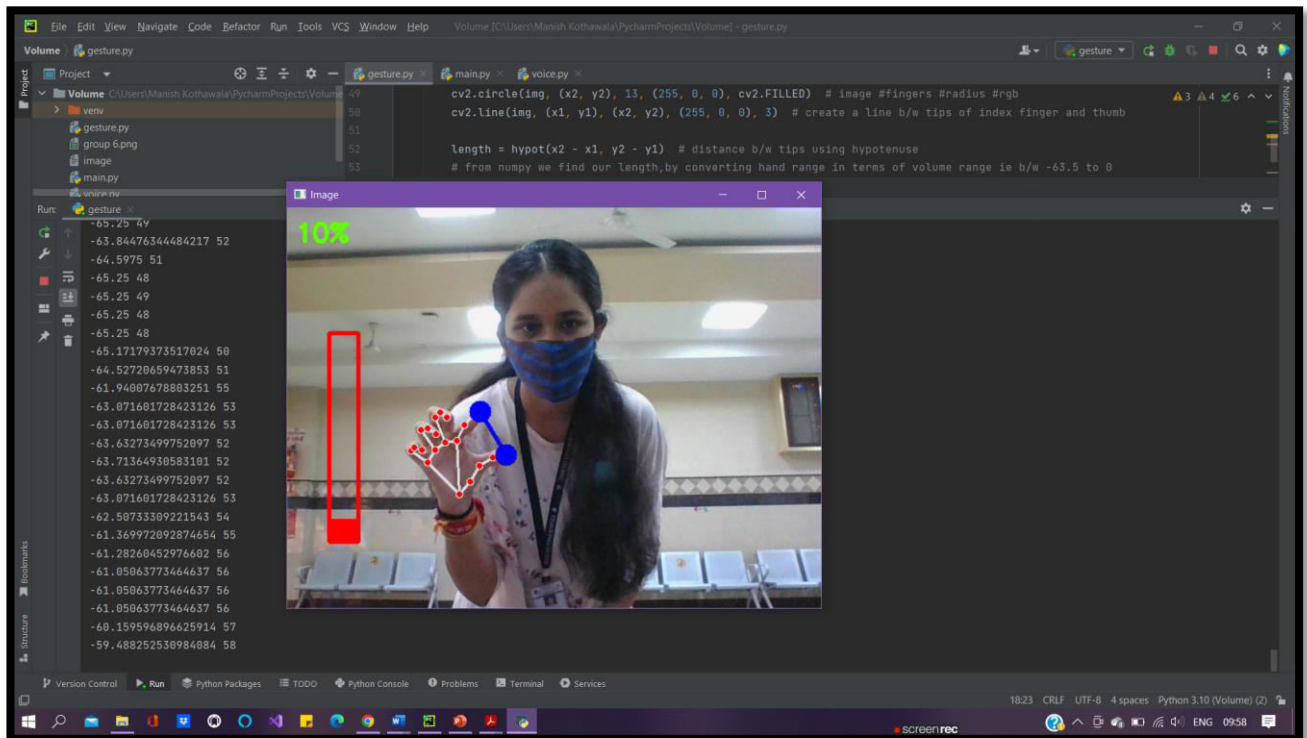
Here are the commands to run voice detection are:

- volume up
- volume down
- volume mute
- volume unmute



V. SIMULATION RESULTS





VI. CONCLUSION AND FUTURE WORK

Hand gestures recognition system has been applied for different applications on different domains, as mentioned in sign language translation, virtual environments, smart surveillance, robot control, medical systems etc.

Our project aims at developing a Hand detection software that is a crucial pre processing procedure for many human hand related computer vision tasks, such as hand pose estimation, hand gesture recognition, human activity analysis, and so on.

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