CHAPTER 1

INTRODUCTION

1.1 ABOUT THE PROJECT

In today's world, everyone is surrounded by machines and gadgets at all times. The use of mobile phones, tablets, computers and smartwatches has increased manifold due to creative new technology and Internet use. The system that contains a combination of hardware and software for communication between the user and the computer or machine, makes up the human computer interface (HCI). Normally, switches, touch screens and control elements are used. An easier way of communication is through the touchless user interface, which could be through voice or gesture input. This project focuses on gesture input and create a web application for controlling multimedia using hand gestures. Instead of using a mouse or keyboard, users can show hand gestures to perform operations or control certain functions of the computer. This could include playing a video and controlling power point presentations and images.

This project aims to develop a web application which focus on the field of gesture recognition. Through this application, users will be able to control video, Microsoft power point, Microsoft Word and images in the system using hand gestures. The input is taken through the webcam of the system. The programming languages used is Python.

A common scenario where this application will be able to help users is in the kitchen, where users may not be able to touch device screens or press buttons with theirhands while cooking. Another scenario is devices used at the beach or poolside, where users will have their hands too wet or sandy to type. Some of the other common applications are in automated homes, driving safety, television control and much more. With upcoming IoT (Internet of Things) devices, it is possible to switch off lights, control surround sound systems, access devices and change room temperature through the connected devices. Many of these devices use gesture recognition and voice input.

CHAPTER 2

SYSTEM REQUIREMENTS

2.1 HARDWARE REQUIREMENTS

The selection of hardware configuration is a very important task related to the software development. Random access memory may affect adversely on the speed and correspondingly on the efficiency of the entire system. The processor should be powerful to handle all the operations. The hard disk should have sufficient capacity to store the database and the application. The network should be efficient to handle the communication fast.

- Processor : Intel i3 or above
- RAM : 8 GB
- Hard Disk Memory : SSD 512 GB
- Keyboard : Normal or Multimedia Web Camera

2.2 SOFTWARE REQUIREMENTS

- Operating System : Windows 10
- Language : Python, html

2.3 TECHNOLOGIES USED

A set of programs associated with the operation of a computer is called software. Software is the part of the computer system which enables the user to interact with several physical hardware devices. The minimum software requirement specification for developing this project are as follows:

- Operating System : Windows 10
- Documentation Tool : MS Word

2.3.1 PYTHON

Python is a widely used high-level programming language for general-purpose programming, created by Guido van Rossum and first released in 1991. An interpreted language, Python has a design philosophy that emphasizes code readability (notably using whitespace indentation to delimit code blocks rather than curly brackets or keywords), and a syntax that allows programmers to express concepts in fewer lines of code than might be used in languages such as C++ or Java. The language provides constructs intended to enable writing clear programs on both a small and large scale. Python features a dynamic type system and automatic memory management and supports multiple including object-oriented, imperative,

functional programming, and procedural styles. It has a large and comprehensive standard library.

Python interpreters are available for many operating systems, allowing Python code to run on a wide variety of systems. CPython, the reference implementation of Python, is open Source software and has a community-based development model, as do nearly all of its variant implementations. CPython is managed by the non-profit Python Software Foundation (PSF). Python's development is conducted largely through the Python Enhancement Proposal (PEP) process. The PEP process is the primary mechanism for proposing major new features, for collecting community-input on an issue, and for documenting the design decisions that have gone into Python.

FEATURES OF PYTHON:

There are many features in Python, some of which are discussed below –

1. Easy to code:

   Python is a high-level programming language. Python is very easy to learn the language as compared to other languages like C, C#, JavaScript, Java, etc. It is very easy to code in python language and anybody can learn python basics in a few hours or days. It is also a developer-friendly language.

2. Free and Open Source:

   Python language is freely available at the official website and you can download it. Since it is open-source, this means that source code is also available to the public. So you can download it as, use it as well as share it.

3. Object-Oriented Language:

   One of the key features of python is Object-Oriented programming. Python supports object-oriented language and concepts of classes, objects encapsulation, etc.

4. GUI Programming Support:

   Graphical User interfaces can be made using a module such as PyQt5, PyQt4, wxPython, or Tk in python. PyQt5 is the most popular option for creating graphical apps with Python.

5. High-Level Language:

   Python is a high-level language. When we write programs in python, we do not need to remember the system architecture, nor do we need to manage the memory.

6. Extensible feature:

Python is an Extensible language. We can write us some Python code into C or C++ language and also we can compile that code in C/C++ language.

7. Python is Portable language:

   Python language is also a portable language. For example, if we have python code for windows and if we want to run this code on other platforms such as Linux, Unix, and Mac then we do not need to change it, we can run this code on any platform.

8. Python is Integrated language:

   Python is also an integrated language because we can easily integrated python with other languages like c, c++, etc.

9. Interpreted Language:

   Python is an Interpreted Language because Python code is executed line by line at a time like other languages C, C++, Java, etc.

10. Large Standard Library:

    Python has a large standard library which provides a rich set of module and functions so you do not have to write your own code for every single thing. There are many libraries present in python for such as regular expressions, unit-testing, web browsers, etc.

11. Dynamically Typed Language:

    Python is a dynamically-typed language. That means the type (for example- int, double, long, etc.) for a variable is decided at run time not in advance because of this feature we don't need to specify the type of variable.

2.3.2 OPENCV

OpenCV (Open-source computer vision) is a library of programming functions mainly aimed at real-time computer vision. Originally developed by Intel, it was later supported by Willow George then Itseez. The library is cross-platform and free for use under the open-source BSD license. The library has more than 2500 optimized algorithms, which includes a comprehensive set of both classic and state-of-art computer vision and machine learning algorithms. These algorithms can be used to detect and recognize faces, identify objects, classify human actions in videos, track camera movements, track moving objects, exact 3D models of objects, produce 3D point clouds from stereo cameras, stitch images together to produce a high resolution image of entire scene.

Human eyes provide lots of information based on what they see. Machines are facilitated with seeing everything, convert the vision into numbers and store in the memory. Here the question arises how computer convert images into numbers. So the answer is that the pixel value is used to convert images into numbers. A pixel is the smallest unit of a digital image or graphics that can be displayed and represented on a digital display device. The picture intensity at the particular location is represented by the number.

2.3.3 PYAUTOGUI

PyAutoGUI lets your Python scripts control the mouse and keyboard to automate interactions with other applications. The API is designed to be as simple. PyAutoGUI works on Windows, macOS, and Linux, and runs on Python 2 and 3.

PyAutoGUI has several features:

- Moving the mouse and clicking or typing in the windows of other applications.
- Sending keystrokes to applications (for example, to fill out forms).
- Take screenshots, and given an image (for example, of a button or checkbox), find it on the screen.
- Locate an application’s window, and move, resize, maximize, minimize, or close it (Windows-only, currently)
- Display message boxes for user interaction while your GUI automation script runs.

The x, y coordinates used by PyAutoGUI has the 0, 0 origin coordinates in the top left corner of the screen. The x coordinates increase going to the right (just as in mathematics) but the y coordinates increase going down (the opposite of mathematics). On a screen that is 1920 x 1080 pixels in size, coordinates 0, 0 are for the top left while 1919, 1079 is for the bottom right. Currently, PyAutoGUI only works on the primary monitor. PyAutoGUI isn't reliable for the screen of a second monitor (the mouse functions may or may not work on multi-monitor setups depending on your operating system and version). All keyboard presses done by PyAutoGUI are sent to the window that currently has focus, as if you had pressed the physical keyboard key.

2.3.4 MEDIAPIPE

Media-Pipe is a framework for building cross-platform (i.e. Android, iOS, web, edge devices) multimodal (e.g. video, audio, any time series data) applied Machine Learning pipelines that consist of fast ML inference, classic computer vision, and media processing (e.g. video decoding). Media-pipe has released various prebuilt python and other language packages

like:

- Object Detection
- Face Detection
- Hand Tracking
- Pose Estimation
- Multi-hand Tracking
- Hair Segmentation

2.3.5 STREAMLIT

Streamlit is an opensource app framework in python language. It helps us create beautiful web-apps for data science and machine learning in a little time. It is compatible with major python libraries such as scikit-learn, keras, pytorch, latex, numpy, pandas, matplotlib, etc..

1. It embraces python-scripting.
2. Less code is needed to create amazing web-apps.
3. No callbacks are needed since widgets are treated as variables.
4. Data caching simplifies and speeds up computation pipelines.

2.3.6 PIL

Python Imaging Library (expansion of PIL) is the de facto image processing package for Python language. It incorporates lightweight image processing tools that aids in editing, creating and saving images. Support for Python Imaging Library got discontinued in 2011, but a project named pillow forked the original PIL project and added Python3.x support to it. Pillow was announced as a replacement for PIL for future usage. Pillow supports a large number of image file formats including BMP, PNG, JPEG, and TIFF. The library encourages adding support for newer formats in the library by creating new file decoders.

2.3.7 Math

This module provides access to the mathematical functions defined by the C standard .These functions cannot be used with complex numbers; use the functions of the same name from the cmath module if you require support for complex numbers. The distinction between functions which support complex numbers and those which don't is made since most users do not want to learn quite as much mathematics as required to understand complex numbers. Receiving an exception instead of a complex result allows earlier detection of the unexpected complex number used as a parameter, so that the programmer can determine how and why it was generated in the first place.

CHAPTER 3
LITERATURE REVIEW

3.1 MEDIA CONTROL USING HAND GESTURES:

Authors: Vallabh Chapalgaonkar, Atharva Kulkarni, Amey Sonawale

Gesture-based real-time gesture recognition systems received great attention in recent years because of their ability to interact with systems efficiently through human-computer interaction. Human-Computer Interaction can gain several advantages with the establishment of different natural forms of device-free communication. Gestures are a natural form of action that we often use in our daily lives to interact, so to use them as a way of communicating with computers generates a new paradigm of computing interaction. This project implements computer vision and gesture recognition techniques and develops a vision based low-cost input software for controlling the media player through gestures

3.2 CONTROLLING POWER POINT USING HAND GESTURES IN PYTHON

Authors: Muhammad Idrees, Ashfaq Ahmad, Muhammad Arif Butt, and Hafiz Muhammad Danish

Presentations have a significant role in different fields of life. Whether you are a student, anentrepreneur, businessman, or a corporate worker, you must have had given presentations atsome point in your life. PowerPoint presentations sometimes become less lively because eitheryou have to use the keyboard to change and operate the slides or use a dedicated gadget toperform these tasks. We aimed to enable people to control the slideshow with the gestures ofhands. The applications of gestures in human-computer interaction have massively risen in thepast few years. The research has tried to control different operations of the PowerPointslideshow through gestures. This research has used Machine Learning to detect gestures withsubtle differences and tried to map them with some fundamental PowerPoint slideshowcontrolling functions using Python.

3.3 ROBUST THE VISION BASED HAND GESTURES INTERFACE FOR OPERATING VLC MEDIA PLAYER

Authors: Anupam Agrawal , Siddharth Swarup Rautaray

In 2010, Anupam Agrawal and Siddharth Swarup Rautaray, “The Vision based Hand Gestures Interface for Operating VLC Media Player Application "program, in that the nearest K neighbor algorithm was used see various touches. Features of VLC media player which were driven by hand gestures including play, as well pause, Full screen, pause, increase volume, and decrease capacity. Lucas Kanade Pyramidical's Optical Flow The algorithm is used to detect hand input video. The algorithm mentioned above detects movement points in the image input. Then the methods of K find a hand centre. By using this facility, the hand is the same noticed. This program uses the database it contains various hand gestures and inputs compared with this image stored and appropriately VLC media player it was controlled. The current application is not very robust recognition phase.

3.4 A-FAST-SIGHTED HAND-BASED TOUCH ALGORITHM RECOGNITION FOR ROBOT CONTROL

Authors: Erol Ozgur, Asansarabi Malima

In 2006, it formed Erol Ozgur and Asansarabi Malima "A fast-sighted hand-based touch algorithm Recognition for Robot Control” which controlled the robot using hand gestures but with limited touch. First the division of the hand circuit was followed by pointing fingers and finally separating the gestures. The algorithm used is consistent in translation, rotation and hand scale. This program works on a robot control app with reliable performance.

CHAPTER 4

PROBLEM DEFINITION

4.1 INTRODUCTION

In my project I introduce a web app for multimedia control using hand gestures. Gesture recognition is the process by which systems can see, recognize andrespond to gestures shown by the user. This perceptual user interface provides a way forusers to communicate with the system without the need for clicking and typing. Gesturescan come from any bodily motion or state. Usually, they come from the hand or face.

During my project I went through the different system development life cycle. First of all I started with system study which helped me understand scope of the system. During this phase I am able to understand the limitations of the existing system and it also helped me in realizing the requirements from the client's perspective.

4.2 EXISTING SYSTEM

In the existing system we control video, power point presentations ,images by using mouse and keyboard for all inputs. The problem with traditional systems can arise in many ways. Firstly, for people with disabilities, it is not possible to click buttons or type for every operation. Secondly, ifsome part of your computer is not working properly, it is not possible to rely on the traditional use of mouse and keyboard for all inputs. Thirdly, even if people are able and have systems that are usable, nowadays, every part of life is being automated and simplified. The hardware required also costs a lot of money.

4.2.1 LIMITATIONS OF THE EXISTING SYSTEMS:

- Existing systems lack natural communication between humans and machines
- Currently available gesture recognition systems are expensive

4.3 PROPOSED SYSTEM

In proposed system we are using the web app for muti media control using hand gestures we can easily control multi medias like video,powerpoint,image by using the different hand gestures. My project uses systems web camera as an input device to capture gestures performed by the users. The vision based gesture recognition seems to be a better option due to its advantages over non-vision based method. With the help of image processing preprocessing the images and which is easy to find the hand landmarks and track the gesture movement. The

major aim behind this project is to enhance user experience while using any computer system. By providing an easier way to control multimedia applications, users will find more interest in using computers altogether.

This project aims to provide such a touchless user interface for computer systemswith the required hardware and software combination. This application can be used to control applications like media player, Microsoft PowerPoint, Microsoft word,image management . by using hand gestures instead of clicking the buttons on the screen or on the keyboard.

4.3.1 ADVANTAGES OF PROPOSED SYSTEM:

- Since it uses only systems webcam or external webcam as hardware, it is cost efficient.
- Maintenance is much easier than the existing gesture recognition system.
- User friendly and easily adaptable web app which explain the working of the application.
- Easy to implement.

4.4 FEASIBILITY STUDY

A feasibility study is made to see the proposed system in the light of the workability, meeting users requirements, effective use of resources, effort and the time that is spend and of course, the cost effectiveness. An important outcome of the preliminary investigation determining whether the system required is feasible.

There are three aspects in the feasibility study portion of the preliminary investigation.

1. Economic Feasibility
2. Technical Feasibility
3. Operational Feasibility

4.4.1 TECHNICAL FEASIBILITY

The web app must be evaluated from the technical point of view first. The assessment of this feasibility must be based on an outline design of the system requirement in the terms of input, output, programs and procedures. Technical feasibility centers around computer system and to what extend it can support the proposed addition. This involves the financial considerations to accommodate the additional technical enhancements. If budget is not a serious constraint, then the project is judged technically feasible. Since the project uses python as programming

language and streamlit and html for web app designing which is easy to understand and the packages used for image processing and GUI automation are freely available. The systems webcam is used to fetch the data , so the proposed multimedia controlled web app is technically feasible.

4.4.2 ECONOMICAL FEASIBILITY

The developing system must be justified cost and benefit. Criteria to ensure that effort is concentrated on project, which will give best, return at the earliest. This deals with whether expected cost saving, increase the profits and reductions in required investment, and other benefits exceed the cost of developing and operating the proposed system. Its preliminary investigation is concentrated on costs of hardware and software. The project uses python as programming language and the packages used for image processing and streamlit and html are used to web page designing which are freely available. The only external hardware required is a webcam and its not mandatory .

4.4.3 OPERATIONAL FEASIBILITY

The operational feasibility depends up on whether system performed in the expected way or not. The project uses python as programming language which is easy to understand and the packages used for image processing and streamlit and html for web app designing are freely available. The web app developed is so simple and user friendly there is no special user training is required.The language used in is English and every people can operate it reading options.The type of diferrent gestures ,buttons,and about the project are written in the home page of the wb app.Here we use seperate pages for media player control and power point control. There is no need of special training required for the users.

CHAPTER 5

SYSTEM DESIGN

5.1 INTRODUCTION

System Design develops the architectural details required to build system or product. The system design process encompasses the following activities:

- Partition the analysis model into subsystems.
- Identify concurrency that is dictated by the problem.
- Develop design for the user interface.
- Choose a basic strategy or implementing data management.
- Identify global resources and the control mechanisms required to access them.
- Design an appropriate control mechanism for the system, including task management.

5.2 ADOPTION OF MODULES

The application consist of Four Modules

- Open web application
- Video captureing
- Hand tracking and Hand Landmark
- Gesture identification and performing action

5.2.1 OPEN WEB APPLICATION

Streamlit and html is used to design the web application.In the application 3 sub pages select the type of medi(video,image,power point)a to perform.

5.2.2 VIDEO CAPTUREING

The web cam is open by using open cv and capture the different hand gestures of the user.

5.2.3 HAND TRACKING AND HAND LANDMARK

Achieves precise key point localization of 21 key points with a 3D hand-knuckle coordinate which is conducted inside the detected hand regions through regression which will produce the coordinate prediction directly which is a model of the hand landmark in MediaPipe. Each hand-

knuckle of the landmark has coordinate is composed of x, y, and z where x and y are normalized to [0.0, 1.0] by image width and height, while z representation the depth of landmark. The depth of landmark that can be found at the wrist being the ancestor. The closed the landmark to the camera, the value becomes smaller.

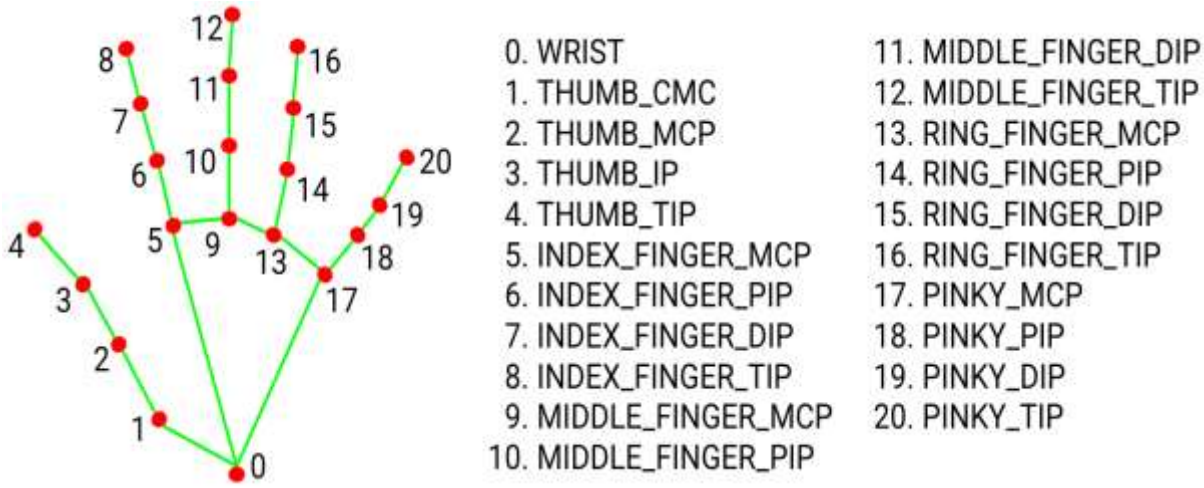


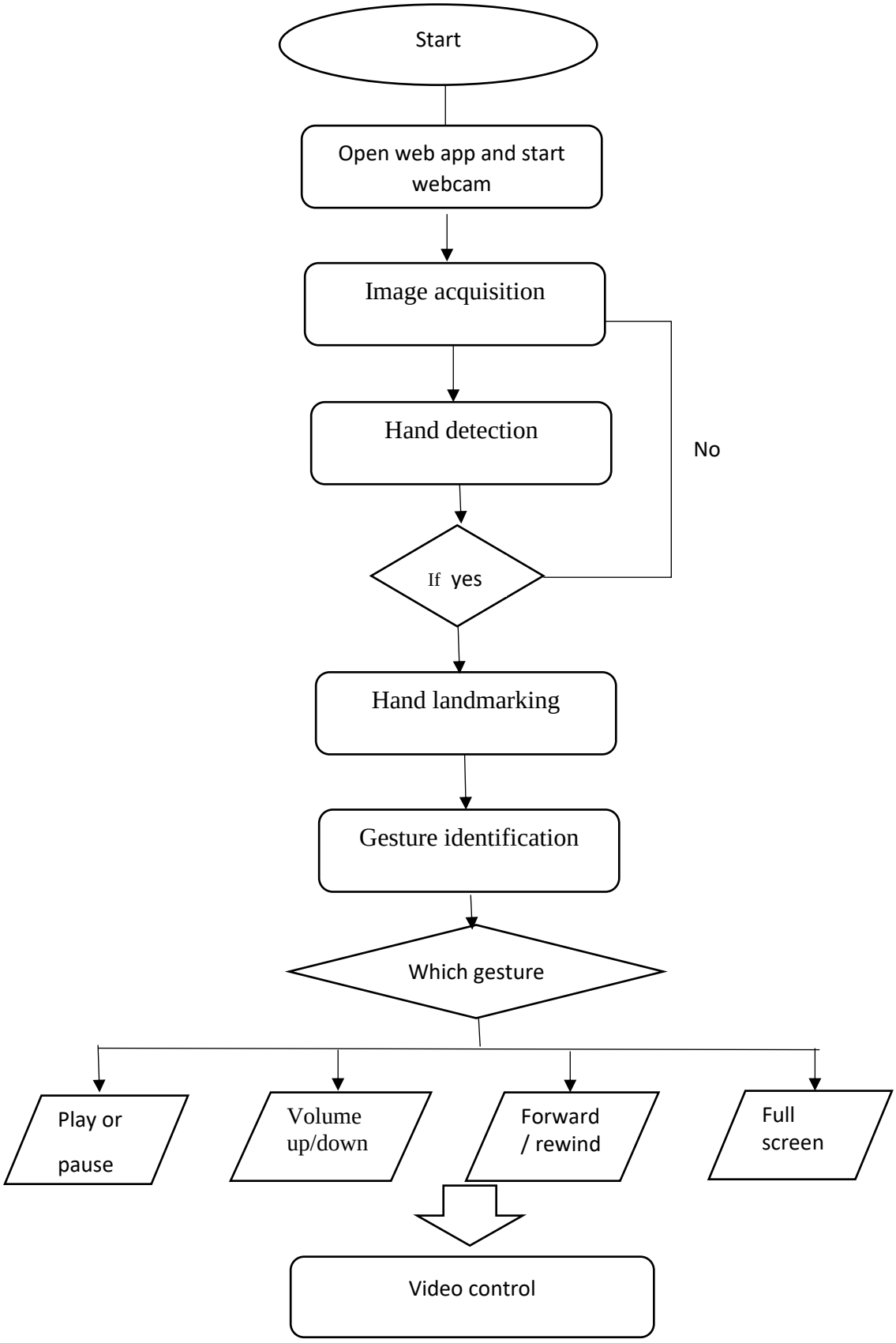
Fig 5.2.3.1 Hand landmark points

5.2.4 GESTURE IDENTIFICATION AND PERFORMING ACTION

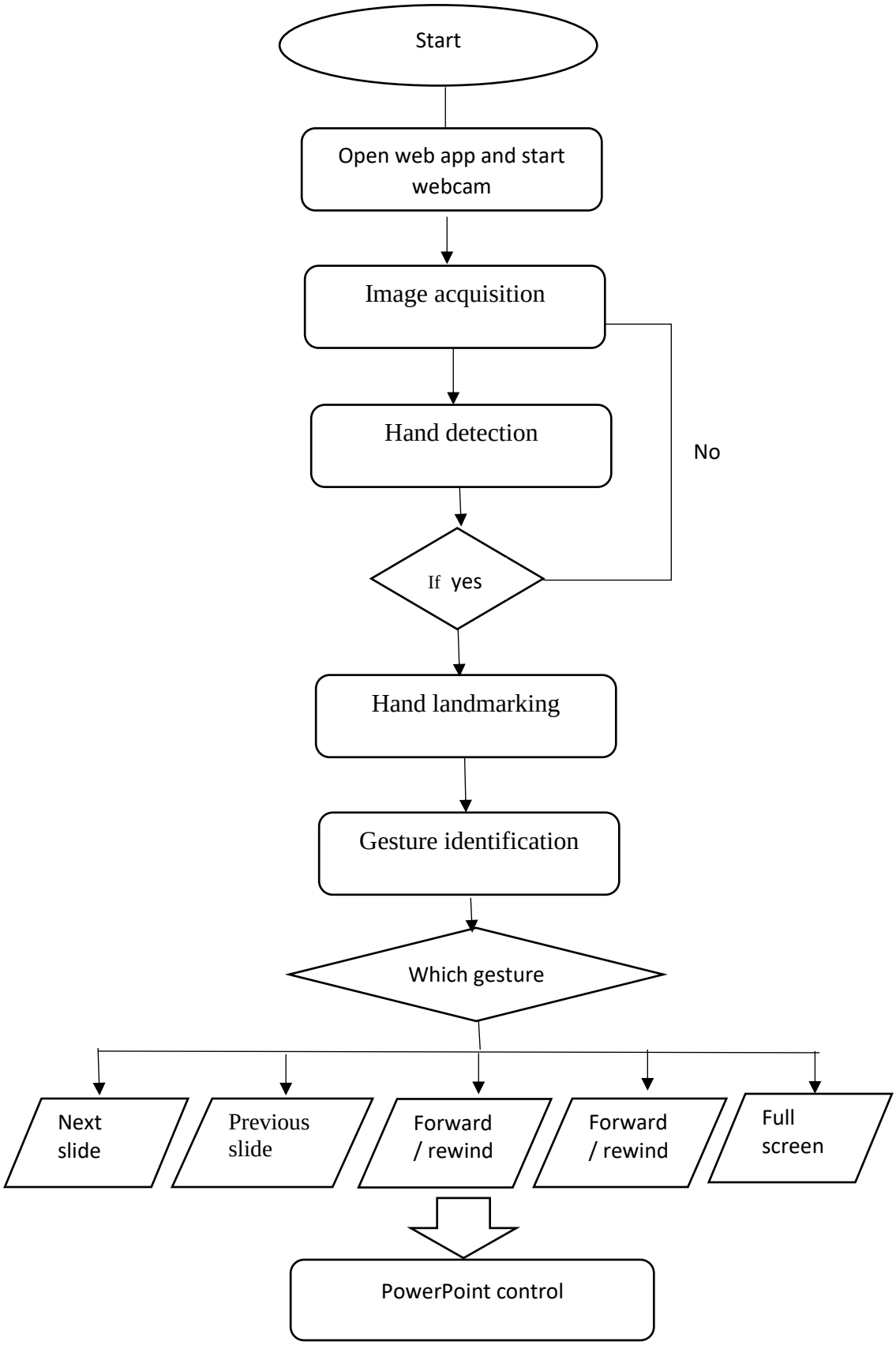
Based on the hand land mark and algorithm detect the type of hand gesture and pyautogui module is used to perform the corresponding keyboard action.

5.2.5 FLOW CHART

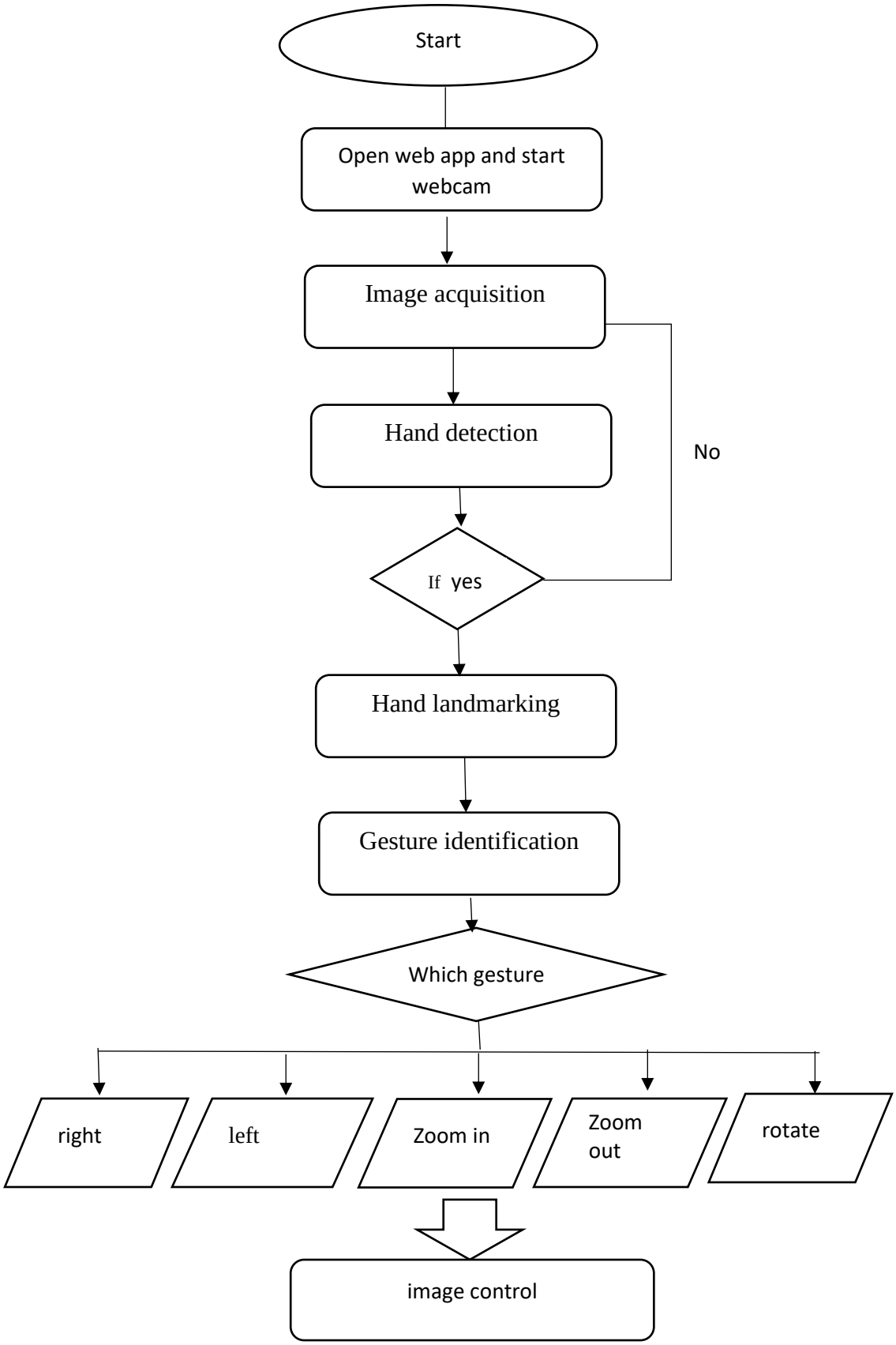
5.2.5.1 VIDEO CONTROL USING HAND GESTURE



5.2.5.2 POWERPOINT CONTROL USING HAND GESTURE



5.2.5.3 IMAGE CONTROL USING HAND GESTURE



5.3 DATA FLOW DIAGRAM

A dataflow diagram is a graphical technique that depicts information and transforms that are applied as data move from input to output. The DFD is used to represent increasing information flow and functional details. A level-0 DFD is also called a fundamental system model represents the entire software elements as a single bible with input and output indicated by incoming and outgoing arrows respectively. Additional process and information flow parts are represented in the next level, i.e., level 1 DFD. Each of the process represented at level 1 are sub functions of overall system depicted in the context model.

ADVANTAGES

- Users easily understood these simple notations.
- Users can make suggestions for modifications.
- They can also spot problem quickly.
- If analyst wants to overview the overall system late, they use the higher overview of thesystem.

5.3.1 RULES FOR CONSTRUCTING A DATA FLOW DIAGRAM

- Arrows should not cross each other.
- Squares, circles and files must bear names.
- Decomposed data flow squares and circles can have same names.
- Choose meaningful names for data flow.
- Draw all data flows around the outside of the diagram.

5.3.2 COMPONENTS OF DATA FLOW DIAGRAM

Data Flow Diagram (DFD) is an important tool used by system analyst. DFD provide an overviewof what data a system would process, what transformation of data are done, what files are used and where the results flow. The graphical representation of the system makes it a good communication tool between the user and the analyst. Analysis model help us to understand the relationship between different components in the design. Analysis model shows the user clearly how a system will function. This is the first technical representation of the system.

The analysis modeling must achieve three primary objectives.

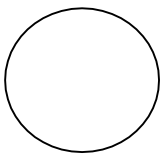
- To establish a basis for creation of software design.
- To describe what the user requires.
- To define set of requirements that can be validated once the software us build.

A data flow diagram is a graphical technique that depicts information flow and transforms that are applied as data move from input to output. The DFD is used to represent increasing information flow and functional details. A level 0 DFD also called fundamental system model represents the entire software elements as single bubble with input and output indicated by incoming and outgoing arrow respectively. To construct the data flow diagram we use arrows, circle, and rectangles.

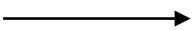
`A Data Flow Diagram (DFD) is a graphical representation of the "flow" of data through an information system, modeling its process aspects. A DFD show what kind of information will beinput to and output from the system where the data will come from and go to and where the datawill be stored. The symbols used to draw DFD are:

- External Entity represents the source of data that enter in to the system or the recipients of data that leave the system.

- Processes represent activities in which data that are manipulated by being stored or transformed in some way.

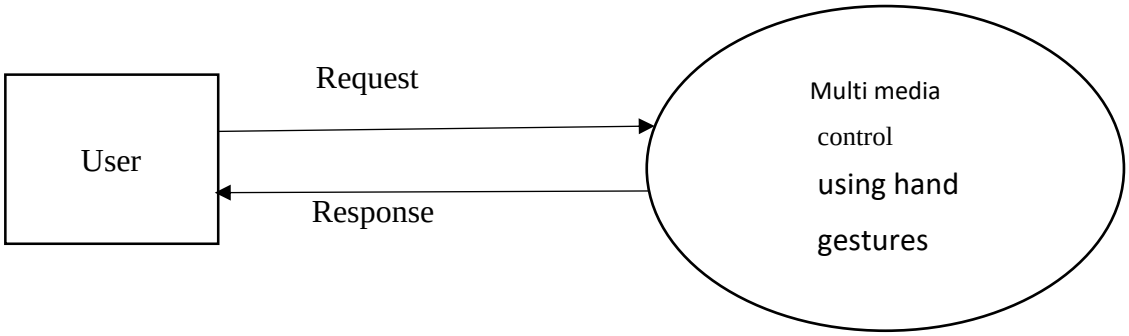


- A data flow shows the flow of information from its source to its destination. A linerepresents a data flow, with arrow heads showing the direction of flow.

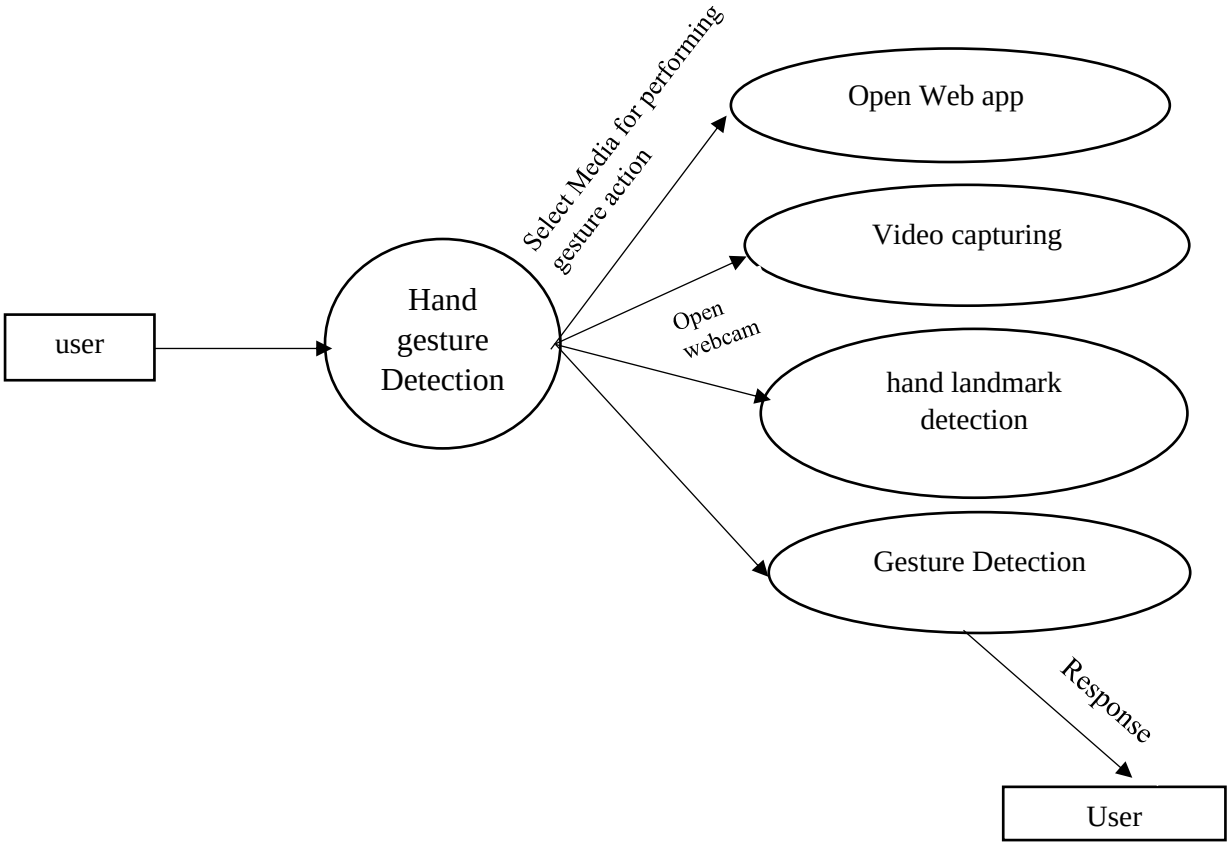


- Data stores represent stores of data within the system. Data stores may be long-term filessuch as sales ledgers, or may be short-term accumulations.

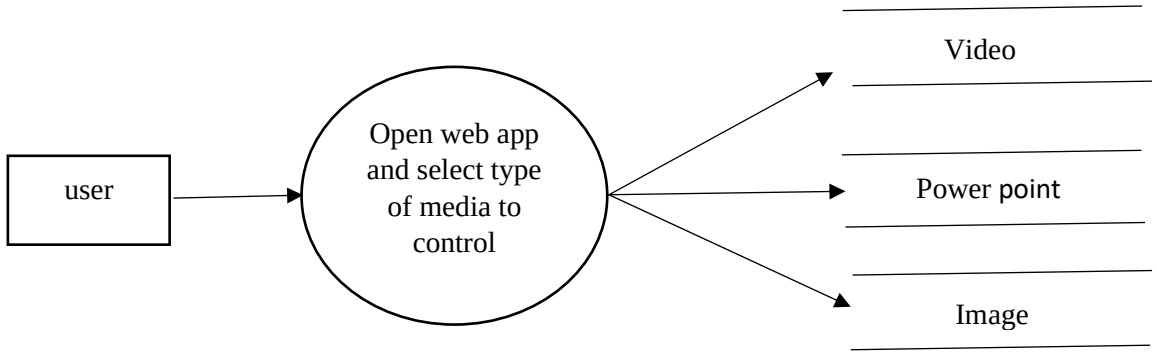
5.3.3 CONTEXT LEVEL DIAGRAM



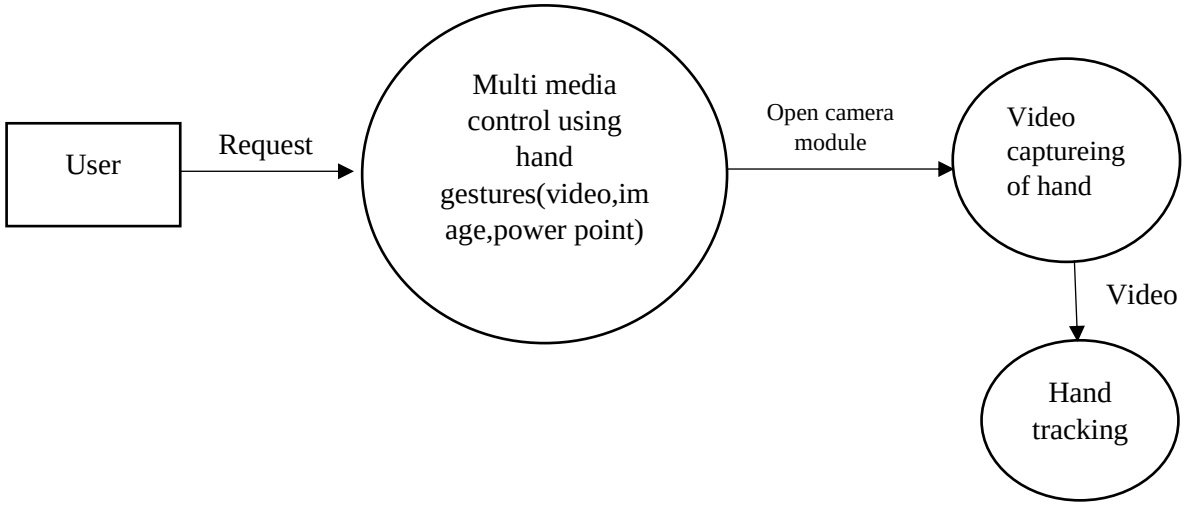
5.3.3.1 LEVEL 1 DFD: MAIN MODULE IN MULTI MEDIA CONTROL USING HAND GESTURES



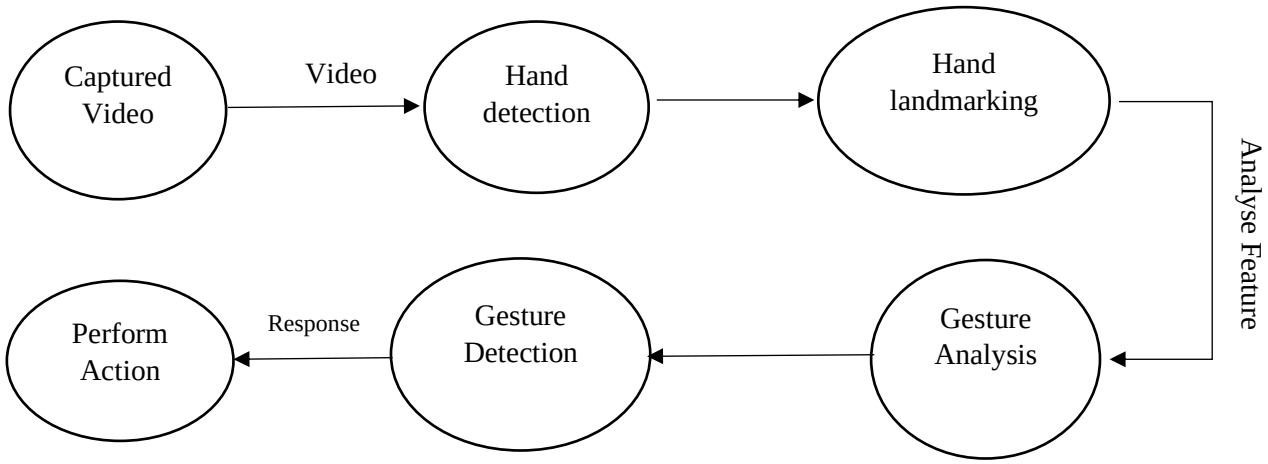
5.3.3.2 LEVEL 1.1: OPEN WEB APPLICATION



5.3.3.3 LEVEL 1.2: VIDEO CAPTURING



5.3.3.4 LEVEL 1.3: HAND LANDMARKING AND GESTURE DETECTION



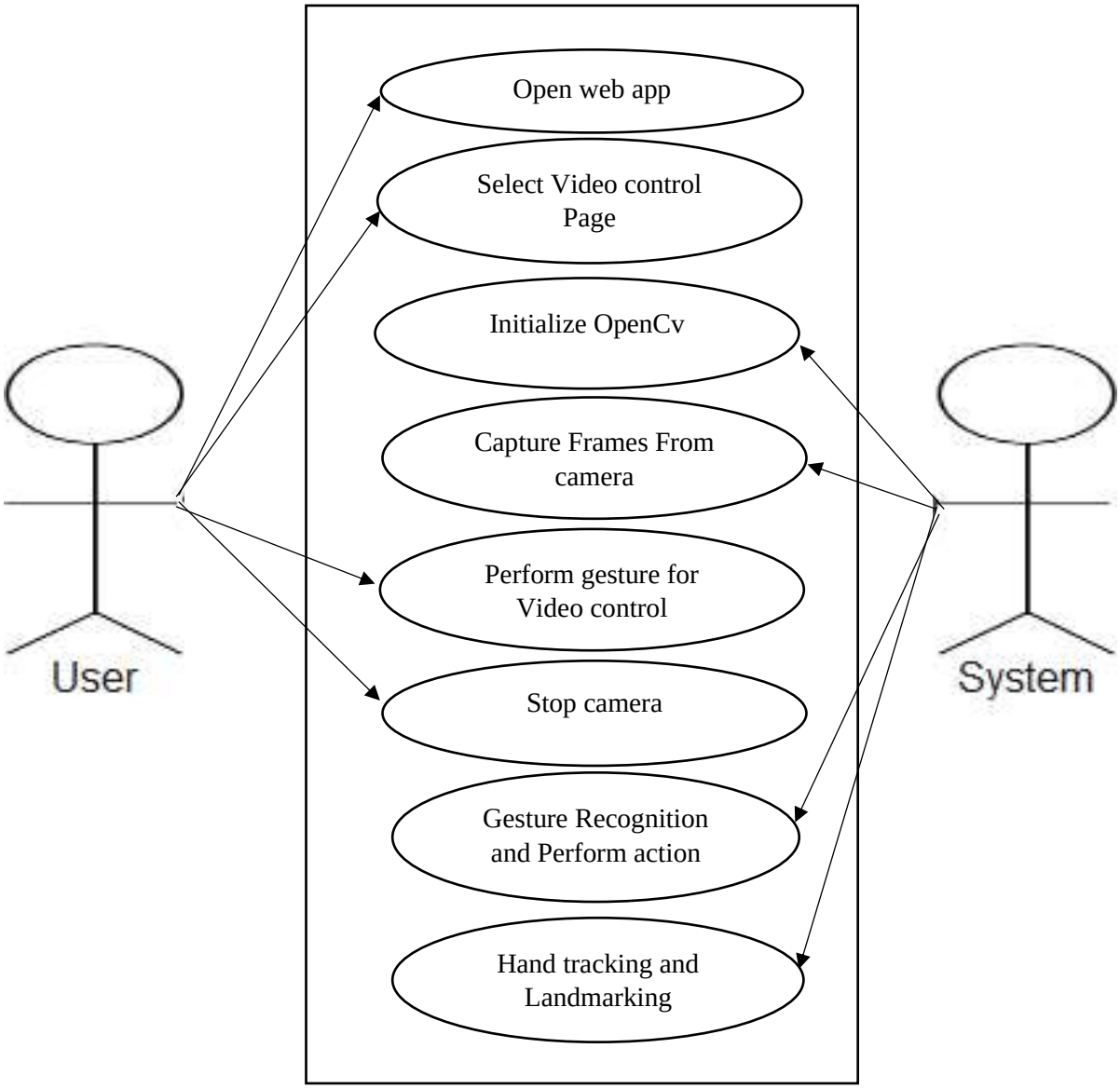
5.4 UML DIAGRAM

The Unified Modelling Language is a standard visual modelling language intended to be used formodelling, analysis, design, and implementation of software based systems.

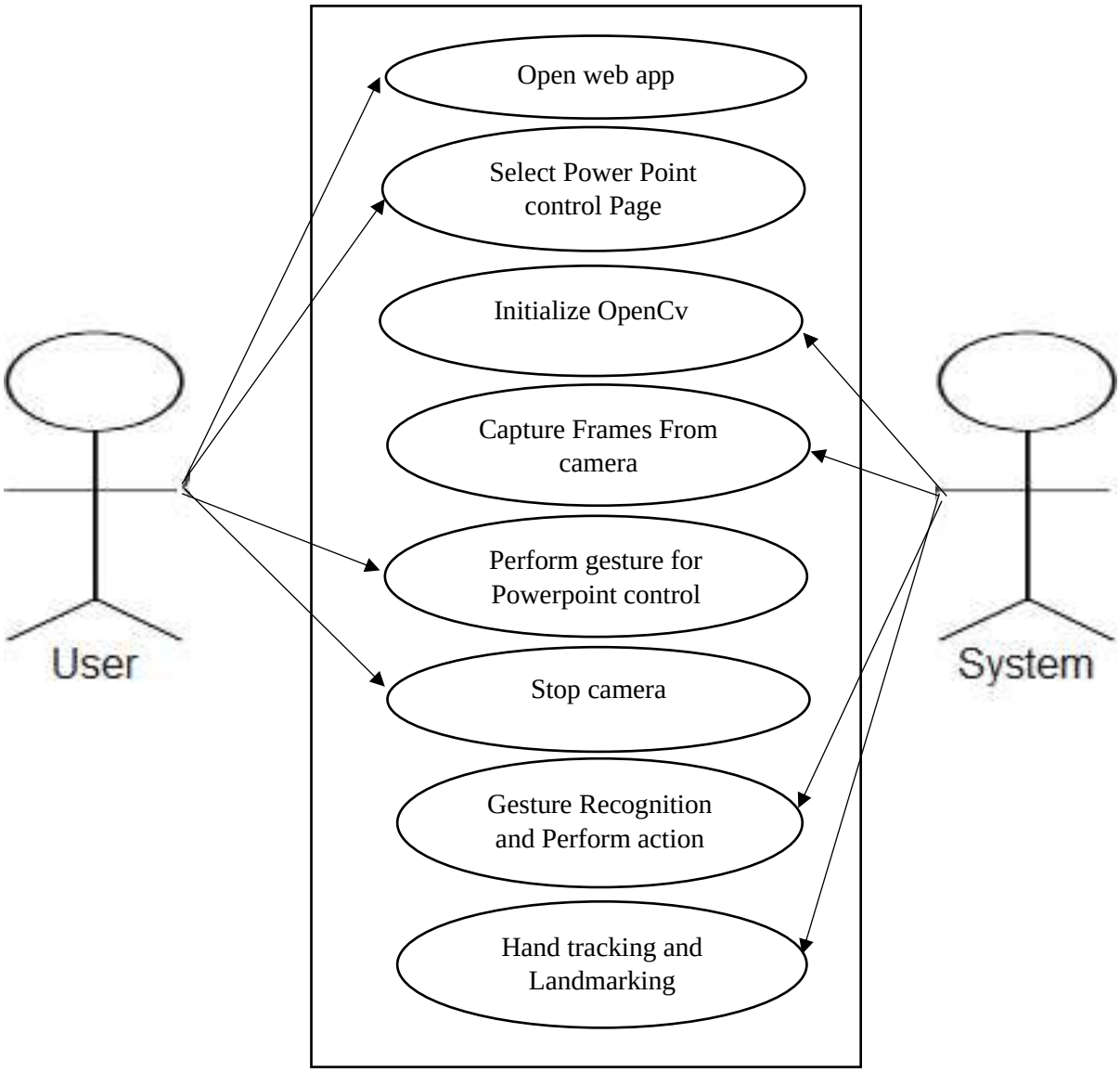
5.4.1 USECASE DIAGRAM

A use case is the set of scenarios that describing an interaction between a user and a system. A use diagram displays relationship among actors and use cases. The two main components of ause case diagram are use case and actors. An actor is represents a user or another system that will interact with the system you are modeling. A user is an external view of the system that represents some action the user might perform in order to complete a task

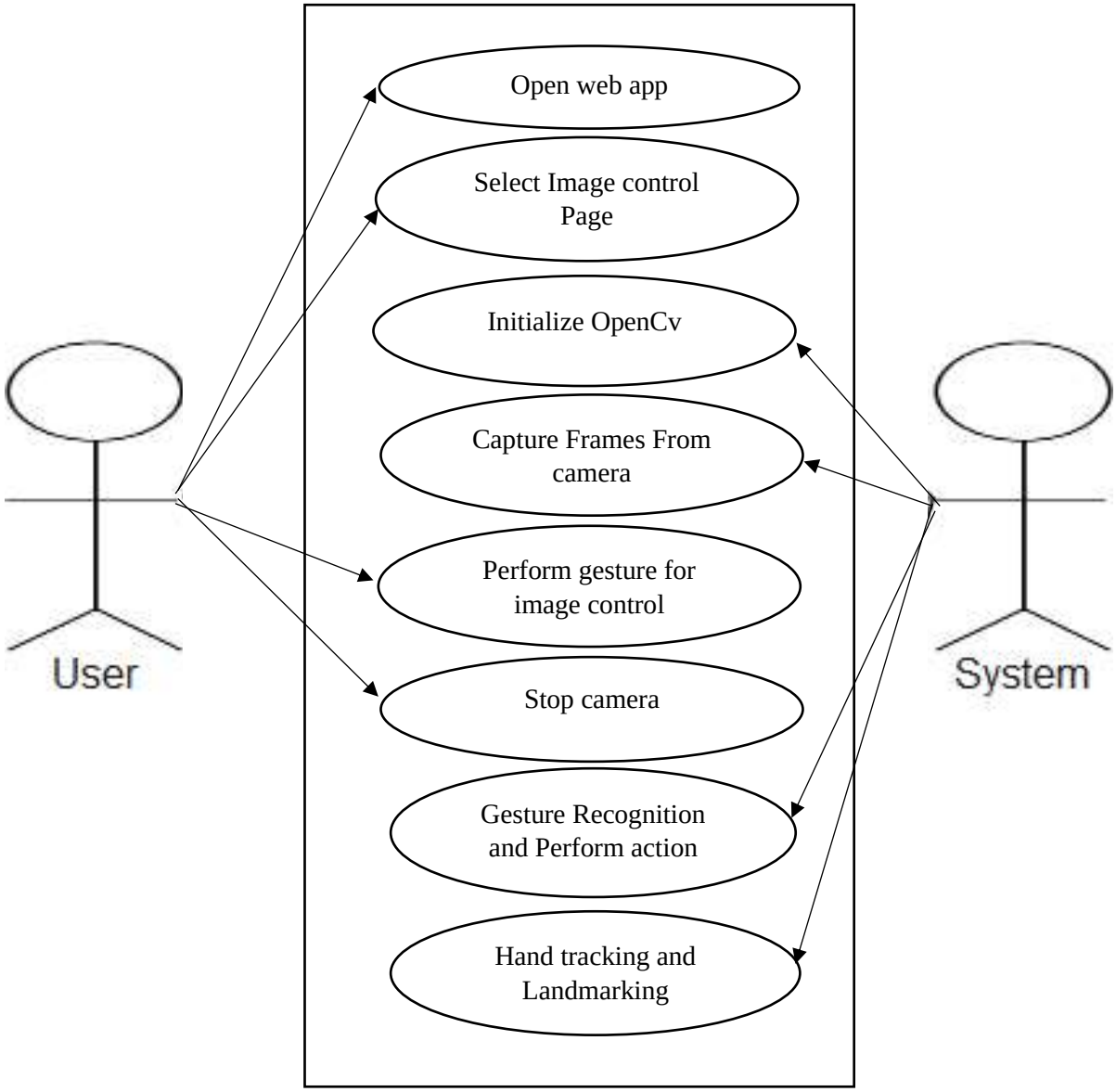
5.4.1.1 USE CASE DIAGRAM FOR VIDEO CONTROL



5.4.1.2 USE CASE DIAGRAM FOR POWER POINT CONTROL



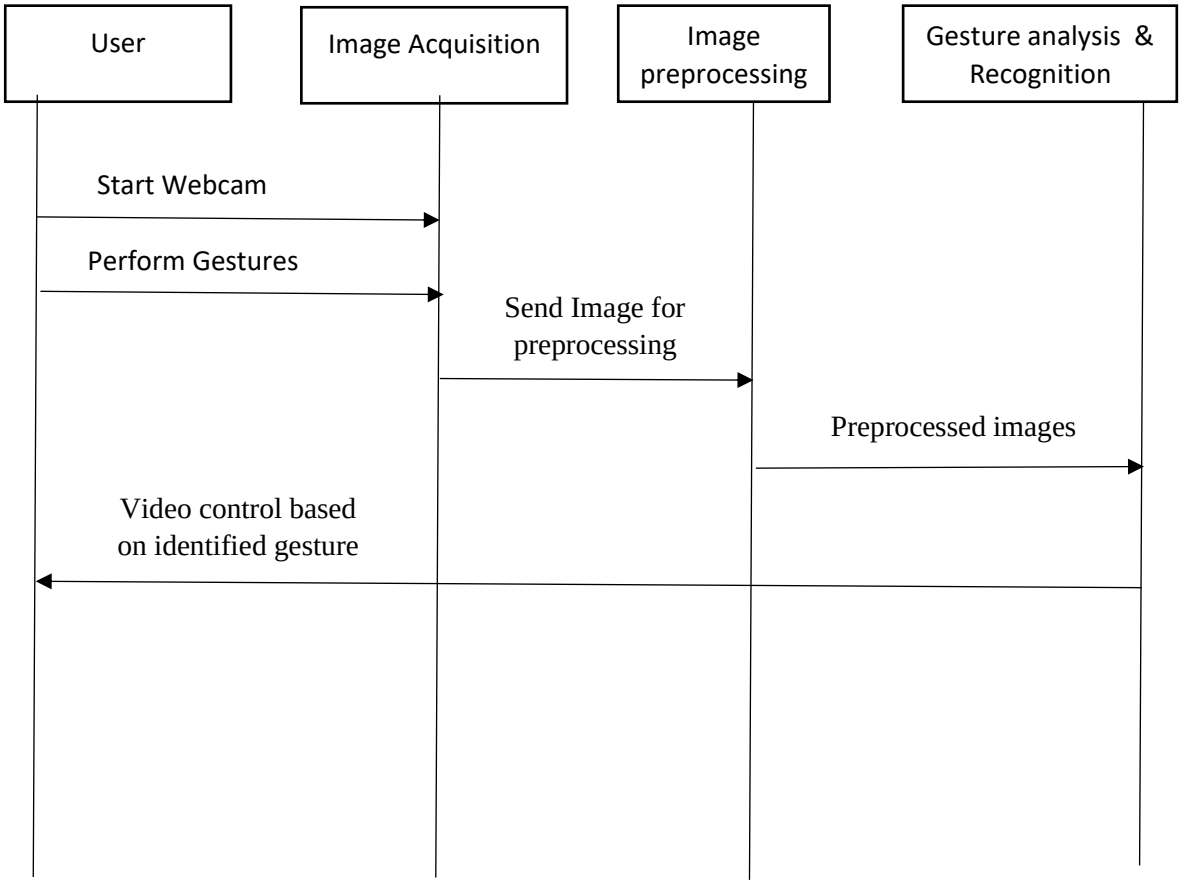
5.4.1.3 USE CASE DIAGRAM FOR IMAGE CONTROL



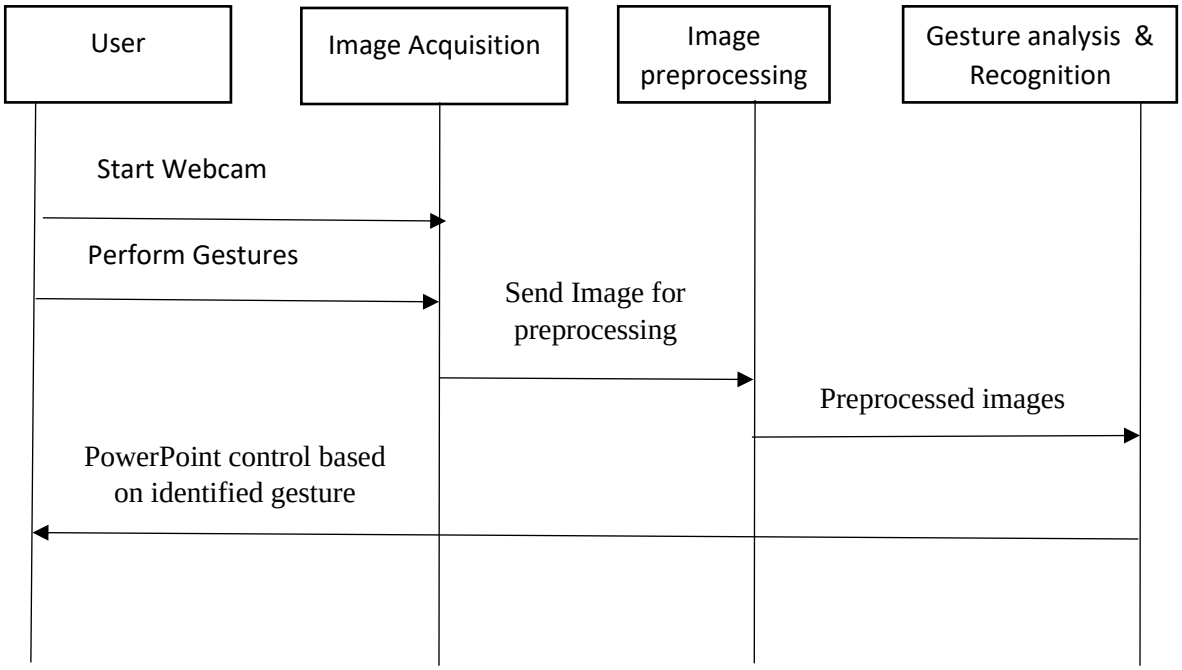
5.4.2 SEQUENCE DIAGRAM

A Sequence diagram shows interaction among arranged in a time sequence. It shows the objects participating in the interaction by their life lines and the messages they exchange, arranged in a time sequence. The sequence diagram has two dimensions; the verticaldimension represents time; the horizontal dimension represents different objects. The verticalline is called objects lifeline. The life line represents the objects existence during the interaction.

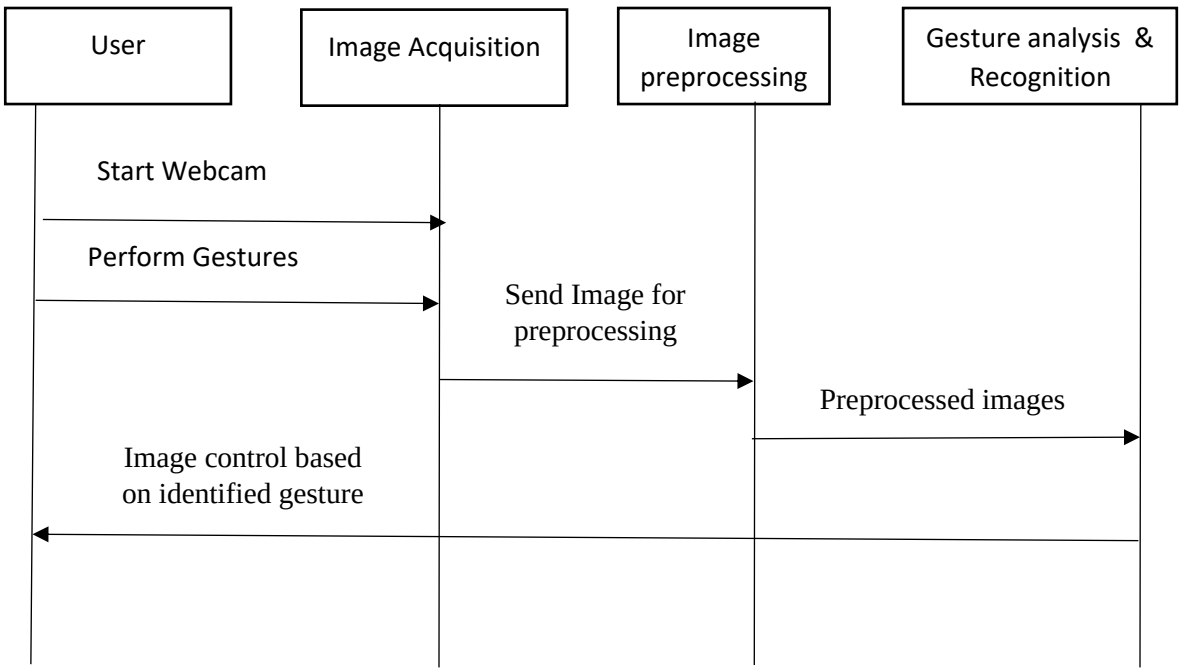
5.4.2.1 SEQUENCE DIAGRAM FOR VIDEO CONTROL



5.4.2.2 SEQUENCE DIAGRAM FOR POWER POINT CONTROL



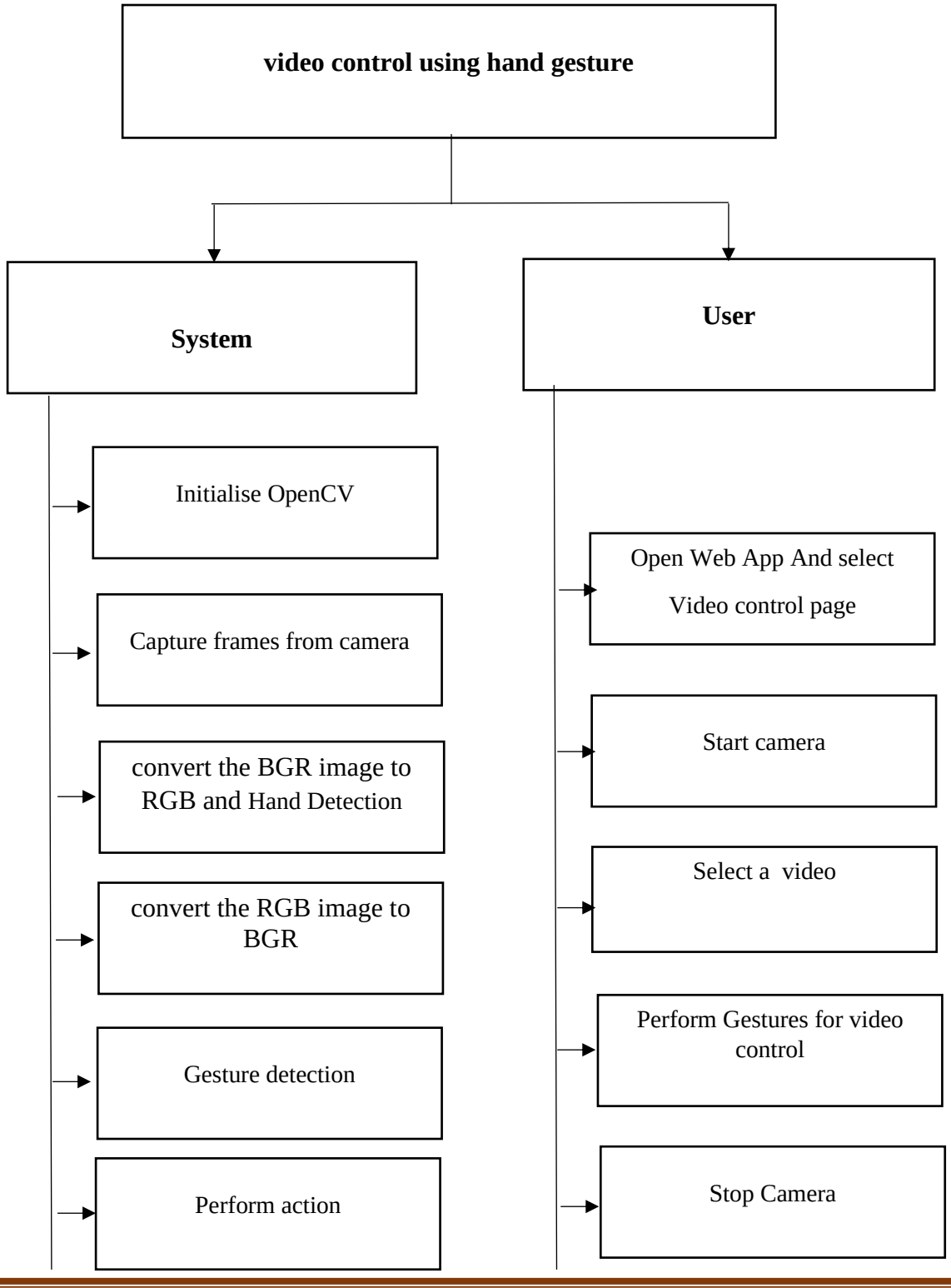
5.4.2.3 SEQUENCE DIAGRAM FOR IMAGE CONTROL



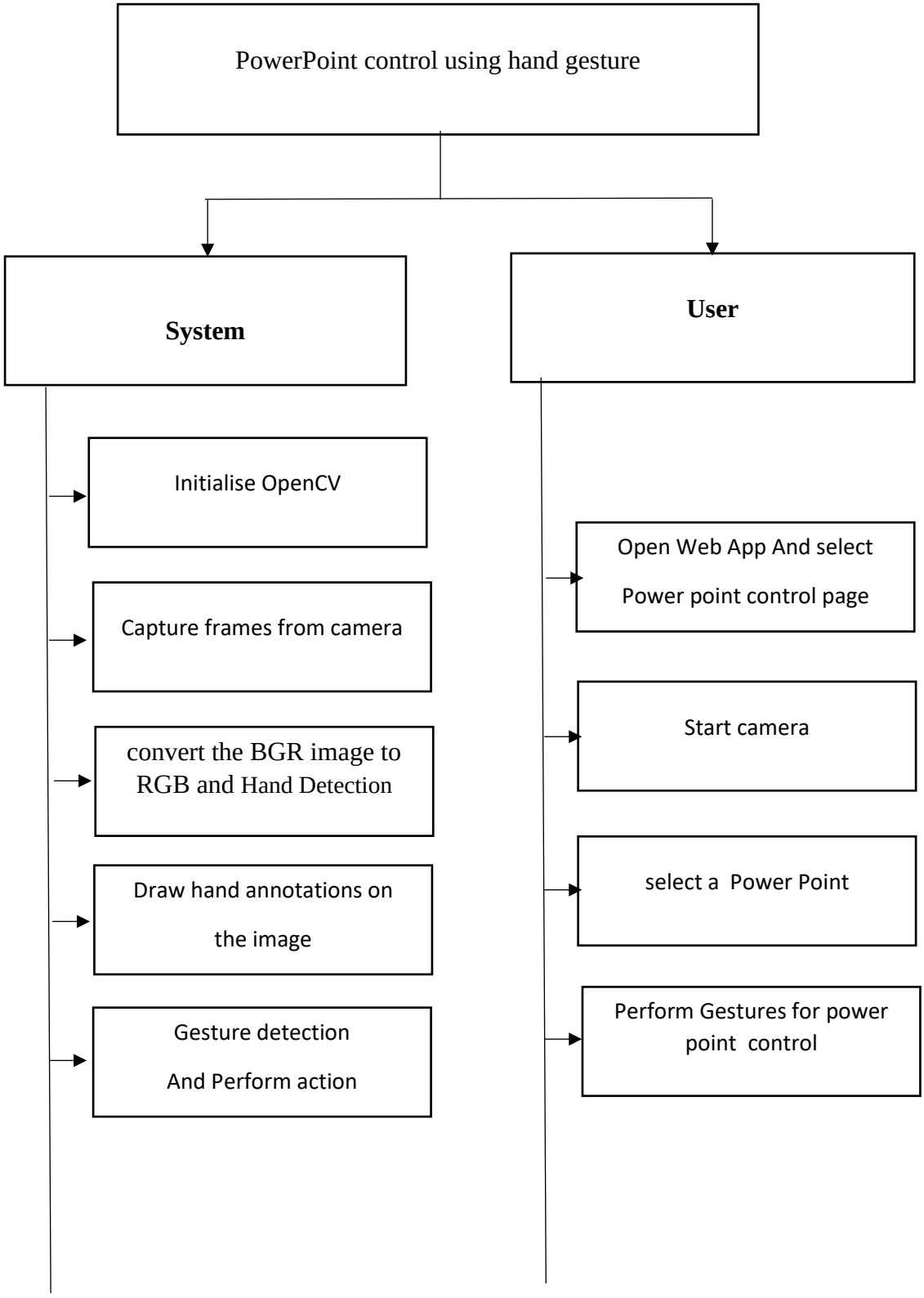
5.4.3 MODULAR DIAGRAM

Modular diagram is used to represent the modules in the software. In the diagram rectangles and arrows are used to represent the working of modules.

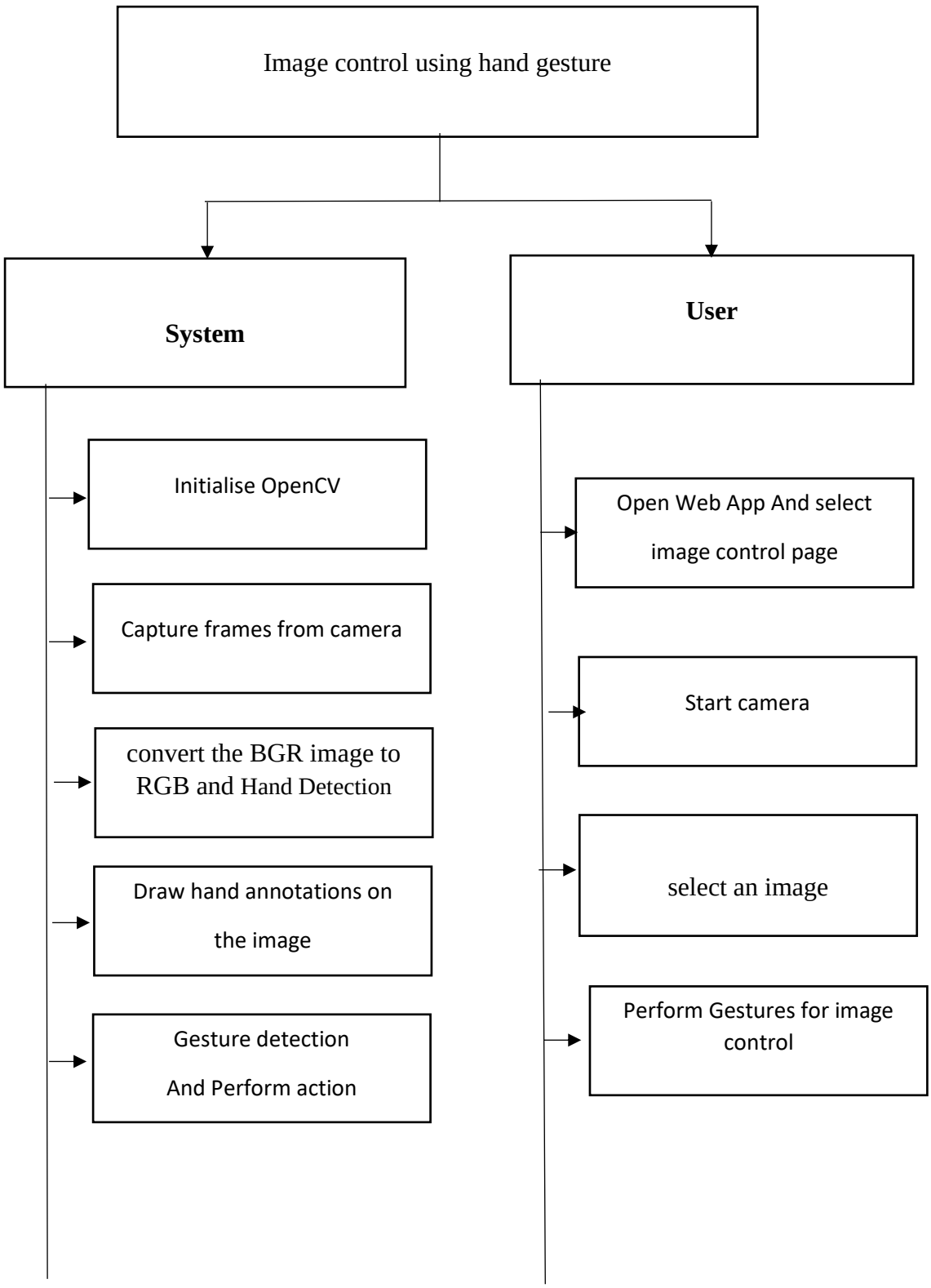
5.4.3.1 MODULAR DIAGRAM FOR VIDEO CONTROL



5.4.3.2 MODULAR DIAGRAM FOR POWER POINT CONTROL



5.4.3.3 MODULAR DIAGRAM FOR IMAGE CONTROL



CHAPTER 6

SYSTEM IMPLEMENTATION

6.1 INTRODUCTION

The purpose of System Implementation can be summarized as follows: making the new system available to a prepared set of users (the deployment), and positioning on-going support and maintenance of the system within the Performing Organizing (the transition). At a finel level of detail, deploying the system consists of executing all the steps necessary to educate the consumers on the use of the new system, placing the newly developed system into production, confirming that all data required at the start of operations is available and accurate, and validating that business functions that interact with the system are functioning properly. Transitioning the system support and maintenance mode of operation, with ownership of the new system moving from the Project Team to the Performing Organization.

A key difference between System Implementation and all other phases of the lifecycle is that all project activities up to this point have been performed in safe, protected, and secure environments, where project issues that arise have little or no impact on day-to-day business operations. Once the system goes live, however, this is no longer the case. Any miscues at this point will almost certainly translate into direct operational and/or financial impacts on the Performing Organization. It is through the careful planning, execution, and management of System Implementation activities that the Project Team can minimize the likelihood of these occurrence, and determine appropriate contingency plans in the event of a problem.

This phase consists of the following processes:

Prepare for the System Implementation: where all steps needed in advance of actually deploying the application are performed, including preparation of both the production environment and the consumer communities.

Deploy System: where the full deployment plans are initially developed during System Design and evolved throughout subsequent lifecycle phases, is executed and validated.

Transition to Performing Organization: where the responsibility for and ownership of the application are transitioned from the Project Team to the unit in the Performing Organization that will provide system support and maintenance.

6.2 ALGORITHM FOR THE SYSTEM

6.2.1 VIDEO CONTROL

START: Start Web application and start webcam.

STEP 1: Detect the user's hand.

STEP 2: Capture the image

STEP 3: Detect the hand landmark and lmList of hand and identify the specific hand gesture.

STEP 4: If gesture for play/pause is detected go to step 9.

STEP 5: If gesture for volume up/volume down is detected go to step 10.

STEP 7: If gesture for forward/rewind is detected go to step 11.

STEP 8: If gesture for full screen is detected go to step 12.

STEP 9: Pyautogui.press('space') and go to step 3.

STEP 10: Pyautogui.press('up') / Pyautogui.press('down') and go to step 3.

STEP 11: Pyautogui.press('right) / Pyautogui.press('left) and go to step 3.

STEP 12: Pyautogui.press('f') and go to step 3.

STEP 13: Stop.

Here we have coordinates for all of the hand landmarks, we will use them to detect different hand gestures and the first of them is detecting whether the fist is open or closed. For that, we will compare the coordinates of tips of fingers [8, 12, 16, 20] and middle points [6, 10, 14, 19] and if the fingertips are below the middle points, then the fist is closed and vice versa. Next get the total number of fingers counted and save it in a variable .

```
for id in range(1, 5):
if lmList[tipIds[id]][2] < lmList[tipIds[id] - 2][2]:
fingers.append(1)
if (lmList[tipIds[id]][2] > lmList[tipIds[id] - 2][2]):
```

fingers.append(0)

6.2.2 POWER POINT CONTROL

START: Start Web application and start webcam.

STEP 1: Detect the user's hand.

STEP 2: Capture the image

STEP 3: Detect the hand landmark of hand gesture and identify the specific hand gesture.

STEP 4: If gesture for next slide is detected go to step 10.

STEP 5: If gesture for Previous slide is detected go to step 11.

STEP 7: If gesture for first slide is detected go to step 12.

STEP 8: If gesture for full screen is detected go to step 13.

STEP 9: If gesture for exit full screen is detected go to step 14.

STEP 10: Pyautogui.press('right) and go to step 3.

STEP 11: Pyautogui.press('left) and go to step 3.

STEP 12: Pyautogui.press('home) and go to step 3.

STEP 13: Pyautogui.press(['fn','f5']) and go to step 3.

STEP 14: Pyautogui.press('esc') and go to step 3.

STEP 15: Stop.

6.2.3 IMAGE CONTROL

START: Start Web application and start webcam.

STEP 1: Detect the user's hand.

STEP 2: Capture the image

STEP 3: Detect the hand landmark of hand gesture and identify the specific hand gesture.

STEP 4: If gesture for next image is detected go to step 10.

STEP 5: If gesture for Previous image is detected go to step 11.

STEP 7: If gesture for zoom in is detected go to step 12.

STEP 8: If gesture for zoom out is detected go to step 13.

STEP 9: If gesture for rotate is detected go to step 14.

STEP 10: Pyautogui.press(‘right) and go to step 3.

STEP 11: Pyautogui.press(‘left) and go to step 3.

STEP 12: Pyautogui.press([‘ctrl’,’=’]) and go to step 3.

STEP 13: Pyautogui.press([‘ctrl,’-’]) and go to step 3.

STEP 14: Pyautogui.press([‘ctrl,’r’]) and go to step 3.

STEP 15: Stop.

CHAPTER 7

SYSTEM TESTING

7.1 INTRODUCTION

System testing is the major quality control measure during software development. Testing is a set activity that can be planned and conducted schematically. Testing begins at the module level and work towards the integration of entire computer based system. Testing is a process of executing a program with the intention of finding an error. A good test case is one that has a higher probability of finding an undiscovered error. A successful test case is one that uncovers an undiscovered error. Testing phase in the "**Multimedia control using hand gestures"** is supposed to verify that the system does exactly what it is designed to do. The system is to be tested with the data at the extremes of the input range. This system is also to be tested for various values outside the input range. In the system that provides different validity test strategies to validate the textboxes, entries in the system. Also it can check the system efficiency in terms of their input and output data's.

7.2 LEVELS OF TESTING

7.2.1 UNIT TESTING

A level of the software testing process where individual units of a software are tested. The purpose is to validate that each unit of the software performs as designed. The first level of testing, unit testing, is the most micro-level of testing. It involves testing individual modules or pieces of code to make sure each part or "unit" is correct. A "unit" can be a specific piece of functionality, a program, or a particular procedure within the application. Unit testing helps verify internal design and internal logic, internal paths, as well as error handling. The unittesting level includes a single type of testing; unit testing. Unit tests are done by the developer who wrote the code.

7.2.2 INTEGRATION TESTING

A level of the software testing process where individual units are combined and tested as a group. The purpose of this level of testing is to expose faults in the interaction between integrated units. Integration testing is done after unit testing. This level tests how the units work together. Individual modules are combined and tested as a group. It‟s one thing if units work well on their own, but how do they perform together? Integration testing helps you determine that, and ensures your application runs efficiently. It identifies

interface issues between modules. There are a few techniques that can be used for conducting integration testing:

- Big Bang Testing
- Top Down Approach
- Bottom Up Approach

The Big bang testing involves testing the entire set of integrated components together simultaneously. Because everything is integrated together and being tested at one time, this approach makes it difficult to identify the root cause of problems. The top down approach starts by testing the top-most modules and gradually moving down to the lowest set of modules one-by-one. The bottom up approach starts with testing the lowest units of the application and gradually moving up one-by-one.

7.2.3 ACCEPTANCE TESTING

A level of the software testing process where a system is tested for acceptability. The purpose of this test is to evaluate the system‟s compliance with the business requirements and assess whether it is acceptable for delivery. The final level of testing, acceptance testing, or UAT (user acceptance testing), determines whether or not the software is ready to be released. Let‟s face it, requirements change throughout the development process. It‟s important that the user verifies the business needs are met before the software is released into production.

Are the functional requirements met? Are the performance requirements met? These are the questions that are answered during acceptance testing level. UAT is the final say as to whether the application is ready for use in real life or not. This phase also involves change control managing requested modifications and new feature requests. Acceptance testing should be done by the business user / end-user.

7.2.4 SYSTEM TESTING

System testing validates the “Multimedia control using hand gestures ” once it has been incorporated into a large system. System testing is actually a series of different tests whose primary purpose is fully exercise the computer based system. All work to verify that “Multimedia control using hand gestures” elements have been properly integrated and perform allocated function. They can check the functioning of processes with respect to their input data. Also “Multimedia control using hand gestures” that test the system validity in a user friendly manner. Recovery testing is a system test that fos the software to fail a variety of ways and verifies that recovery testing is properly performed. Security testing attempts to verify that

protection mechanisms built into a system will, in fact, protect it from improper penetration. Stress testing executes a system in a manner that demands resources in abnormal quantity, frequency or volume. Performance testing is designed to test the run time performance of software within the context of an integrated system

7.3 TESTING TECHNIQUES

7.3.1 BLACK-BOX TESTING

The technique of testing without having any knowledge of the interior workings of the application is called black-box testing. The tester is oblivious to the system architecture anddoes not have access to the source code. Typically, while performing a black-box test, a tester will interact with the system's user interface by providing inputs and examining outputs without knowing how and where the inputs are worked upon.

7.3.2 WHITE-BOX TESTING

White-box testing is the detailed investigation of internal logic and structure of the code. White-box testing is also called glass testing or open-box testing. In order to perform white-box testing on an application, a tester needs to know the internal workings of the code. The tester needs to have a look inside the source code and find out which unit/chunk of the code is behaving inappropriately.

7.3.3 GREY-BOX TESTING

Grey-box testing is a technique to test the application with having a limited knowledge of the internal workings of an application. In software testing, the phrase the more you know, the better carries a lot of weight while testing an application. Mastering the domain of a system always gives the tester an edge over someone with limited domain knowledge. Unlike black-box testing, where the tester only tests the application's user interface; in grey-box testing, the tester has access to design documents and the database. Having this knowledge, a tester can prepare better test data and test scenarios while making a test plan.

7.4 TEST PROCEDURE

Software testing accounts for the largest percentage of technical effort in the software process. The objective of the software testing is to uncover errors. To fulfil this objective, a series of test steps unit, integration, validation and system tests are planned and executed. In this system, they can adopt various types of test strategies. These are checks the validity, accuracy of the data, etc. in the system.

7.5 TEST CASE AND OUTPUT

1The test case is a document that describes an input, action or event and an expected response, to determine if a feature of an application is working correctly. A test case should contain particulars such as test case identifiers, test case name, objectives, test conditions, input data requirements steps and expected results. Test result emphasizes how the actual results differed from the expected results. This suggests the need for re-testing and to discover the source of differences. the test phase of systems development process involves the defining of the criteria by which the system will be tested and measuring the criteria against the acceptable failure rate. Individual modules are tested during the development itself. The tests are repeated until all known errors are eliminated and the program matched the design specifications.

7.5.1 TEST CASES

7.5.1.1 VIDEOPLAYER

Test Objectives : To check whether the video player is controlled by using hand gestures or not

Test Data : Webcam Live Video

Step No	Steps	Data	Expected Results	Actual Results
1	Run application and start capturing video.	Image Frames	Starts Analysing the Frames	Starts Analysing the Frames.
2	Run application and start capturing video.	Image Frames	Control video player using hand gestures	Control video player using hand gestures

Table 7.5.1.1 Test cases & Output of video control

7.5.1.2 POWEREPOINT

Test Objectives : To check whether power point is controlled by using hand gestures or not

Test Data : Webcam Live Video

Step No	Steps	Data	Expected Results	Actual Results
1	Run application and start capturing video.	Image Frames	Starts Analysing the Frames	Starts Analysing the Frames.
2	Run application and start capturing video.	Image Frames	Control Power point using hand gestures	Control Power point using hand gestures

Table 7.5.1.2 Test cases & Output of power point control

7.5.1.3 IMAGE

Test Objectives : To check whether the image is controlled by using hand gestures or not

Test Data : Webcam Live Video

Step No	Steps	Data	Expected Results	Actual Results
1	Run application and start capturing video.	Image Frames	Starts Analysing the Frames	Starts Analysing the Frames.
2	Run application and start capturing video.	Image Frames	Control image in the gallery using hand gestures	Control image in the gallery using hand gestures

Table 7.5.1.3Test cases & Output of image control

CHAPTER 8

CONCLUSION AND FUTURE ENHANCEMENT

8.1 CONCLUSION

The new system has overcome most of the limitations of the existing system and works according to the design specification given. The developed systems dispense the problem and meet the needs of by providing reliable and comprehensive information. All the requirements projected by the user have been met by the system.

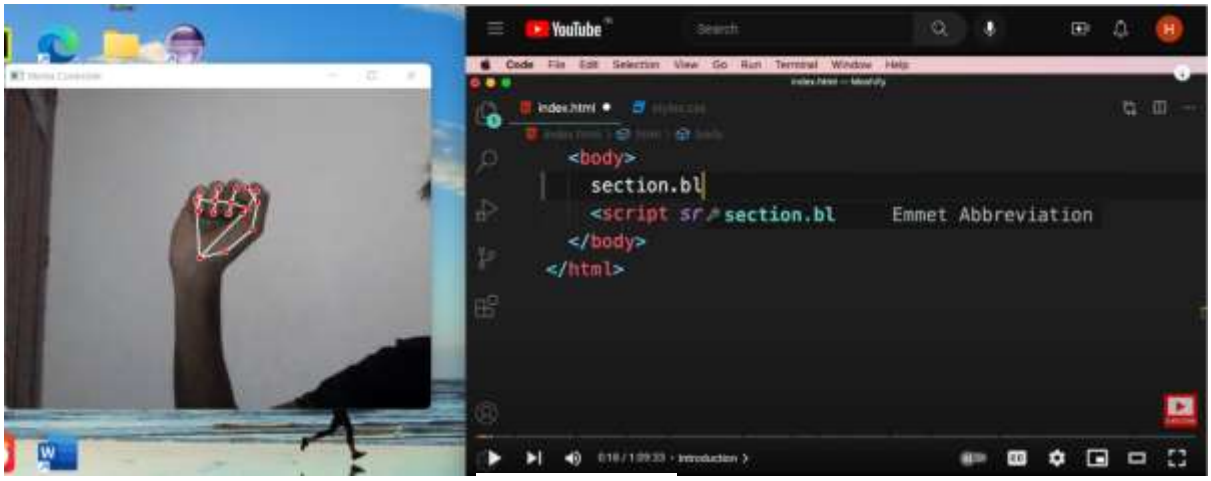
The project describes a Web application that controls Multi medias like video,power point,image etc.. with the help of hand gestures. The method proposed here successfully created a hand gesture recognition system, that is able to recognise which gesture is performed by the user and accurately perform the functionality associated with it. The project uses only webcam, would completely eliminate the keyboard and mouse. Also this would lead to a new era of Human Computer Interaction (HCI) where no physical contact with the device is required.

8.2 FUTURE ENHANCEMENT

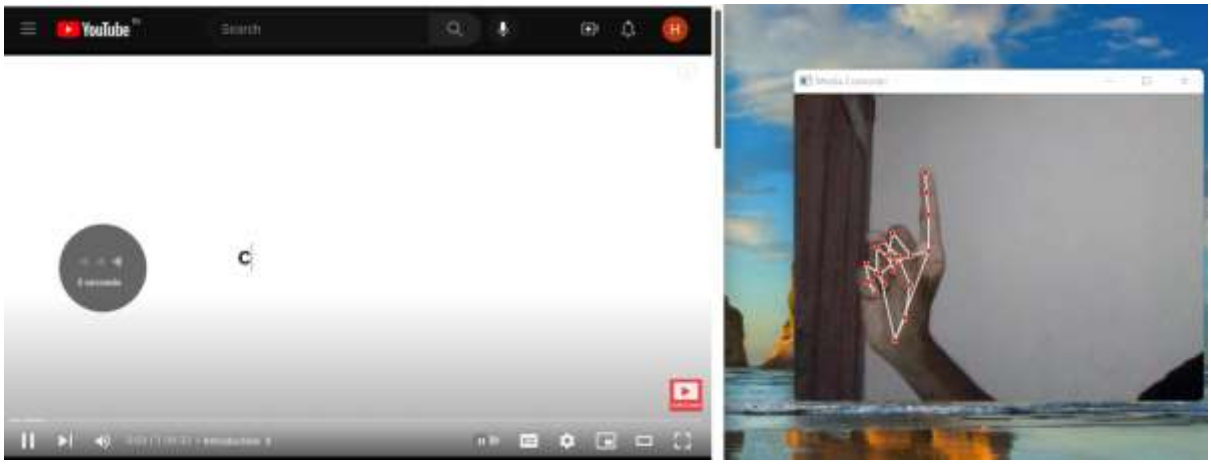
To overcome the drawbacks of the current system, we can modify it for better. we can integrate iris detection to this project to make it run more smoothly. this project can be extended to other public service technical systems to avoid direct contact. ATM machines, Ticket Counters, etc can make use of the extended version.

APPENDICES

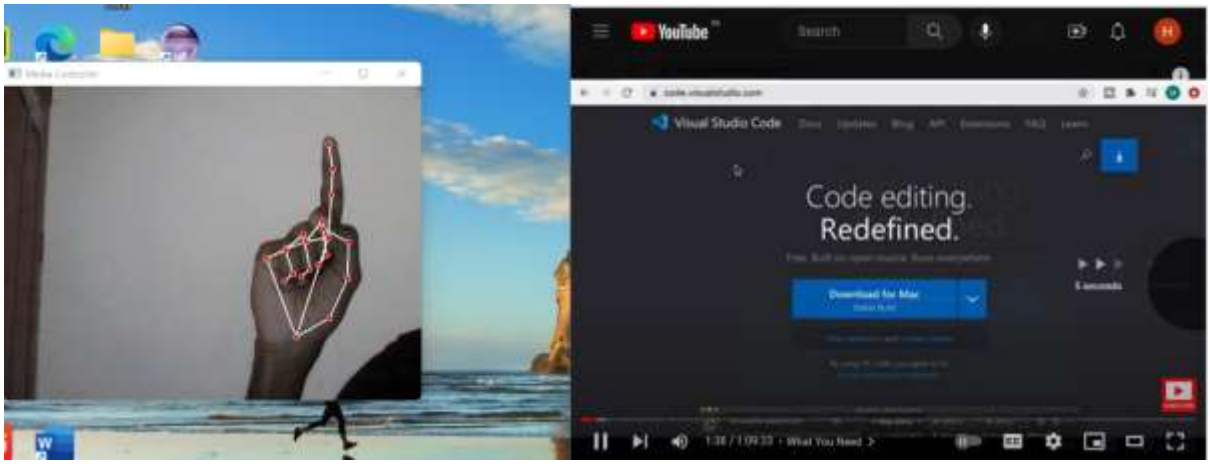
VIDEO CONTROL USING HAND GESTURES



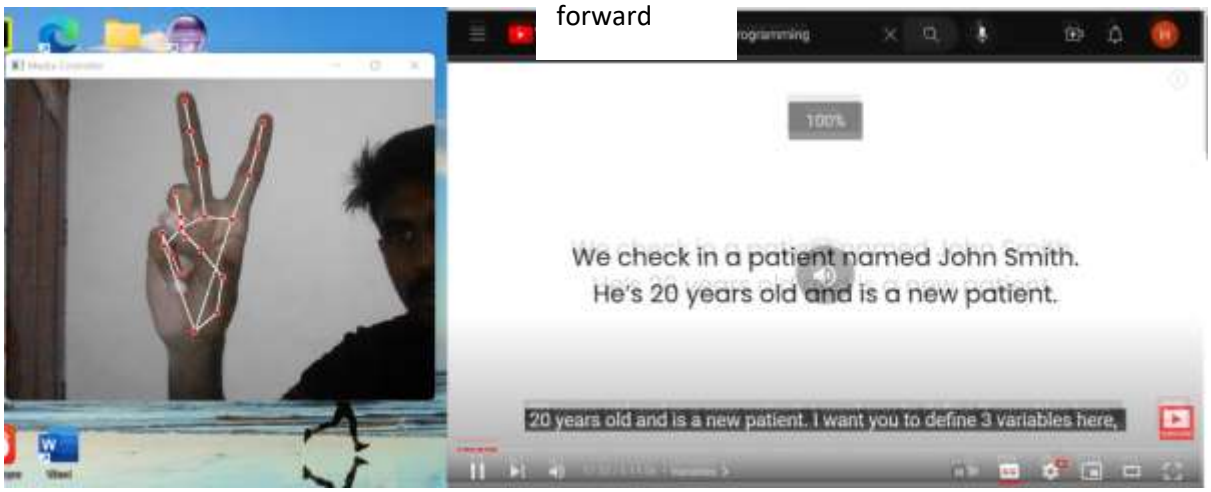
Play/pause



rewind



forward



Volume up