Implementation of the Video Conferencing Web Application "THE MEET UP"

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Abstract

During the last few years, video conferencing has become very popular and very reliable as a tool to bridge the gap where travel is not an option. And the COVID-19 epidemic has also led to lockdown orders that have led to dramatic changes in the way people work. The number of people working in the home (WFH) had increased significantly during the pandemic. The need for distance learning has also increased and has become a compulsory education system in the midst of this current situation. The Companies are also adopting an innovative recruitment process at such time. So to address this issue, our project aims to build a conference app that helps to provide communication between people through audio conferencing, video conferencing, screen sharing and messaging in real time. In this, we have created group video chat with the help of WebRTC technology and socket programming. Also we have added real- time chat feature and screen share feature. We had created the web app using Jquery for front end and node.js express.js for signaling server and real time database of Firebase for storing chats and user information. WebRTC helped us to create peer to peer connection and with the help of sockets we have done transfer of sdp packets and ice candidates. We have discussed extensively about them in our paper.

Keywords: Video Conferencing, Virtual Meetings, Real-Time Communication, Video/Audio Communication

Introduction

This project centers around the development of a Zoom Cloner application, designed to enhance virtual communication experiences by replicating the functionalities of Zoom meetings. Meetup is an innovative video conferencing platform designed to enable seamless, high-quality communication for individuals and businesses alike. With the growing demand for remote collaboration, Meetup provides a user-friendly, scalable solution for virtual meetings, ensuring that teams, educators, and communities can stay connected from anywhere. The platform supports real-time video/audio communication, screen sharing, group chats, and secure access controls, allowing users to host and join meetings with ease. Built with modern technologies, Meetup offers a fast, responsive interface that works across multiple devices, ensuring a smooth experience for every user. Whether it's for professional collaboration, educational purposes, or personal gatherings, Meetup empowers users to connect, share ideas, and collaborate effectively in a virtual environment.

Literature review

Video conferencing will soon be more than a perk for businesses; it will be a need for those that want to

stay competitive .Currently, 59 percent of employees use video communications at work on a regular or weekly basis, with 45 percent doing so on adaily or weekly basis. Almost half of the respondents say video consumption at work has increased since two years ago, while27% say personal usage has declined in the same time period.Some Video Conferencing Systems Many video conferencing systems are available, including Skype, Q audio Conf, and Cisco WebEx Meeting.

Skype:

Skype is a software that allows you to make audio/video calls as well as send and receive text messages and files over the Internet. In 2003, the initial version of this software, which was designed for voice communication, was released. It has recently become popular since then as one of the first websites towards using VoIP technology.[1]

Cisco WebEx Meeting:

Video conference Meeting with Cisco WebEx is a multi-purpose audio and video conferencing system for companies of all sizes. Cisco WebEx can host many meetings at the same time, allowing users to interact in real time. For large-scale promotionalevents and educational sessions, this web conferencing software is also highly recommended.[2]

Google Meet:

Google Meet is a video-communication service created by Google. It's one of two applications that replace Google Hangouts,the other being Google Chat. Google Meet is tightly integrated with Google Suite, making it simple to schedule meetings using the app. [3]

Methodology:

Meetup uses a combination of proprietary and standard algorithms to optimize video conferencing performance. While exact details of Meetup's proprietary algorithms are not publicly available, we can infer its core technology based on research papers, patents, and industry standards. Here's a breakdown of key algorithms used in Meetup :

1. Connecting User:

For the two users to connect, the simplest option is that both the users visit the same website.
This page can then identify each browser and connect both of them to a shared signalling server, using something like the WebSocket API.

2. Start signals/Signalling:

WebRTC does not specify how signalling should be done. Signalling is any form of communication that helps the 2 browsers establish and control their WebRTC communication. May be done using:

- a combination of XHR and the Google App Engine Channel API

-XHR polling

- Server-Sent Events – WebSocket.
3. Find Candidates/ICE Framework :

The next step is for the two browsers to exchange information about their networks, and how they can be contacted. This process is commonly described as "finding candidates", and at the end each browser should be mapped to a directly accessible network interface and port. Each browser is likely to be sitting behind a router that may be using Network Address Translation (NAT) to connect the local network to the internet. Their routers may also impose firewall restrictions that block certain ports and incoming connections. Finding a way to connect through these types of routers is commonly known as NAT Traversal.

4. Network Address Translation(NAT):

NAT solves the problem of scarcity of IP addresses. The basic idea behind NAT is for the ISP to assign each home or business a single IP address (or at most, a small number of them) for Internet traffic. Within the customer network, every computer gets a unique IP address, which is used for routing intramural traffic. However, just before a packet exits the customer network and goes to the ISP, an address translation from the unique internal IP address to the shared public IP address takes place.

5. Start RTC-Peer-Connection streams:

Once this has all been completed, the browsers can finally start streaming media to each other, either directly through their peer-to-peer connections or via any media relay gateway they have fallen back to using.

6. Peer -to -Peer- Communication :

Multiple computers come together and pool their resources to form a content distribution system. These computers are peers. There is no dedicated infrastructure like in a client-server architecture; no central point of control. P2P networks are self-scaling and faster.

Results:
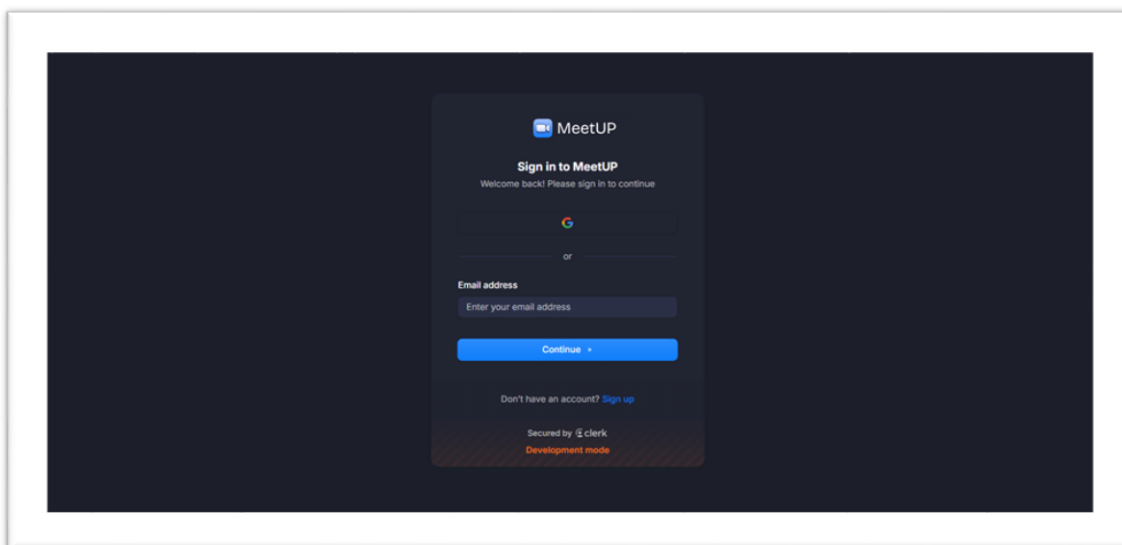
Above mentioned picture is the login page of our website Meetup , designed with a modern and user-friendly interface. Users can sign in seamlessly using their email or Google authentication for a quick and secure login experience. The page is powered by Clerk for authentication and currently runs in development mode.
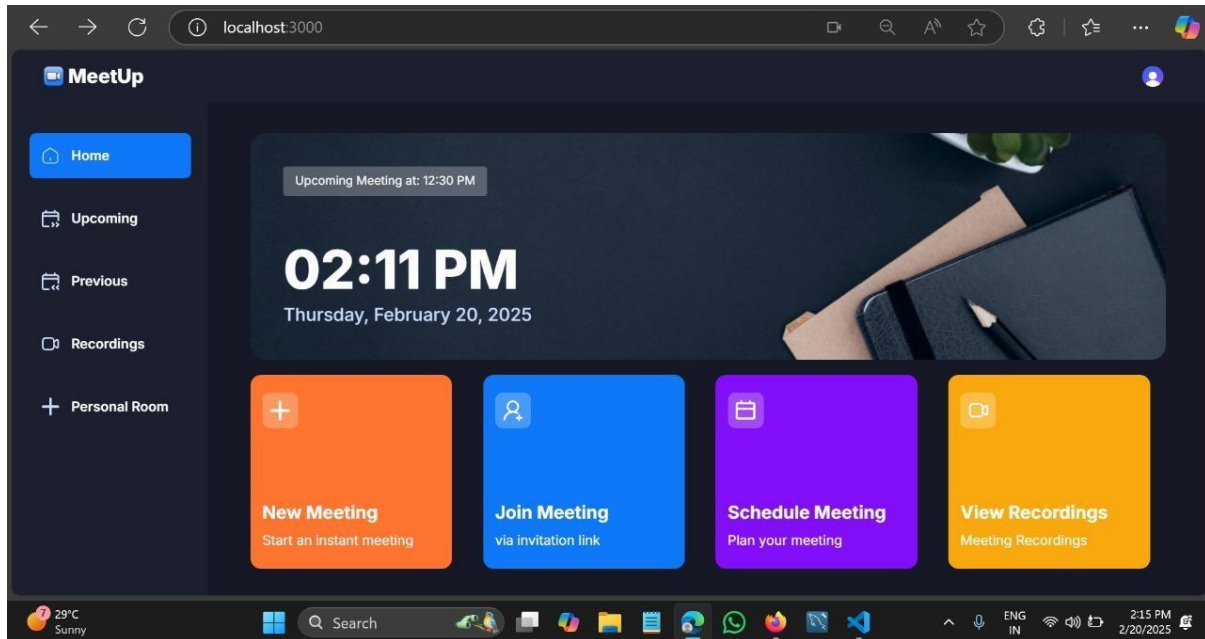
Above mentioned is the home page of our website. The homepage provides quick access to essential features, including starting a new meeting, joining via an invitation link, scheduling meetings, and viewing recordings. A sleek dashboard displays upcoming meetings, the current time, and an intuitive sidebar for easy navigation. With a clean and professional design, MeetUp ensures a smooth and efficient online meeting experience.
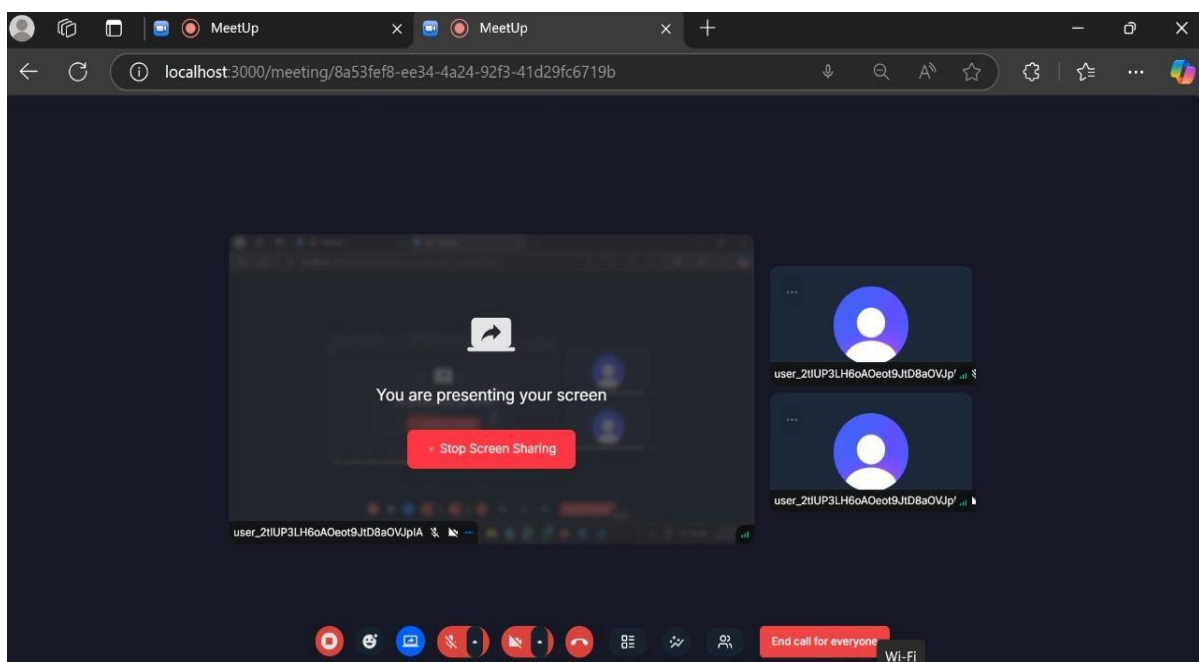
This is the web interface of our meeting app, whenever user will come across our app they will experience a user friendly interface mentioned above. We do offer real time communication thorough our web conferencing app. It can be very useful and efficient for connecting people throughout the globe and provide them hassle free communication. The web application can be used for multiple purpose like business meeting, video conferencing and E-learning. This project not only highlights the current capabilities of web conferencing apps but also lays the foundation for future innovations in virtual communication technology A Meet up video conferencing app is a real-time communication platform enabling users to interact via video, audio, and messaging over the internet. It utilizes WebRTC for peer-to-peer communication or third-party APIs for seamless video streaming. Users can create, join, and schedule meetings with unique IDs, while features like screen sharing, chat, and participant controls enhance collaboration.

Conclusion:

This paper illustrates how WebRTC can be used to enable real time communication capabilities for a web application. A project has been implemented which provides a platform where two users can join/host a meeting on the same webpage. Users can text, audio/video chat and file share. One can further improve the application by adding features like screen sharing and a login page for extra security. Preferences management, background blurring, support for many participants is also possible.

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