



# Real-Time Video Conferencing Application

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**Abstract:** In the last 10-15 years, Video Conferencing (VC) has become more popular and more reliable as a tool to reduce the distance gap when travel is not an option or it is impossible to do so. Video Conferencing uses audio and video telecommunications to bring people from different locations together. Various communication activities such as business meetings, seminars, conferences, voice calls, and instant messaging can be carried out. Especially in recent years, with the effect of the global Covid-19 epidemic, the remote implementation of various fields such as education, business, meetings, and conferences with audio and video support has increased the use and need for these systems. The goal of this article is to design and implement an open-source video conferencing prototype, where people can participate openly, and it can be utilized based on the closest location and network quality.

**Index Terms –** video conferencing, real-time, communication, Audio, Video

## I. INTRODUCTION

Video conferencing is the only recent technology that has reached a level of stability, usability, and affordability which permits its use in real teaching scenarios and in many companies for their research projects. The use of video conferencing apps is being hailed as the next advance in electronic communication. Many companies are developing systems to support such concepts as virtual teams, telecommuting, and remote conferencing.

Video conferencing application has recently become increasingly popular and disperse in faster and cheaper internet connections with better technologies. Modern standalone video conferencing apps provide advanced video and audio qualities due to more efficient compression and can function over normal broadband internet connections. Growing processing power and cheaper accessories, such as webcams, have also made it possible to participate in a video conference using dedicated software on a normal personal computer without any expensive hardware. The technology of video conferencing has come a long way.

A high-quality online video meeting provides an environment that will feel like we are actually sitting down across from the other participants in the same room and gives us that face-to-face contact that need to build trust and relationships between them. In the current stage, where everything has gone online and people are working from home, and also students are learning via online classes conducted by institutes, and faculties from college with the help of this video conferencing platform. Video conferencing has recently become increasingly popular and disperse in the wake of faster and cheaper internet connections and better technologies.

The concept behind this video call is simple: It is simple as making a phone call to any one, and it provides both video and audio. The right video conferencing tool allows us to set up a virtual “rooms” and provides a number or clickable link from where any users can use to “enter” the room. Once all are in the meeting, we can see them on our screen and with the help of webcam they can see us. A conference video call is helpful for a meeting because it makes it easier to keep track of who is speaking.

video conferencing technologies can be used to share documents and display information on whiteboards. This project provides a video conferencing platform in which anyone can communicate with anyone with their own private room, companies can use it for project discussion or interviews, and schools and colleges can use it for online teaching by sharing virtual whiteboards and also manage records of the students. All of this can be done in this project with the help of key features such as screen recording, sharing a YouTube video, unlimited private room, inviting some third person, live chat room, mute audio, and disable video.

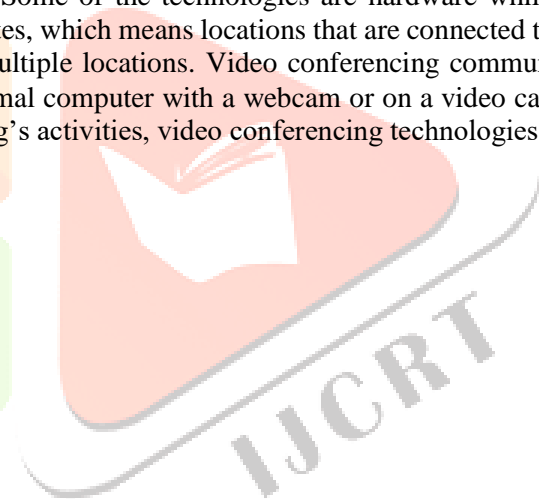
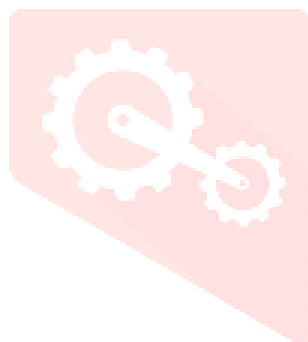
## II. LITERATURE SURVEY

The most advanced and reliable video conferencing servers today are software solutions based on standard architecture servers.[1] Android applications are Java and Kotlin. Java is an object oriented programming language that lifts objects that exist in the real world and has good flexibility as one of the programming language.[2]

The IPVCN is a novel innovation architecture, where the infrastructure is provided in cooperation by various internet service providers and cloud computing companies.[3] Through confirmation experiments of interpersonal recognition using three kinds of conference content, compared to F2F meeting, we found that video conferencing halved the synchronization frequency of actions and did not convey the warmth felt to people enough.[4] In this study, a mobile-based video conferencing system was developed on the Android platform to establish voice and video communication over the internet and cloud-based instant messaging[5]

## III. VIDEO CONFERENCING

Video conferencing is a method of communicating between two or more locations in which sound, vision, and data signals are conveyed in an electronic way to enable continuous interactive communication. VC is much more personal and effective than audio conferencing, all the parties which are being involved in that meeting can see the expressions, especially facial expressions and body language which are so important and vital to the way we communicate. Video conferencing works by using various technologies. Some of the technologies are hardware while others are software related. A Video conference can be between two sites, which means locations that are connected to each other via the video conference, or the conference can connect multiple locations. Video conferencing communication can take place in a special video conferencing studio or on a normal computer with a webcam or on a video call on mobile phones. Besides audio and video transmission of the meeting's activities, video conferencing technologies can be used to share data, and documents and display information.



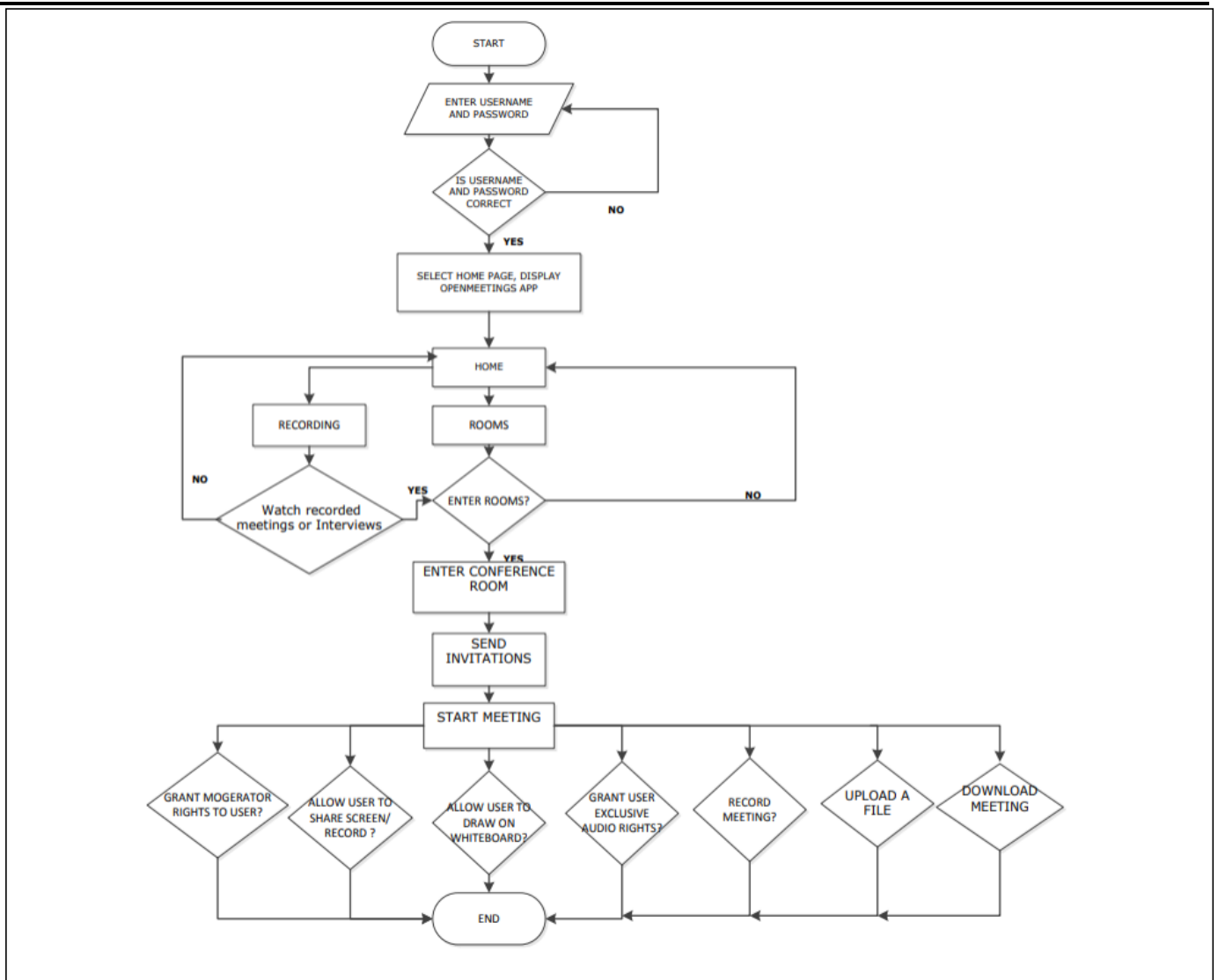


Fig 1. System architecture

## IV. COMPONENTS OF VIDEO CONFERENCE

Videoconferencing has three essential components:

- The Hardware.
- The intervening network that carries the signals between sites.
- The conference environment or room.

### 1. The Hardware

The basic equipment needed for a video conference session includes a camera, microphone, video conferencing unit, display unit, and audio system.

**Camera** – A camera to capture images and convert them into an electrical signal. The location of the camera must be ideal to allow for realistic eye contact. Also, the good quality and functionality of the cameras should be able to provide a sharper, more colourful image, with less visual noise.

**Microphone** – Microphones used in VC are usually very sensitive and should be placed away from equipment like projectors which can produce some background noise.

**Video Conferencing Unit** – The VC unit usually referred to as the codec (Coder/Decoder) accepts the vision and sound signals (video and audio) and processes them into a suitable format for transmission through the network to the remote site. To receive information the Decoder does the reverse: it accepts the digital signals from the remote site over the network and decodes or converts these into video and audio. Finally, this video and audio are fed to a display unit and speaker to display the pictures and reproduce the sound from the remote site respectively.

**Display Unit** – A display unit can be either a TV unit or a projector projecting onto a surface. The display unit is connected to the codec.

**Audio System** – A good audio system is ideal for video conferencing. In some instances, TV speakers are used but in most instances (i.e. classrooms, boardrooms, etc.), a good audio system with a mixer, amplifier and speakers might be required.

## 2. The Network

Video conferencing technology works across internet protocol (IP) networks and integrated system digital networks (ISDN). Through these vast networks, videoconferencing has the capability to connect to worldwide audiences. With IP transmission, the results can be variable as the videoconference data has to compete with other computing data. ISDN guarantees connections at the selected quality, giving more reliable conferences, but as call charges are levied it is also more expensive than IP. A simple video conference can be initiated at as low as 384 kbps with 30 frames of video per second in real-time.

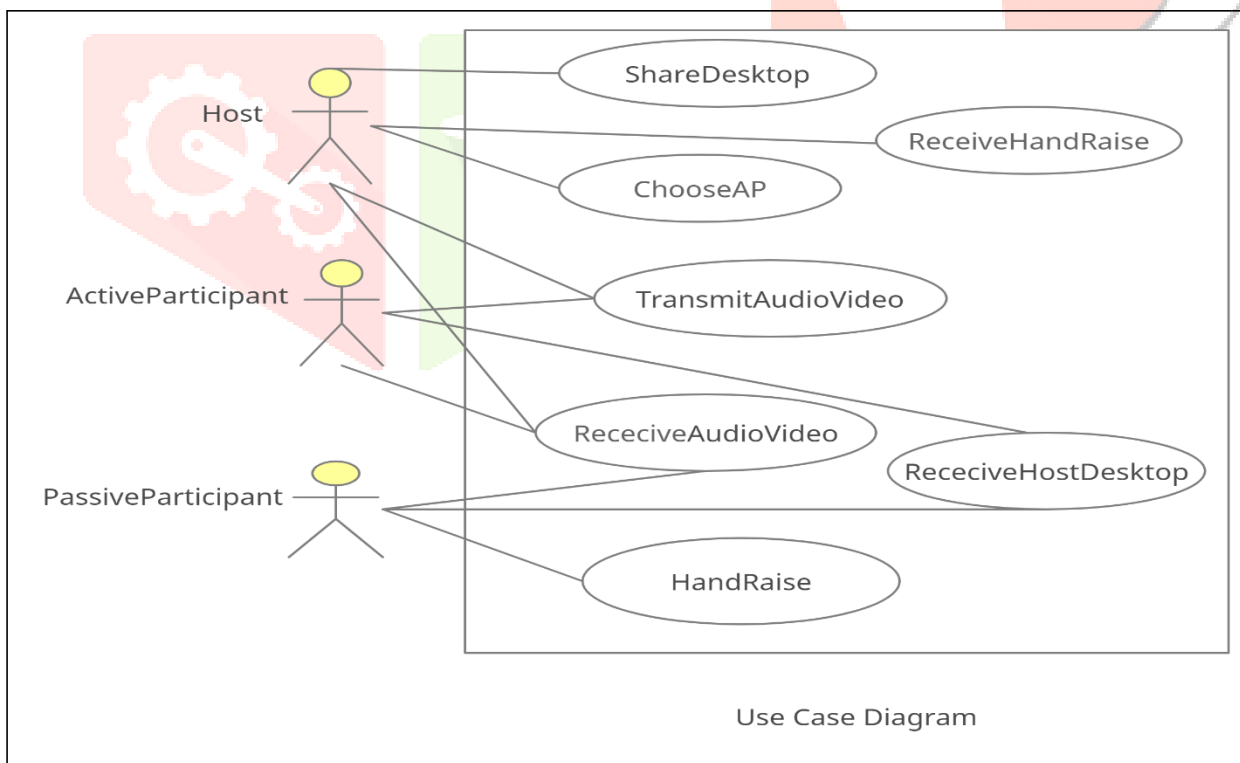
## 3.The Conference Environment

Lighting is an easy way to improve picture quality. If the room is not specially built or equipped for video conferencing, it is probable that there are not enough lights to provide the optimum quality for the video conference cameras. The result is a flickering visual noise seen especially when the cameras are zoomed in. Another result is a lack of color saturation. Thus proper lighting is an easy way to improve video quality. Also, the room should be well acoustically designed to avoid echo.

# V. SYSTEM DESIGN

Users first have to create an account by giving some required information. After successfully creating an account user can login into the application with the help of an e-mail and password. The application user will be directed to the room code. The user has to put in the code so the user can create a virtual room for video conferencing. Other users have to repeat the same procedure and in the room code user have to put the same code as the host user did so that they can connect with other and also they can send the invitation link to another user. After connecting, users can have more features like chatting, recording a video call, screen sharing, security password.

Fig 2



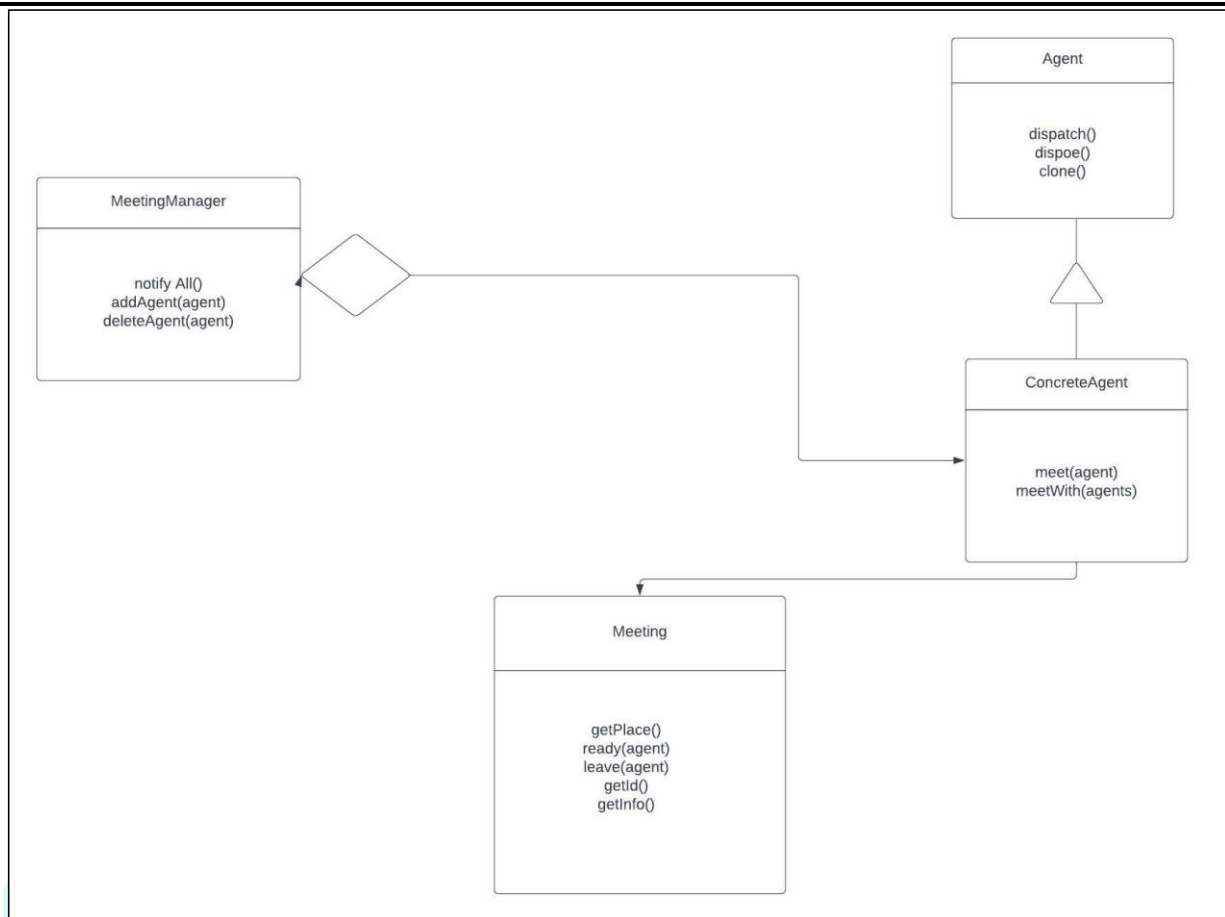


Fig.3 Class UML Diagram

## VI. FRAME WORK

An application that provides you with useful and beneficial features during a video conference. The system also allows you to record video conferences. With features like mute, pause, and camera change it also has the features of screen sharing. This app is made using a high-security encryption algorithm so that no one can breach your video conference room. Only the user with your secret room code can join the video chat. You can maintain a record of your entire video chat history. Apart from this it can also send text/image/voice messages to your friend

## VII. APPLICATION OF VIDEO CONFERENCING

There are various applications of Video Conferencing. Some of the applications include;

**Meetings:** Using VC leads to cost savings on travel, accommodation and staff time. Several sites can be linked together. Having a set time and duration for a meeting encourages punctuality and focused discussion

**Teaching:** VC allows easy access to the remote expertise. When the no of expertise is small, one lecture can teach various virtual classes at a time, travelling to various campuses is significantly reduced.

**Data sharing:** Images from a personal computer (PC), such as spreadsheets, PowerPoint illustrations etc. can be shared to enhance a presentation

**Interviews:** Cost savings can allow more candidates to be interviewed from remote locations. With data sharing, CVs can be viewed and discussed online.

**Telemedicine:** In rural areas, specialist medical help may not be available on hand. By linking to a regional centre, cottage hospitals and clinics can receive help in diagnosing patients' disorders.

**Legal work:** VC helps reduce intimidation of vulnerable court witnesses.

There are other various applications include;

- Remote staff training
- Thesis defence at another institution
- Supervision of students on work placements
- Within institutions, videoconferencing may benefit many different user groups such as:
- Academics and researchers collaborating and teaching .
- Administrators and managers working with colleagues to find solutions.
- Students accessing external expertise, conducting research or staging interviews.

## VIII. BENEFITS

Used for sharing of presentations. It allows immediate, full two way communication of content; verbal, pictorial objects etc. Greater access to experts/specialists (nationally and internationally). Most productive use of time and significant travel cost savings. Reduced environmental impact through less travel and reduced pressure, stress and fatigue from travel. Easier short notice meetings between individuals in distant locations thus decisions can be made more quickly. Increased meeting attendance by participants who are unable to join in. Greater accessibility and it allows geographical reach to rural and remote locations. A conference session can be saved for future reference e.g a class notes can be saved and distributed via a network for references by students.

## IX. FUTURE SCOPE

The project design can be upgraded in future by adding more features in the application or can try to make the audio and video quality much better with changes in softwares.

## X. CONCLUSION

The impact of video conferencing helps save time, money, and energy. It also provides an invaluable tool for students, teachers, and parents to better communicate with each other. The video conferencing system using android studio technology. In this research we used the firebase authentication, firebase fire store for the database. This app is easy to use and easy to install. The video conference system is designed as an app based to be used for only android operating systems. The aim of this research is to reduce the effort and difficulty of mobility to communicate and to create a video conference that supports the characteristics of voice calls, video calls, share files, share desktop, record in different format, member can join the meeting at the time without any interruption while, front and back camera support.

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