Video Conferencing Web Application
(Google Meet Clone)

SYNOPSIS

OF MINI-PROJECT

BACHELOR OF COMPUTER APPLICATIONS

SUBMITTED BY

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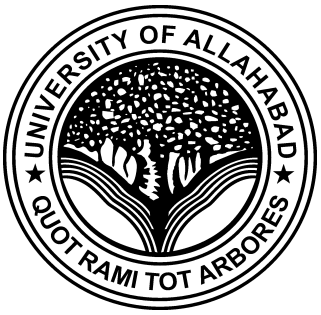
Batch Year – 2022-25

Enrollment No. – U2246056

PROJECT GUIDE – Dr. Sarika Yadav



Centre of Computer Education & Training

Institute of Professional Studies

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Uttar Pradesh

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INTRODUCTION

The proposed project is a **video conferencing web application** designed to meet the needs of modern digital communication. With the increasing reliance on remote work, online education, and virtual events, there is a growing demand for versatile and efficient video conferencing tools that support various forms of real-time interaction. This application leverages advanced web technologies such as **HTML, CSS, JavaScript, Socket.io, WebRTC, and Node.js** to deliver a seamless, secure, and user-friendly experience for diverse user groups.

Application Areas

1. **Remote Work and Business Meetings**: The application is ideal for corporate environments, enabling teams to conduct virtual meetings, presentations, and collaborative sessions. Features like video streaming, screen sharing, and live chat ensure effective communication and collaboration among remote teams.

2. **Online Education and E-Learning**: The application provides a platform for virtual classrooms, webinars, and online training sessions. Teachers and students can interact in real-time using video conferencing, share educational materials via PDF sharing, and use the hand-raise feature to facilitate orderly discussions.

3. **Virtual Events and Webinars**: The application supports hosting large-scale virtual events, webinars, and workshops. Organizers can use features like screen sharing for presentations, live chat for audience engagement, and microphone/camera control to manage participants.

4. **Healthcare and Telemedicine**: In healthcare, the application can be used for remote consultations, follow-ups, and virtual health sessions, allowing healthcare professionals to connect with patients in real-time while maintaining data privacy and security.

5. **Social Interactions and Community Building**: The application is also suitable for personal use, such as virtual gatherings, online social events, and community meetings. Users can join sessions using unique IDs, ensuring secure and private communication.

PROBLEM DEFINITION

The surge in remote work and virtual communication has heightened the need for reliable and versatile video conferencing solutions. Traditional platforms often face significant challenges that impact their effectiveness and user satisfaction. These challenges include issues related to user interface complexity, integration capabilities, performance scalability, and security concerns.

Problem Statement

Current video conferencing solutions frequently encounter the following problems:

1. **Complex User Interfaces**: Many platforms have complicated and non-intuitive interfaces, making it difficult for users to navigate and utilize essential features efficiently.
2. **Limited Integration**: Existing tools may lack seamless integration with other productivity tools, hindering users' ability to streamline their workflows and collaborate effectively.
3. **Scalability Issues**: As the number of participants in a meeting increases, maintaining high-quality video and audio can become problematic, leading to degraded performance and user experience.
4. **Security and Privacy**: Ensuring the security of communications and protecting user data are significant concerns. Many platforms face challenges in implementing effective encryption and privacy measures.
5. **Cost Barriers**: Many video conferencing solutions are either too expensive for small organizations or lack essential features without additional costs, limiting their accessibility.

MOTIVATION

The motivation for developing this video conferencing web application stems from the need to improve upon existing solutions that often struggle with usability, integration, performance, and security. By addressing these issues, our goal is to provide a user-friendly, feature-rich platform that enhances virtual communication and collaboration.

Additionally, this project offers a valuable opportunity to advance my technical skills. Working with technologies such as HTML, CSS, JavaScript, Socket.IO, WebRTC, and Node.js will deepen my understanding of web development and real-time communication, and help me gain hands-on experience in building scalable and efficient systems.

OBJECTIVE

To design and implement a secure and efficient video conferencing web application that support multiple participants, real-time video/audio streaming ,text chat ,and basic collaboration features using web technologies (HTML/CSS,JavaScript, and Node.js) and WebRTC for peer-to-peer communiction.

GOALS TO BE ACHIEVE

The primary objectives of our video conferencing web application are to:

1. User-Friendly Interface: To design an intuitive and easy-to-navigate interface that simplifies the user experience and minimizes complexity.

2. Feature Integration: To incorporate essential functionalities, including screen sharing, video streaming, mic and camera controls, live chat, PDF sharing, and hand-raising, ensuring a comprehensive communication tool.

3. Seamless Real-Time Communication: To utilize WebRTC and Socket.IO for smooth, real-time video and audio streaming, maintaining high quality and low latency during calls.

4. Robust Security: To implement strong security measures that protect user data and communications, adhering to best practices for encryption and privacy.

5. Technical Skill Enhancement: To advance technical skills in web development and real-time communication technologies, leveraging tools such as HTML, CSS, JavaScript, Socket.IO, and Node.js.

Expected Outcomes

- **An intuitive and user-friendly interface** that simplifies interaction and enhances usability.
- **Seamless integration capabilities** with other productivity tools.
- **Reliable performance and scalability** to accommodate varying numbers of participants.
- **Effective security measures** to safeguard user data and communications.
- **A cost-effective solution** that provides value without compromising essential features.

REQUIREMENT ANALYSIS

SOFTWARE ANALYSIS

- **Frontend Technologies:** HTML, CSS, JavaScript
- **Backend Technologies:** Node.js, WebRTC (For Video Streaming), Socke.io (For Real Time Chatting)
- **Development Environment:** Visual Studio Code

HARDWARE ANALYSIS

- **Operating System**: Windows 10 or later/ macOS 10.15, Andior, IOS
- **Processor:** Intel i3 or higher
- **RAM:** at least 2GB
- **Storage:** minimum 256GB of SSD

TESTING STRATEGIES USED

1. **Unit Testing:** To test individual components or functions of the application in isolation to ensure they work correctly.
2. **Integration Testing:** To test the interaction between different components or systems to ensure they work together as expected.
3. **Compatibility Testing:** To verify that the application works across different browsers, devices, and operating systems.
4. **Performance Testing:** To assess the application's performance under various conditions and ensure it can handle the expected load**.**

MODULE DESCRIPTION

1. **Page**
   - **1.1. Landing Start a Meeting Option:** This feature allows users to initiate a new video conference. Users typically click a button or link to start a meeting, which generates a unique meeting ID or link that can be shared with other participants.
   - **1.2. Join a Meeting Option:** This feature enables users to enter an existing video conference using a unique meeting ID or link. This option usually involves entering their name or other identification details and may include options to configure video and audio settings before joining.

2. **Video Streaming Screen:**
   - **2.1. Video Streaming Module:** This module handles the live video feed, displaying video from participants. It ensures high-quality video streaming.
   - **2.2. Video On/Off**: This feature allows users to toggle their video feed on or off. When video is turned off, the user's video feed is not transmitted to other participants, but they can still see and hear others.
   - **2.3. Mute/Unmute Audio**: This feature enables users to toggle their audio on or off. When audio is muted, the user's microphone is disabled,. This feature helps manage background noise and ensure focused communication.
   - **2.4. Chat Box**: The chat box allows participants to send and receive text messages during the meeting. It can be used for private or group chats, sharing quick notes, or providing feedback without interrupting the speaker.
   - **2.5. Hand Raise:** This feature lets participants signal that they want to speak or ask a question. Raising a virtual hand notifies the host or other participants that someone wishes to contribute, helping to manage turn-taking in discussions.
   - **2.6. Screen Sharing (Tab, Window, Entire Screen):** This feature allows users to share their screen with others in the meeting.
   - **2.7. Session Recording (Tab, Window, Entire Screen):** This feature records the meeting for future reference.

2.8.

2.9. File/PDF Attachment Module: This module allows users to upload and share files or PDFs within the meeting. Participants can attach documents to the chat or display them directly during the meeting, facilitating easy sharing of resources and information.

DFD

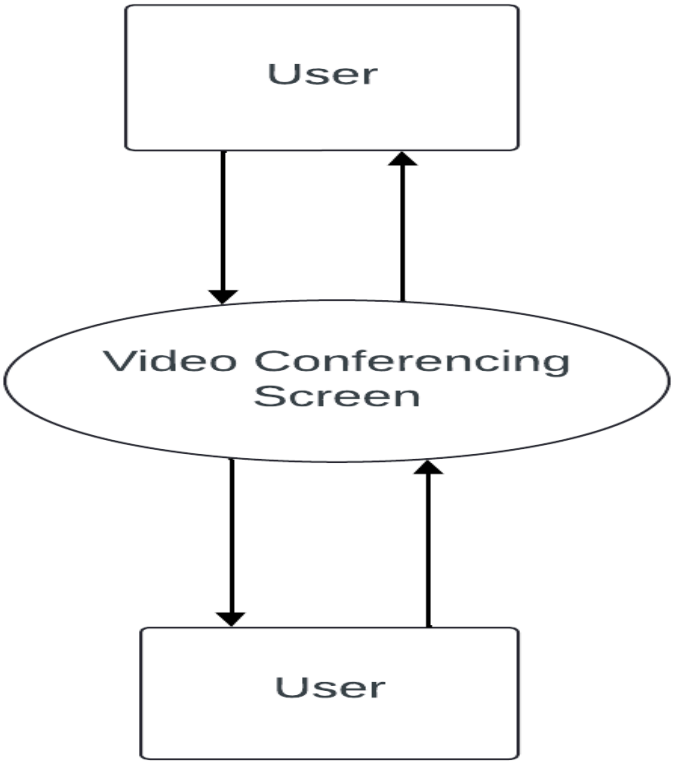


Fig. 1. Context-Level DFD (Level 0 DFD)

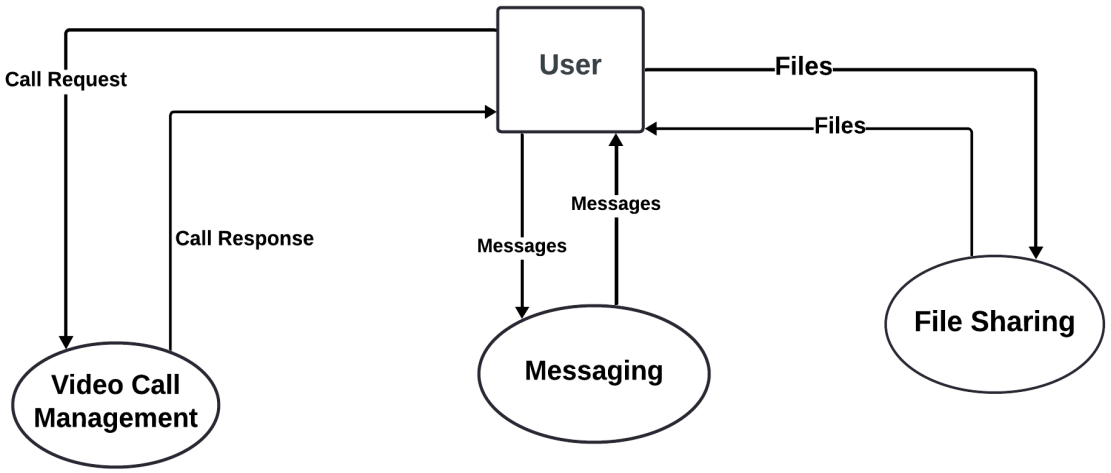


Fig. 2. Level 1 DFD

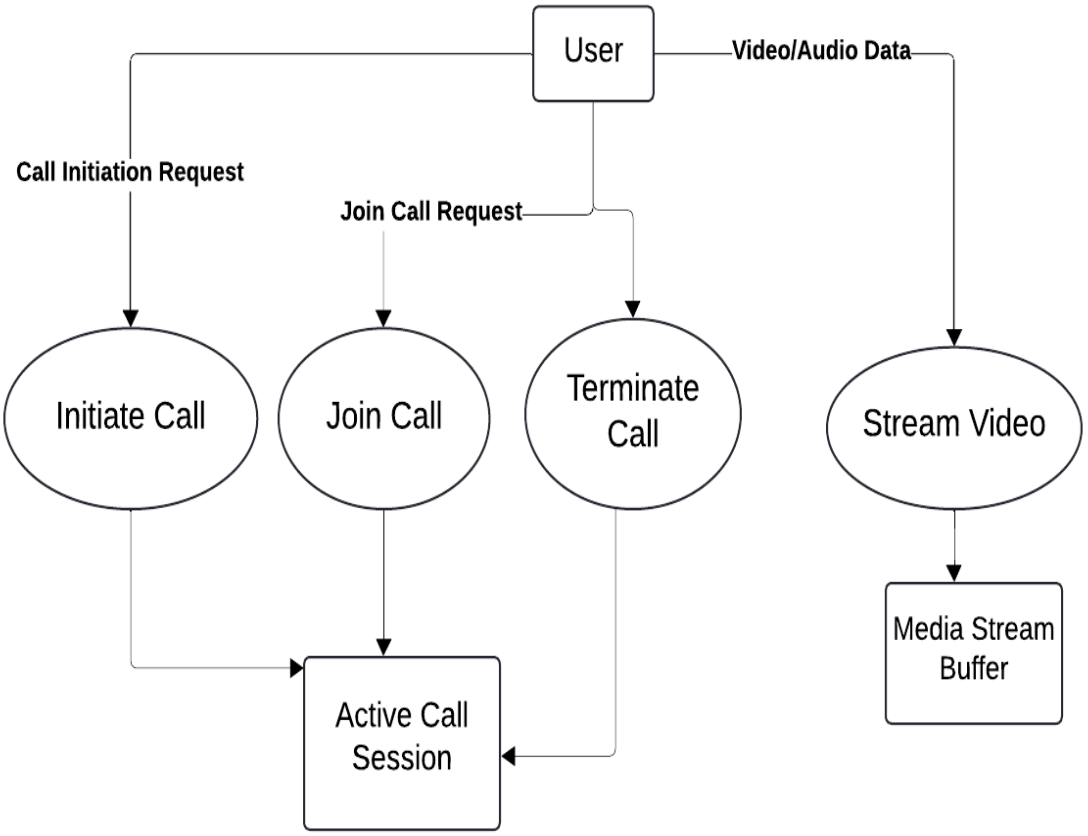
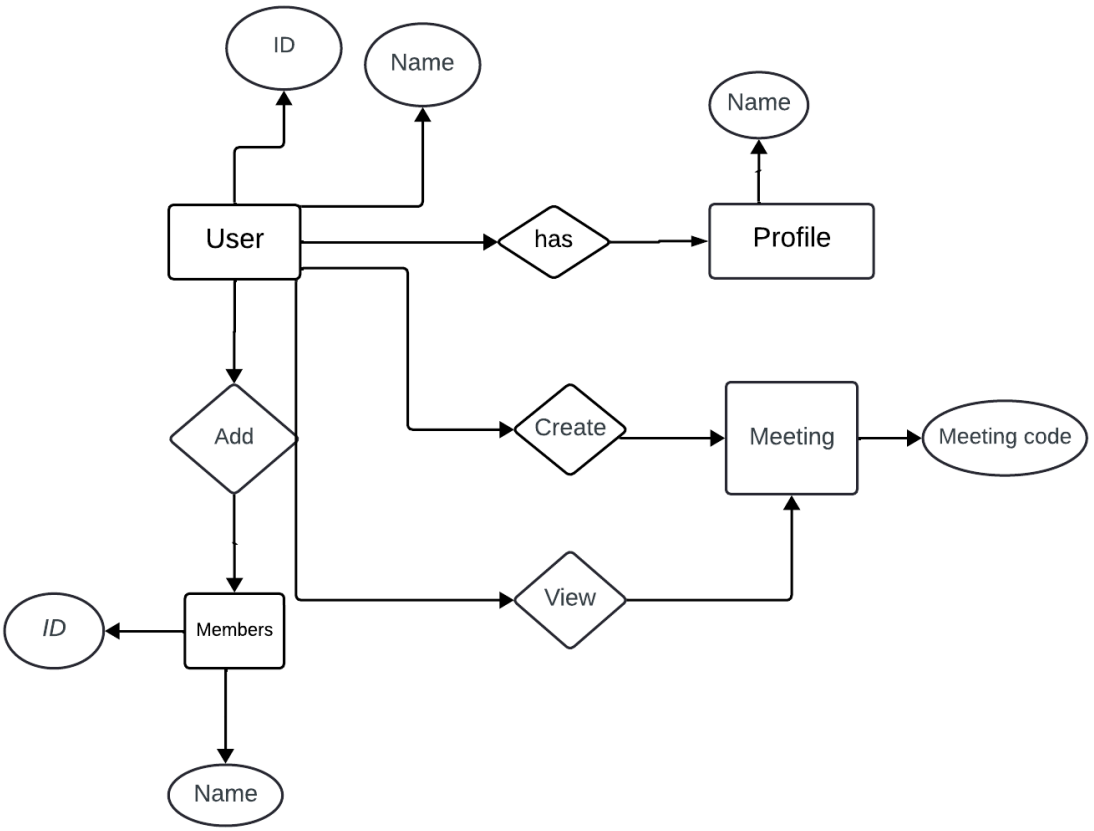


Fig. 3. Level 2 DFD: Video Call Management

ER Diagram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S. No.	Project Activity	Estimated Start Date	Estimated End Date
1	Synopsis Presentation	02/09/2024	
2	Landing Page	03/09/2024	10/09/2024
3	Video Streaming Screen Setup	15/09/2024	22/09/2024
4	Communication and Interaction Features	23/09/2024	07/10/2024
5	Screen Sharing and Session Recording	08/10/2024	16/10/2024
6	File Sharing and Additional Enhancements	17/10/2024	22/10/2024
7	Testing and Deployment	23/10/2024	28/24/2024

MEETING WITH SUPERVISOR

Date	Mode	Comments From Supervisor	Signature of The Supervisor
08.08.24	Offline	Analyze available video conferencing web application	
27.08.24	Offline	Prepare a concise and well-structured synopsis	

REFERENCES

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2. **https://nodejs.org/en**
3. **https://socket.io/**
4. **https://webrtc.org/**