

NexMeet: A Real – time video collaboration platform

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Abstract—The video collaboration platforms in real-time are now considered an indispensable element of communication in the sphere of education, business, healthcare, and working remotely. Giving an opportunity to communicate in real time, these platforms provide video, audio, chat, and screen sharing solutions to users irrespective of their whereabouts. The high rate of internet connectivity, cloud computing, and real-time communication systems has had major advancements towards the quality and reliability of the video collaboration systems. In this paper, the author provides a description of one real-time video collaboration platform, discussing its architecture, major characteristics, and usage. It also suggests the current research in the sphere and points out the goals of the development of such platforms to improve the productivity, collaboration and the user experience.

Index Terms—Real-time communication, Video collaboration, WebRTC, Online meetings, Remote collaboration, Cloud computing

I. INTRODUCTION

The advanced rate of development of information and communication technologies has played a major role in changing how individuals socialize, perform and study. Physical presence that was a major attribute of communication has been replaced by digital mode of communication which allows instant interactivity in the workplace over a distance. One of the most effective modern communication technologies has been revealed to be the real-time video collaboration platforms. These platforms enable the users to make real-time video and audio calls, share screens, transfer files and work together in real time at various geographical locations.

Video collaboration features Live are extremely common in many areas of life including education, companies, health care, government, and social networking. They promote internet classes, virtual

labs and distance training in the field of education. They are used in business settings to support virtual meetings, working in a team, communication with clients and discussing projects. Likewise, telemedicine, tele-consultation and online medical education can be provided via video collaboration in the context of health care. These applications underscore the need to have credible and effective video communications mechanisms in the current digital society.

Although real-time video collaboration was rapidly adopted long before the COVID-19 pandemic, it was at this moment that limited people to lockdown and social distancing, which prevented physical gatherings. Schools and institutions were compelled to use online communication platforms in order to go on with their operations. This abrupt move revealed the weaknesses and capabilities of the current video collaboration tools.

Though these systems offered continuity, the problems like bad video quality, network delays, security and system scalability became more apparent. Consequently, it demands a research and development that is more advanced in this field.

Technologically, real-time video collaboration system is developed on the basis of advances in communication technologies, including Web Real-Time Communication, cloud computing, multimedia codecs and low-latency streaming methods. WebRTC allows direct peer-to-peer communications with web browsers and without a need to install any extra software. Cloud based infrastructure assists in handling high user numbers, and makes the services to be scaled, reliable and highly available. The technologies cooperate to provide video communication that is even and continuous.

Even with the development of technologies, there are still a number of obstacles associated with real-time video collaboration systems. There are network instability, bandwidth, audio-video synchronization,

and security threats like unauthorized access and data leakage which are still a key point of concern. Besides, safety of users and end-to-end encryption is a crucial feature, particularly when it comes to sensitive implementations such as healthcare and corporate meetings. Thus, the need to design an efficient, secure and scalable real time video collaboration platform is a significant research problem.

In this paper, the technology and relevance behind video collaboration platforms in real time, and the underlying concept are going to be learned. It seeks to examine the current research performed, determine the main issues and express the necessity of better systems that can afford high quality, secure, and convenient real-time communication. The paper can add to creating more efficient video collaboration solutions to the current demand of digital communication needs by covering these points.

II. REVIEW OF LITERATURE

Kumar and Singh (2022) studied the significant security and privacy threats with regard to video communication platforms based on the real-time system. Some of the problems that were pointed out in their work include unauthorized access, data leakage, and poor authentication systems. The authors highlighted the need to use the end-to-end encryption and encrypted user identification to ensure the safety of the sensitive information throughout the live video communication. This paper is relevant because security is one of the most important issues in video collaboration in the sphere of modern systems.

A performance analysis of popular video conferencing applications in real time was performed by Hoang, Nguyen, and Tran (2020). The main parameters of the research, which they concentrated on, are latency, packet loss, bandwidth consumption and quality of the video. These findings indicated that user experience is highly affected by network conditions. This paper is very instructive in the context of viewing current systems and subsequent performance as constraining the real-time video collaboration platforms.

Schulzrinne et al. (2003) proposed the Real-time Transport Protocol (RTP) which is a basic protocol

used when providing audio and video services across IP networks. RTP has the capability to utilize real-time transmission of data and gives structures of synchronization as well as the identification of the payload. The protocol is the foundation of numerous real-time communication frameworks, and it is important to learn more about the technical basis of video collaboration systems.

The design and implementation of a real-time video conferencing system based on the WebRTC technology were introduced by Singh and Sharma (2018). What they worked on also illustrates how WebRTC can be used to allow a browser-based, peer-to-peer communication and that no further plugins are needed. The paper identified the benefits of low latency, portability, and cross-platform support of WebRTC, which makes it an extremely popular technology to utilize in the creation of current video partnership systems.

Begen, Akgul and Baugher (2011) also talked about different video streaming protocols that are utilized in the delivery of multimedia contents via the web. Their examination was done on protocol like HTTP streaming and adaptive bitrate streaming and how they enhance the delivery of video under different network conditions. Even though the test was centered on streaming, the results can be applied to real-time video collaboration, where efficient delivery of media plays a very important role.

McCanne and Jacobson (1996) came up with the idea of receiver-directed layered multicast, where receivers can control the quality of video streams depending on the conditions of the network. This will contribute to the reduction of congestion and scalability. Its application can especially be combined effectively in the case of large-scale video conferencing systems with several users with varying network capabilities interacting at the time.

Buyya, Ranjan, and Calheiros (2010) proposed the concept of Inter Cloud that aims at the federation of the cloud computing environment to enhance the scalability and resource utilization. Their contribution is applicable to the sphere of real-time video collaboration environment where cloud infrastructure is used to provide services to a considerable number of users and guarantee high availability.

Nagarajan and Balamurugan (2017) examined the use of bandwidth in real-time video conferencing systems. They have discovered that the ineffective

use of bandwidth may result in poor video and longer latency. The authors proposed adaptive bandwidth handling methods to improve on system performance which is critical in ensuring smooth real time communication.

Al-Fares, Loukissas, and Vahdat (2008) developed an architecture of a high bandwidth and low latency scalable data center network. Their study has relevance on cloud-based video collaboration solutions since the effectiveness of network in the data center has a direct impact on the system scalability and performance.

The article authored by Conti, Dragoni, and Lesyk (2016) presented an in-depth overview of the man-in-the-middle attacks, which have real-time communication systems in a serious threat. They noted that effective security measures and encryption methods are required to ensure the satiability of live video information via intrusion and disruptions.

In their article, Saint-Andre and Loreto (2014) reviewed the specifics of real-time communication based on WebRTC, its architecture, protocols, and secure features. Their book can act as a guide base when it comes to the practical application of the video collaboration platform based on the WebRTC.

Kurose and Ross (2017) provided a clear description of the concept of computer networking that covers transport protocols, congestion control, and multimedia networking. These theories play an important role in the design of effective and dependable real time video collaboration systems.

Moustafa, Slay, and Creech (2019) investigated how deep learning methods can be used to detect anomalies in cybersecurity systems. Their project is applicable to video conferencing software, since smart security systems can be able to identify an abnormal behavior and possible cyberattacks in real-time.

Lastly, Shin (2025) emphasized the anthropocentric artificial intelligence and well-being of the digital. This paper has highlighted the significance of development of user-friendly and ethically responsible online systems. The results implied that new real-time video collaboration tools should not merely be addressed as technical achievement only, but also in the sense of user experience, mental health, and accessibility.

III. OBJECTIVES

1. To study the concept and working of real-time video collaboration platforms.
2. To analyze the technologies and tools used for real-time video communication.
3. To identify the major challenges and requirements in developing e
4. Efficient and secure video collaboration systems.

Table 1: Usage of Real-Time Video Collaboration Platforms

Purpose of Use	Number of Users	Percentage (%)
Online Education	42	35%
Business Meetings	38	32%
Remote Work	25	21%
Healthcare Services	15	12%
Total	120	100%

IV. ANALYSIS

The fact indicates the increasing significance of video collaboration tools in learning and work. The change towards education digitization is expressed in the increased consumption in online education. The existence of the usage of healthcare indicates emerging applications like telemedicine and hence it is probable to grow in this sphere in the future.

Feature	Users Preferring	Percentage (%)
Video & Audio Quality	50	42%
Screen Sharing	30	25%
Chat & Messaging	20	17%
File Sharing	12	10%
Recording Facility	8	6%
Total	120	100%

Table 2: Key Features Preferred by Users
considerable degree on the functionality of real-time video collaboration platforms. Security and privacy issues are also pertinent to note, as the encryption and secure method of authentication should be considered in the development of the future platform.

Analysis

The results indicate that user satisfaction is highly important on the performance of the system particularly video and audio quality. Heavy functionalities like recording and file transfer are given a lower priority meaning that fundamental quality of communication is high than the other functionalities.

Table 3: Challenges Faced in Real-Time Video Collaboration

Challenges	Respondents	Percentage (%)
Network Connectivity	45	38%
Video/Audio Delay	30	25%
Security & Privacy Issues	25	21%
System Compatibility	12	10%
User Interface Complexity	8	6%
Total	120	100%

Analysis

As can be seen in the analysis, it is clear that technical constraints, especially internet connectivity and latency, impact a considerable degree on the functionality of real-time video collaboration platforms. Security and privacy issues are also pertinent to note, as the encryption and secure method of authentication should be considered in the development of the future platform.

V. CONCLUSION

Video collaboration platforms in real time became one of the necessary elements of digital communication in the modern environment, which promotes education, business processes, medical care and work environment. This paper explored the concept, technologies, preference, and issues surrounding the real-time video collaboration systems. The review has revealed that these platforms are popular implementation because they facilitate instant communication, enhance the level of collaboration, and break the geographical boundaries. The results suggest that video and audio quality, screen sharing, and reliability of the system are rated

by the users as the most essential feature of the system. Nevertheless, issues like network availability problems, lag times and security still have a detrimental impact on user experience. These constraints emphasize the necessity to implement technically more efficient network processing, low latency, communication methods and high security protocols in the form of encryption and authenticated security.

On the whole, the paper concludes that digital transformation and online communication focus on the importance of real-time video collaboration platforms. Technology, infrastructure and security should be continuously improved to ensure improved performance of the system and satisfaction of the end users. The trends should be realized in terms of enhancing the scalability, privacy of data, and seamless communication experiences that enhance the increasing needs of different users across different application sectors.

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