Real-Time Video Conferencing Android Application

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ABSTRACT

The development of an Android application for video conferencing enables real-time communication with audio and video capabilities. The application is designed to provide users with a seamless and reliable way to connect with others remotely. The focus is on providing a high-quality user experience that allows for easy communication and collaboration from anywhere, at any time. The use of audio and video ensures that users can communicate effectively and get the most out of their meetings or conversations. This Android application for video conferencing is an important tool for businesses and individuals who need to stay connected in an increasingly mobile and distributed world.

Keywords- *Video Conferencing, Android Application, Real Time Communication, Audio, Video*

1. INTRODUCTION-

Video conferencing has become an essential part of modern communication, and our application offers the latest technology to ensure high-quality video and audio communication. Whether you are working remotely, conducting online meetings, or catching up with friends and family, our video conferencing application offers an immersive and interactive experience. With this application, you can easily connect with your colleagues, friends, and family through audio and video conferencing.

Our application is built using Java and is specifically designed for Android devices, ensuring a seamless and user-friendly experience. With our application, you can easily create a virtual meeting room, invite participants, and collaborate on documents and presentations in real-time. You can also switch between audio and video modes, depending on your preference and internet connectivity. Our application is designed to provide a reliable and secure platform for all your video conferencing needs. Video conferencing technology works across internet protocol (IP) networks and integrated system digital networks (ISDN).

1.1 Hardware Components Used-

To conduct a successful video conference session, certain hardware components are essential. These include a camera to capture images and convert them into an electrical signal. It is crucial to position the camera in a way that allows for natural eye contact, and the camera should have high-quality functionality to produce sharper and more colourful images with less visual noise. A sensitive microphone is also required, which should be placed away from equipment like projectors to avoid background noise. The video conferencing unit, also known as the codec, is responsible for accepting and processing vision and sound signals (video and audio) into a suitable format for

transmission through the network to the remote site. The codec can also decode digital signals from the remote site into video and audio for display on a display unit, which can be a TV unit or a projector projecting onto a surface. An audio system with a mixer, amplifier, and speakers is also necessary for quality sound production during the video conference session. In certain environments like classrooms or boardrooms, a good audio system is crucial.

1.2 Software Used-

Android Studio:
- Android Studio is an integrated development environment (IDE) used to develop Android applications.
- It is the official IDE for Android app development, provided by Google.
- Android Studio provides a wide range of tools and features to help developers create high-quality Android apps.
- The IDE includes an emulator to test the app on different Android devices and configurations.

Firebase:
- Firebase is a mobile and web application development platform, owned by Google.
- It provides a wide range of tools and services to help developers build better apps.
- Firebase includes features such as real-time databases, authentication, cloud storage, and hosting.
- Firebase can be integrated with Android Studio to make app development faster and more efficient.

Jitsi:
- Jitsi is an open-source video conferencing platform that allows users to host and join video calls from different devices.
- It provides a range of features such as screen sharing, recording, and chat.
- Jitsi can be used with Android Studio and Firebase to create a video conferencing app for Android devices.
- Jitsi can be customized to suit specific requirements, and its source code is available for developers to modify and improve.

2. System Design-

To utilize the real-time video conferencing Android application, users must first register an account by providing essential information. Once the registration process is complete, users can access the application by logging in with their e-mail and password. Upon logging in, the user will be directed to the room code entry page, where the user must enter a unique code to create a virtual room for the video conferencing session. To participate in the session, other users must follow the same process and enter the same code as the host user. Additionally, users may invite others to the session by sharing the invitation link.

Upon joining the session, users can enjoy various features, such as real-time chatting, recording video calls, and screen sharing. To ensure the security of the session, users can set a password to restrict access to the virtual room. The application's user-friendly interface and straightforward registration process make it easy for users to utilize the full range of features available in the real-time video conferencing Android application**.**

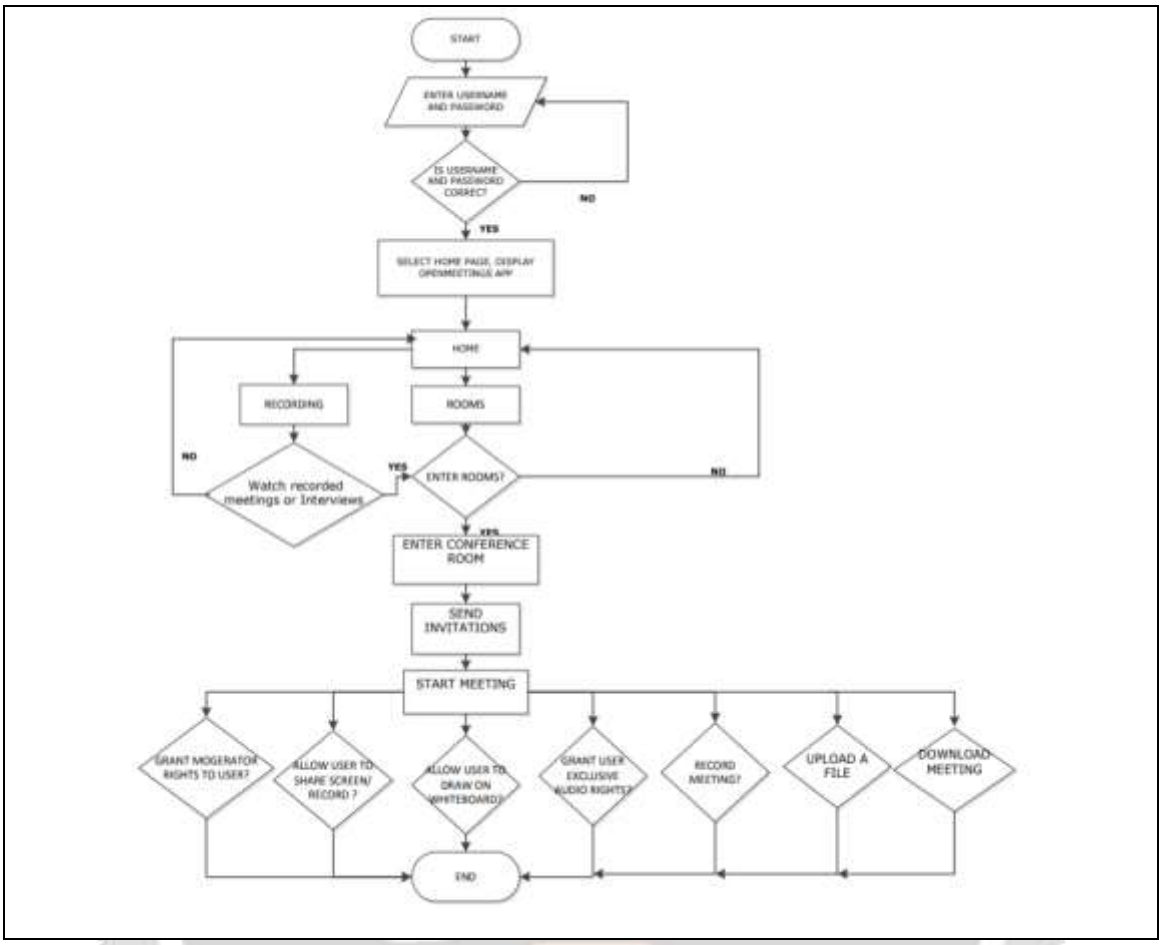

Fig 1 - System Architecture

2.1 Use Case Diagram

To initiate the video conferencing application, the users must first register by providing the necessary information for creating an account. After successful registration, the user can log in to the application using their email and password. Upon logging in, the user is redirected to the room code page where they can enter a unique code to create a virtual room for the video conferencing session. To participate in the session, other users must also enter the same code as the host user or utilize an invitation link sent by the host user.

Once the session has been established, users can benefit from several features such as real-time chatting, video call recording, screen sharing, and setting a security password to protect the confidentiality of the meeting. The video conferencing application's user-friendly interface and seamless registration process allow users to effectively utilize the full range of features available.

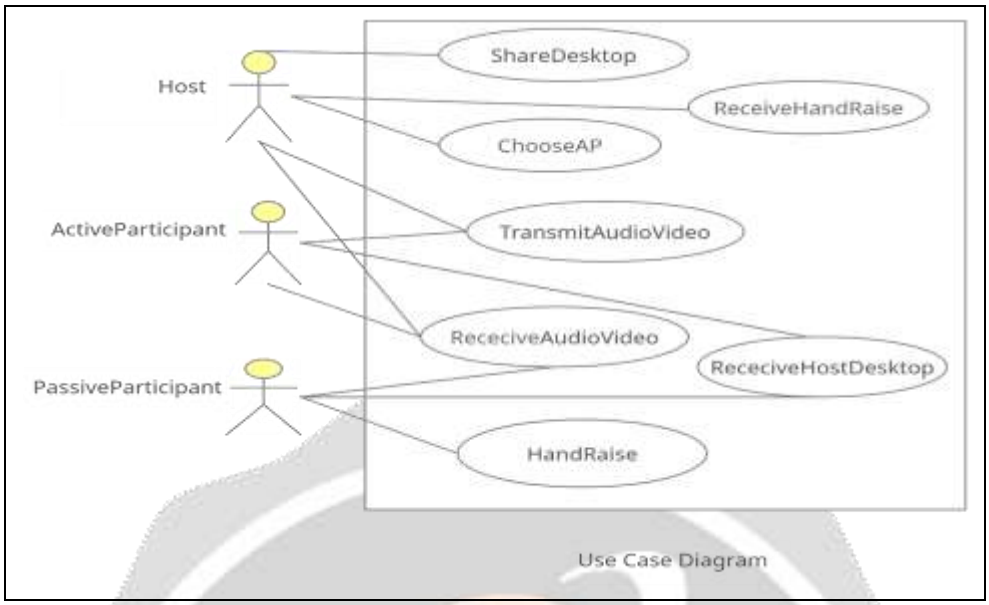

Fig 2 - Use Case Diagram

2.2 UML Diagram

To access the meeting app, you need to enter your username and password. The app will check if the information you entered is correct, and if it's not, you'll be prompted to enter the correct credentials again. Once you enter the correct login information, you will be directed to the homepage, where you can access various features of the app.

In the homepage, you will find options to enter different rooms for your meetings. You can also record your meetings and view recordings of previous meetings. When you enter a room, you will be asked for permission to join the meeting. If you grant permission, you will be taken to the conference room where you can participate in the meeting.

During the meeting, you can perform various operations such as recording the meeting, uploading and downloading files, sharing your screen, allowing users to draw on a whiteboard, and granting access to other users. When the meeting is over, you can end the session and exit the room.

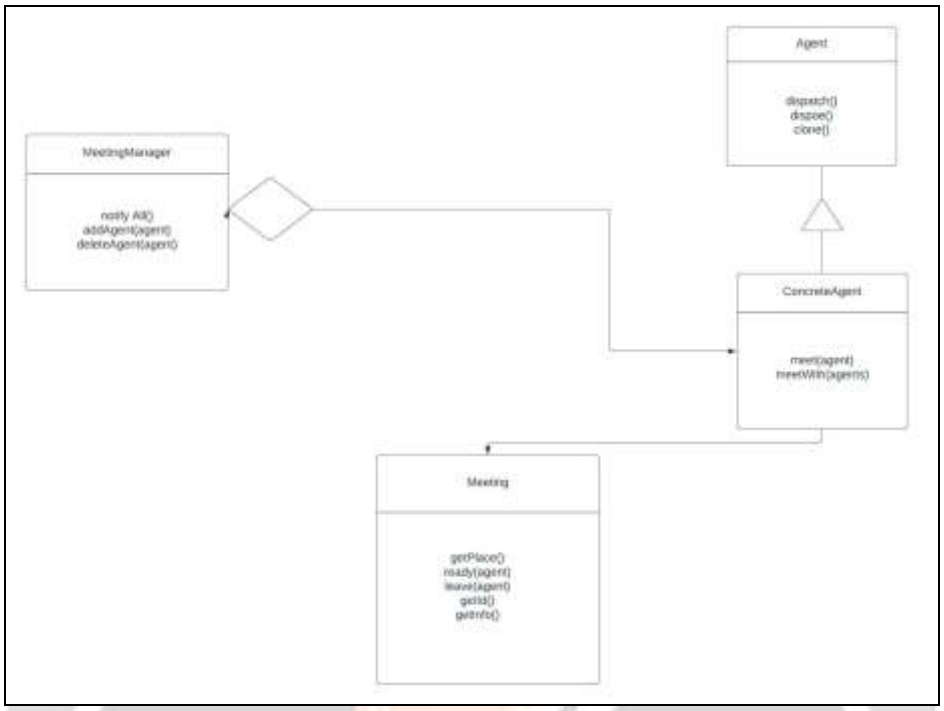

Fig 3 - UML Diagram

3. RESULT

The result of a video conferencing app is to provide users with a platform to communicate face-to-face with others in real-time, regardless of their physical location. With a video conferencing app, users can conduct virtual meetings, collaborate with colleagues, attend online classes, connect with family and friends, and more. The app should offer a high-quality video and audio experience, with minimal lag or delay, and provide additional features such as screen sharing, chat, and recording capabilities. A well-designed video conferencing app should be user-friendly, secure, and adaptable to different network conditions and device types. Overall, the result of a video conferencing app is to make remote communication more accessible, efficient, and enjoyable for users.

A video conferencing app is designed to provide users with a platform where they can communicate with others face-to-face, irrespective of their physical location, in real-time. It enables users to conduct virtual meetings, collaborate with colleagues, attend online classes, connect with family and friends, and much more. The app should ensure a high-quality audio and video experience with minimum lag or delay, and should offer additional features such as screen sharing, chat, and recording capabilities. The video conferencing app should be well-designed, user-friendly, secure, and adaptable to various network conditions and device types.

3.1 USER INTERFACE

The user interface (UI) of a video conferencing application typically begins with a home screen that displays an app icon. Upon clicking the icon, the user will be directed to the first page, which typically offers options for creating an account or logging in if an account has already been created.

To create an account, the user will be prompted to provide their name, email address, and password. Once this information has been entered, the user can create an account, and their details will be stored in the application's database.

After creating an account, the user will be directed to a welcome page or a login page where they will need to enter their email and password. Once authenticated, the user will have access to the video conferencing app's main features, such as the ability to join or create meetings, participate in video conferences, and interact with other users.

Overall, the UI of a video conferencing app should be intuitive and user-friendly, with clear options for creating an account or logging in, and easy-to-use features that enable users to join or create meetings with ease. The app's database should be secure and protect user data, and the authentication process should be seamless, allowing users to access the app quickly and easily..

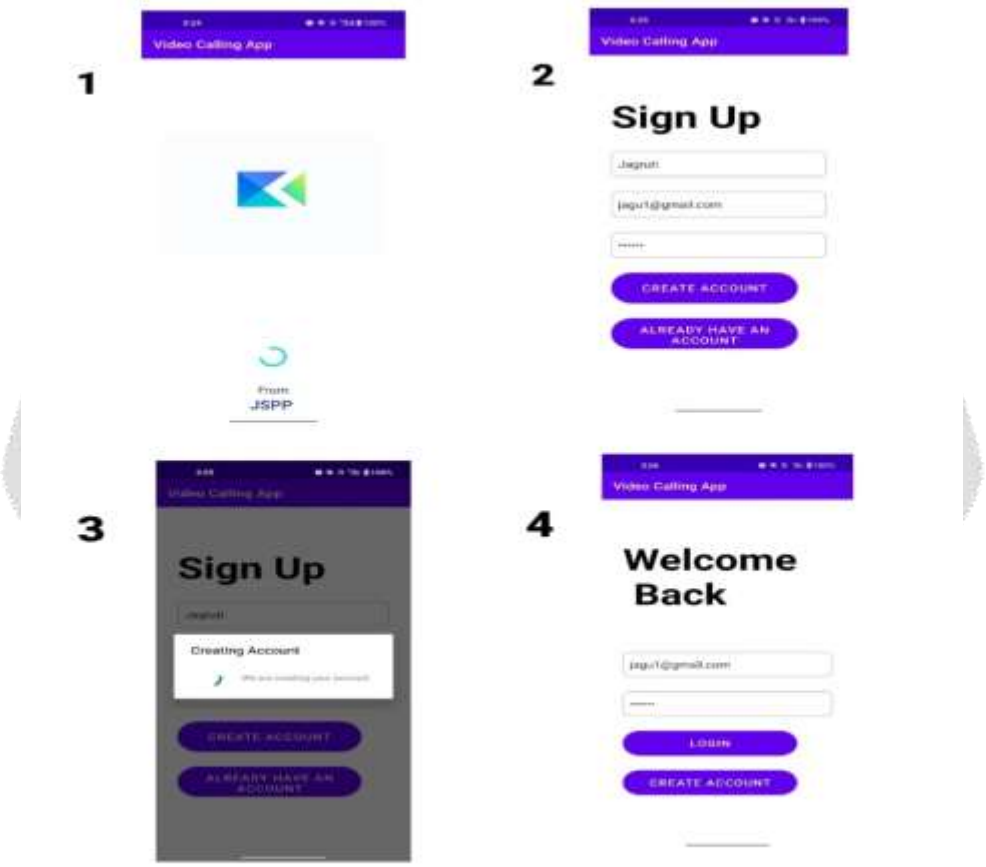

Fig 4 -User Interface

After logging in to the video conferencing app, the user will be prompted to enter the room ID or join a meeting by clicking on the designated button. Once the user has successfully joined the meeting, they will be presented with an interface displaying the option to invite others to the meeting and the ability to mute their audio and video feed.

Upon entering the video conference, the user will be able to engage with other participants, communicate with them via audio and video feeds, and take advantage of any additional features provided by the application, such as screen sharing or virtual backgrounds.

As the meeting progresses, users will be able to interact with each other through the app's interface, which may include features such as chat or polling tools. The app should be designed to allow for easy navigation and a smooth user experience, with minimal lag or delay in audio and video feeds. The goal of the video conferencing app's user interface is to provide users with an intuitive and user-friendly experience, enabling them to join meetings quickly and easily, engage with other participants, and access additional features as needed.

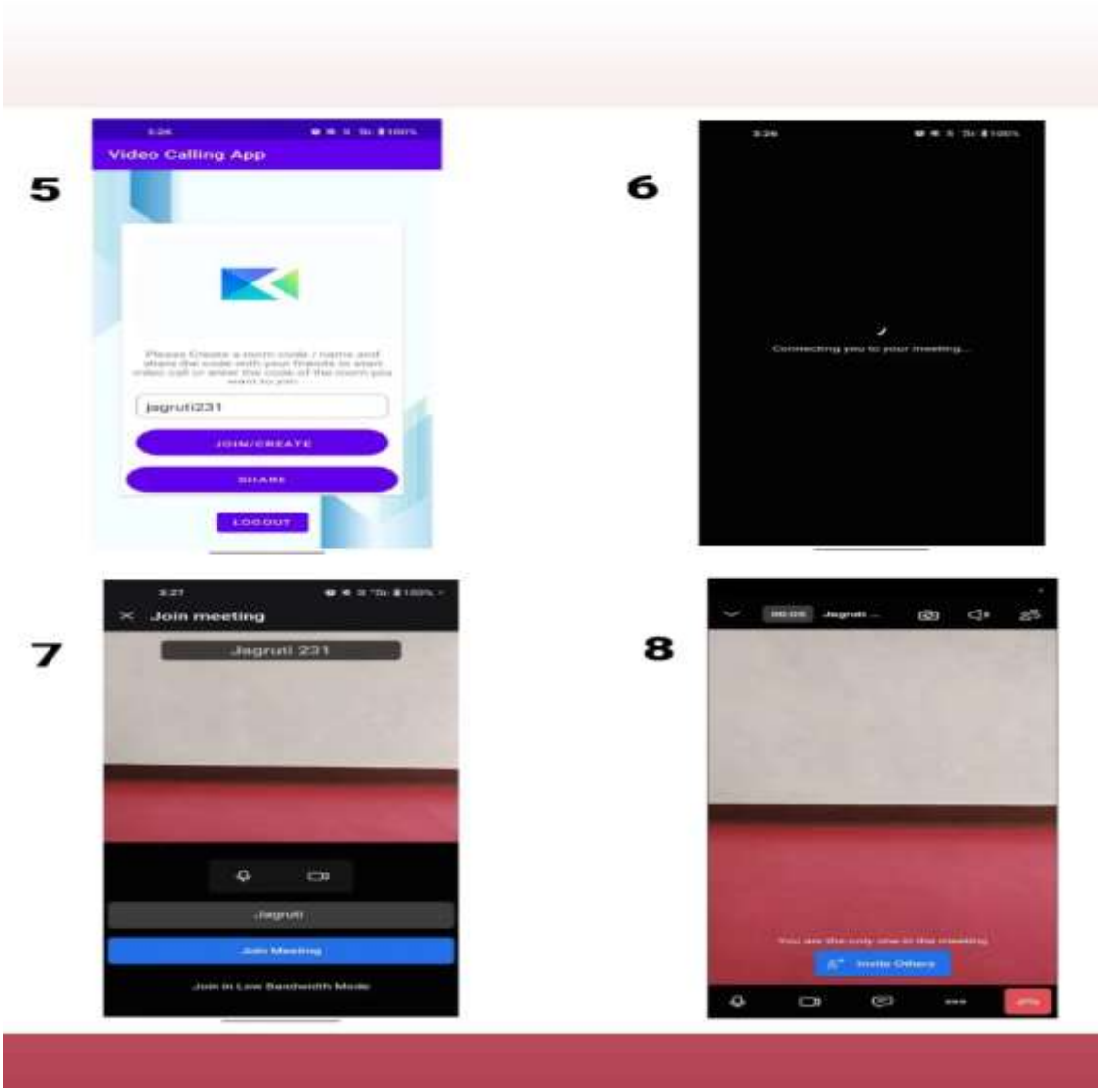

Fig 5- MEETING

The video conferencing app comes packed with various advanced features that set it apart from other similar apps. The app provides users with a unique car mode feature that enables them to participate in a meeting while driving without compromising their safety. Moreover, the app also offers an array of security options to ensure that the meetings remain private and confidential. The app includes a live streaming feature, allowing users to stream the meetings in real-time, making it more accessible to a larger audience. The app also includes features such as polls,

which allow users to participate in live polls during meetings, and status sharing, which keeps everyone informed about the participants' current status. The app also includes a screen sharing feature that allows users to share their screens during meetings, making it easier to collaborate and work together. Additionally, the app offers a tile view, which enables users to view all the participants in a single window, enhancing the overall meeting experience. The app also includes an extensive collection of emojis that can be used to express emotions and feelings during meetings**.**

Overall, the video conferencing app offers an extensive range of features that cater to the diverse needs of users. With its unique car mode and low bandwidth capabilities, the app provides users with a seamless video conferencing experience, enabling them to participate in meetings from anywhere, at any time.

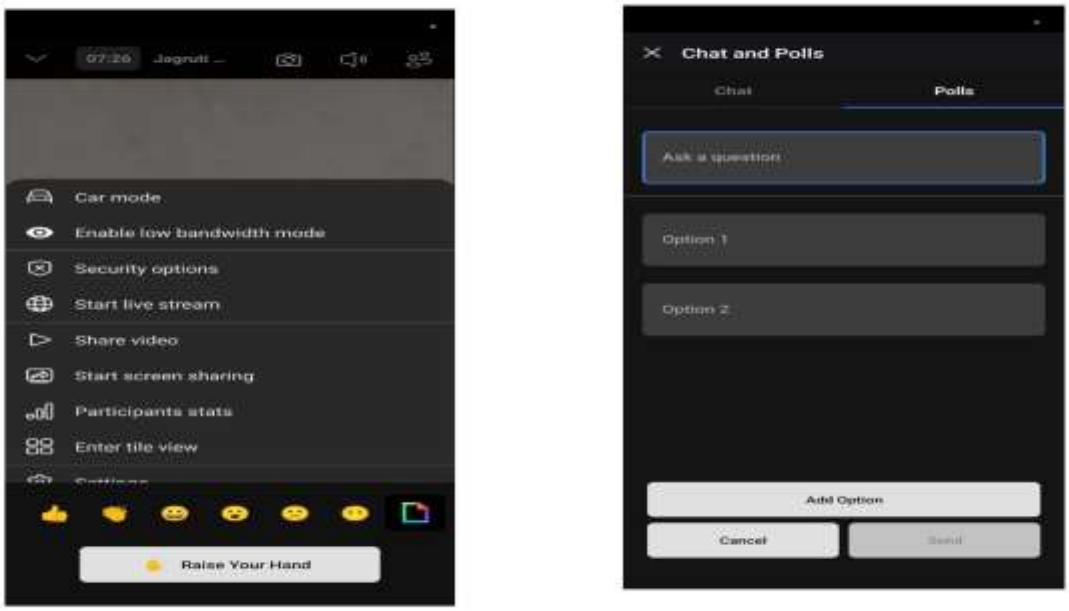

Fig 6 – Features

4. CONCLUSION

The advent of video conferencing has revolutionized the way we communicate, saving us valuable time, energy, and money. This technology provides an incredible set of tools that enables students, teachers, and parents to better connect with one another. Our research project involved creating a video conferencing system using Android Studio technology, with Firebase Authentication and Firebase Storage for the database. The system is user-friendly, easy to install, and designed specifically for the Android operating system. Our primary goal was to create a video conferencing solution that would alleviate the challenges of mobility and facilitate seamless communication. The app is equipped with various features, such as voice and video calls, file sharing, screen sharing, recording, and multiple format support. Members can join meetings in real-time without any interruption, with both front and back camera support.

5. ACKNOWLEDGEMENT

We would like to express our deepest gratitude to Prof. Suchitra Deokate, our teacher and mentor, for their invaluable guidance and support throughout this project. Their expertise and insightful feedback have been instrumental in shaping our understanding of the subject matter and developing our skills. We are truly fortunate to have had such a dedicated and inspiring teacher, whose passion for teaching has inspired us to pursue our own

academic and professional goals. Thank you, Prof. Suchitra Deokate, for your unwavering encouragement and belief in our potential**.**

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