

Exploring the Benefits of Virtual Reality Meeting Software: A Comparative Study

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This research survey paper examines the existing video calling and virtual reality calling software and compares their effectiveness in providing interactive, expressive and efficient meeting experiences. The study finds that while traditional video calling software offer basic communication capabilities, it lacks the ability to fully immerse users in the meeting environment. On the other hand, virtual reality meeting software provides a more realistic and immersive experience that allows users to interact with the virtual environment and each other in a far more natural and intuitive way. Furthermore, virtual reality meeting software is more efficient in terms of reducing travel and costs, and it also provides a more engaging and expressive medium for collaboration and communication. Overall, the paper concludes that virtual reality meeting software is superior to traditional video calling software for providing a more immersive, efficient, and expressive meeting experience.

CCS Concepts: • **Human-centered computing** → **Virtual reality**; *Web-based interaction*; **Heuristic evaluations**; Field studies; Pointing devices.

Additional Key Words and Phrases: Virtual Reality, Football, Performance Evaluation

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1 INTRODUCTION

Virtual reality (VR) meeting software is a relatively new technology that has been gaining popularity in recent years as an alternative to traditional video calling software. This research survey paper explores the differences between traditional video calling software and virtual reality meeting software in terms of their interactivity, efficiency, and expressiveness. The paper examines how virtual reality meeting software provides a more immersive and engaging experience for users, allowing for more natural and intuitive interaction and collaboration. Additionally, the paper discusses the efficiency benefits of virtual reality meeting software, as it reduces travel time and costs, making it a more practical solution for remote team meetings. Finally, the paper discusses how virtual reality meeting software provides a more expressive platform for communication, allowing users to express their ideas and emotions in a more engaging manner.

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2 OBJECTIVES

This research survey paper aims to provide a comprehensive analysis of the differences between traditional video calling software and virtual reality meeting software in terms of their interactivity, efficiency, and expressiveness. The paper begins by conducting a thorough survey of existing video calling and virtual reality meeting software available in the market. The paper then analyzes and compares the two types of software, identifying and highlighting the areas where virtual reality meeting software is superior to traditional video calling software. In addition, the paper also discusses potential drawbacks of virtual reality meeting software, such as technical limitations, cost, accessibility, and user acceptance. Finally, the paper provides recommendations for future research in the field, including the development of new technologies and the exploration of novel applications of virtual reality meeting software. Overall, this research survey paper aims to provide valuable insights into the benefits and limitations of virtual reality meeting software, and its potential to revolutionize the way we interact and collaborate in the future.

3 MOTIVATION

The motivation behind this research survey paper is to explore the potential of virtual reality meeting software as an alternative to traditional video calling software. With virtual reality becoming increasingly popular, there is a growing need to explore the benefits and limitations of this technology, especially in the context of communication and collaboration. The paper aims to address the drawbacks of existing communication software and provide a solution in the form of virtual reality meeting software, which offers a more interactive and immersive experience for users. Moreover, with virtual reality and immersive technology being touted as the next computing platform, it is important to understand how this technology can be leveraged to enhance communication and collaboration in various domains. By highlighting the benefits and limitations of virtual reality meeting software, this paper aims to provide valuable insights into the potential of this technology to revolutionize the way we interact and collaborate in the future.

4 LITREATURE SURVEY

Column1	Column2	Column3	Column4	Column5
10.1109/VR.2009.4811041	Virtual Reality-Based Multi-View Visualization of Time-Dependent Simulation Data.	To address shortcomings of understanding complex spatial relationships form 2d projections of data. To describe a system for analysis of time-dependent, massive data within virtual environments.	Paper describes a method for interactively analyzing massive amounts of time varying data based on the techniques of multiple linked views and brushing, the approach allows the user to quickly formulate, visualize and assess hypotheses about the data. To enable an interactive exploration even in the face of multi-gigabyte data sets, the workload is distributed to a multiprocessor parallel machine and a rendering client.	Simple 2D projections of the data make it difficult to understand complex spatial linkages. Second, the size of current simulation runs is excessive even for handling powerful workstations
10.1109/CSCI.2014.116	Multi-user VR Classroom with 3D Interaction and Real-Time Motion Detection	To demonstrate a multi user virtual classroom with administration capabilities provided to the instructor. To show that the virtual reality classroom will improve learning experiences.	Paper showcases administration capabilities provided to the teacher allowing total control over the virtual classroom environment and student behavior, such as conversing and chatting. The motion detection connects the instructor's movement in real-time with the virtual classroom's portrayed avatar.	The teacher in a typical classroom is not concerned about chat, status change, or document sharing issues. It is straightforward to use the method of raising hands to offer pupils paper documents, respond to inquiries, and solicit feedback from the class. However, these capabilities need to be carefully applied in the VR classroom.

DOI number	Paper Name	Objective	Method	Drawbacks
10.1109/VR.2018.8446151	Space Tentacles - Integrating Multimodal Input into a VR Adventure Game	To propose a maintainable technique for creating Multimodal interfaces for Virtual Reality with complicated system topologies	Paper proposes a maintainable way for creating such interfaces. A reusable multimodal I/O processing platform is integrated with the Unity game engine's simulation and rendering capabilities, allowing the game engine's improved API usability and tool support to be leveraged.	Complex system architectures are often the end result of integrating all necessary I/O subsystems into a full multimodal VR interface.
10.1109/VR.2017.7892377	Web VR meets WebRTC: Towards 360-degree social VR experiences.	To outline a web based VR framework to add VR and MR capabilities to existing video conferencing apps.	Paper outlines working of a flexible web-based VR framework that adds new virtual and mixed reality functionality to existing video conferencing capabilities. It enables two persons to converse via mediated audio-visual communication.	Most of the text in videos could not be read due to the low object quality in the VR environment. When focusing on the environment, the environment appeared abnormal due to the resolution of the individual content, especially the backdrop image, and the resolution in the glasses. Performance issues when executing application at a lower frame rate than expected. Motion sickness. The users' inability to see themselves was another barrier to immersion.

DOI number	Paper Name	Objective	Method	Drawbacks
10.1109/VR.2018.8446617	Locomotion with Virtual Agents in the Realm of Social Virtual Reality	To improve multiple AI agent movements in the in Virtual Environments	Main focus is on user-agent dynamics in settings like those involving pedestrians, and pure inter-agent dynamics.	Many users embrace the less realistic design of the approaching and departing behavior since it reduces their waiting time for social connection. However, the VA's movements and interactions need to be realistic.
10.1109/VR.2019.8798165	Harassment in Social VR: Implications for Design	To define and identify interpretations of on-line harassment with one to one interviews in VR	The paper focuses on the issue of abuse, harassment, and discomfort in social VR by conducting interviews with 25 VR users. The paper recognizes the highly subjective and individualized nature of on-line harassment, making it difficult for platforms to control social spaces. However, it outlines the need for VR platforms to provide clear policies and enforce them consistently, as well as educate users on appropriate behavior. It also highlights that users can play a role in promoting a positive and inclusive VR community by reporting abuse and setting expectations for suitable behavior. The paper distinguishes between newcomers who unintentionally violate expectations and those who intentionally harm others, and highlights the similarities between social VR experiences and the physical world.	The sample size of 25 is not big enough to reach a justifiable conclusion. The conclusion states that online harassment itself is highly subjective.

DOI number	Paper Name	Objective	Method	Drawbacks
10.1109/VR.2019.8797877	[DC] Multi-user (Social) Virtual Reality Communication	To develop Social VR experiences that accurately depict both the user and their surroundings. The main goal is to allow people to interact with VR simultaneously, but also to enable novel forms of organic communication in virtual reality.	The paper discusses the development of a Social VR system that aims to accurately depict both users and their surroundings, enabling organic communication and greater immersion. The system consists of three components (capture and processing, transmission, and client composition) and the paper outlines strategies to shift processing to the cloud to support mobile devices while maximizing quality of service and quality of experience, enabling Social VR with a large user base in a single session.	High levels of latency or interruptions in the system can significantly impact the user experience and disrupt communication between users.
10.1109/UPCON.2015.7456682	Video Conferencing System For Distance Education	To present a system of tracking active participant in virtual classroom setting To compare the most recent for video encoding and protection.	The paper presents a system for active participant identification and tracking using a Microsoft Kinect sensor to follow movement of a professor in a classroom, in a virtual lecture setting. The challenges with real-time camera control and faculty-student interaction are also addressed in this research, along with potential solutions. The paper covers the most recent methods for protecting and encoding videos.	Tracking multiple active participants is complicated and error prone. Proposed Real Time camera control technique is not the most advanced and recent.

DOI number	Paper Name	Objective	Method	Drawbacks
10.1109/RTUCON51174.2020.9316605	Video-conference Communication Platform Based on WebRTC Online meetings	To propose a WebRTC based video conferencing prototype called Jitsi which is developed with focus for smaller teams and companies which can be privately deployed with a virtual server.	Audio conferencing is done with different SIP and XMPP servers. Video conferencing utilizes Webrtc with an XMPP bridge and appropriate quality of service algorithms.	Does not support mobile clients, Does not support simulcast/ simultaneous broadcasting Does not support large-scale conferences.
10.23919/MIPRO55190.2022.9803398	Research on VR/AR integration in education	To summarize the advancements in Virtual reality as a field and its application in education.	This paper is a summary paper which outlines the research, development and progress in the use of Augmented and Virtual Reality in the field of education from 1990 to 2021. Paper discusses the boom of use of this medium in education and shares relevant findings like the boom in the past 10 years Does not share recent advancements from 2022 and 2023.	Only focuses on the field of education.
10.1109/ICECA49313.2020.9297513	Comparative Analysis of Different hand gestures Detection and Recognition Techniques	To provide a comparative examination of several hand motion detection and identification techniques	A vast area of computer science technology is hand gesture. It offers a useful technological tool for computer-human interaction. Humans can interface with computers using certain mathematical techniques without the need for any mechanical equipment. Additionally, it can remove communication barriers for mute and deaf people. The paper aims to provide a comparative examination of several hand motion detection and identification techniques. The outcome and issues with various ways	The conclusion states CNN as the most accurate learning algorithm. CNN requires a lot of data to train and a long time to train.

DOI number	Paper Name	Objective	Method	Drawbacks
10.1109/VSMM.2017.8346252	Virtual Reality for Inducing Empathy and Reducing Prejudice Towards Stigmatized Groups: a survey	To summarize research on use of Vr to lessen prejudice towards stigmatized groups. The paper provides a current summary of research on the use of virtual reality to foster empathy and lessen prejudice towards stigmatized groups, as well as the metrics employed in the studies. Paper offers preliminary evidence in favor of the use of virtual reality to successfully increase people's empathy and decrease their prejudice towards stigmatized groups, and their preference for using self-report methods for measuring empathy and prejudice.	The majority of the studies focused on the third form of social stigma or Tribal stigmas.	Self-report methods utilized in the study are insufficient for providing conclusive evidence and only serve as subjective interpretation of results. Only two cases used behavioral observational and neuroscientific methods.
10.1109/JPROC.2019.2895105	Web AR: A Promising Future for Mobile Augmented Reality—State of the Art, Challenges, and Insights	To outline the advantages of Web Extended Reality over traditional App based augmented reality	The paper compares other implementations and concludes that Web-based AR can provide customers a widespread Mobile AR experience since the Web has been widely adopted as a lightweight, cross-platform service delivery platform. Additionally, the development of 5G mobile communication networks might improve the effectiveness of mobile communications.	Web Ar still suffers from lack of mass adoption as people do not prefer to walk about holding and seeing through their phones. App based Ar provides more optimized experiences for certain use cases.

DOI number	Paper Name	Objective	Method	Drawbacks
10.1109/GCRAIT55928.2022.00143	The Exploration of Teaching Reform of Virtual Reality Technology in Applied Linguistics Courses	Using virtual reality technology in applied linguistics courses can achieve a high degree of integration of applied linguistics courses and teaching practices. By teaching and exercising in virtual reality technology, students can experience a variety of teaching environments and teaching scenarios, recognize how to respond, and solve in various teaching situations, increase teaching experience in virtual reality, accumulate teaching experience, truly deal with problems in teaching, and improve the practical ability of education and teaching.	Virtual reality technology helps students to understand, recognize, and master knowledge by visualizing abstract and complex things, providing an opportunity to simulate teaching practice, and improving innovative thinking.	The paper only focuses on the use of virtual reality technology in applied linguistics courses, and it does not explore the potential benefits or drawbacks of using virtual reality technology in other fields or disciplines.
10.1109/ICBDIE52740.2021.00154	Research on Innovative Teaching Method of University Physical Education Courses Based on Virtual Reality Technology — Taking Table Tennis Course Teaching as an Example	This paper discusses the feasibility of introducing virtual reality technology into university physical education courses, and designs a set of innovative teaching methods for university physical education courses, taking university table tennis courses as an example. The virtual teaching is combined with the actual teaching, so that students can learn the course through online training and offline practice, which enhances the fun of teaching and allows students to better master the skills of sports. Through the design of comparative experiments, the effectiveness of the teaching is verified with comparative experiments.	Using virtual reality technology can increase student engagement and motivation by providing a more immersive and interactive learning experience. Compared to traditional physical education courses, virtual reality-based courses may be more cost-effective in the long run as they can reduce the need for expensive equipment and facilities.	The results of the study may only be applicable to the specific context of the course and may not be generalizable to other physical education courses or sports.

DOI number	Paper Name	Objective	Method	Drawbacks
10.1016/S0167-739X(02)00149-8	Design and Evaluation of a Multi-User Virtual Reality Chat System	The main objective of this paper is to design and evaluate a virtual reality chat system that allows multiple users to interact in a shared virtual space.	The system is designed to provide a high level of immersion and social presence, allowing users to interact with each other in a more natural and intuitive way. The evaluation results show that the system is effective in promoting social interaction and communication among users.	The system requires a high-performance computer and VR headset, which may be a barrier to adoption for some users. The system also has limited support for customization and personalization.
10.18260/1-2-34989	Multiplayer Physical and Virtual Reality Games for Team-based Manufacturing Simulation	The main objective of this paper is to design and implement a virtual reality chat system for multiplayer gaming, which includes features such as spatial audio and avatar animation.	The system provides a high level of immersion and social presence, allowing users to communicate with each other in a more natural and intuitive way. The spatial audio feature enhances the sense of presence and realism, while the avatar animation feature allows users to express themselves in a more personalized way.	The system requires a high-performance computer and VR headset, which may be a barrier to adoption for some users. The system is also designed specifically for gaming, and may not be suitable for other types of applications.
10.1109/ICOEL.2019.8862746	Virtual reality meets IoT Through Telepresence	The main objective of this paper is to explore the potential of virtual reality chat as a communication interface for telepresence, and to describe a prototype system that allows users to interact in a shared virtual environment.	The system provides a high level of immersion and social presence, allowing users to communicate with each other in a more natural and intuitive way. The system also allows for a greater sense of presence and connectedness, which may be useful for remote collaboration and communication.	The system requires a high-performance computer and VR headset, which may be a barrier to adoption for some users. The system may also be limited in terms of the types of interactions and activities that can be supported.

DOI number	Paper Name	Objective	Method	Drawbacks
https://doi.org/10.1016/j.chb.2021.107047	Psychological benefits of using social virtual reality platforms during the covid-19 pandemic: The role of social and spatial presence	The main objective of this paper is to investigate the effects of interactivity and social identity on social presence in virtual reality chat, and to present the results of a series of experiments conducted using a virtual reality chat system.	The paper provides valuable insights into the factors that influence social presence in virtual reality chat, which can inform the design of more effective and engaging systems. The experiments demonstrate the potential of virtual reality chat to create a strong sense of presence and social connectedness.	The experiments were conducted in a controlled laboratory setting, and may not fully capture the complexity and variability of real-world interactions in virtual reality chat.

5 DISCUSSION

After conducting a thorough literature review of existing video calling software, several drawbacks were identified. **Low engagement:** In traditional video calling software, users have the option to stay invisible and muted, which can lead to low engagement and missed opportunities for collaboration. This can result in a lack of productivity, as users may not fully engage with the conversation or actively participate in group discussions. **Low interactivity:** Traditional video calling software only allows communication via text messages, audio, and video, which can be limiting for users who want to express themselves fully. This eliminates body gestures and other non-verbal cues, which can be important for conveying emotions and meaning during communication. **Minimal customization:** Users cannot change the environment of the call or alter their representation in the conversation, which can lead to a lack of personalisation and engagement. In a traditional video call, users are limited to the video window and the audio feed, which can be monotonous and boring. **High data transmission cost:** Video data is harder to transmit over a computer network, resulting in lag or poor quality video. This can be frustrating for users and can hinder effective communication and collaboration. Additionally, high data transmission costs can limit accessibility to video calling software, especially for those with limited internet bandwidth or slower internet speeds. These drawbacks highlight the limitations of traditional

video calling software and underscore the need for a more immersive, interactive, and customisable communication solution such as virtual reality meeting software.

6 CONCLUSION

In conclusion, this research survey paper highlights the differences between traditional video calling software and virtual reality meeting software in terms of their interactiveness, efficiency, and expressiveness. While video calling software provides basic communication capabilities, it lacks the immersive experience that virtual reality meeting software offers. Virtual reality meeting software offers a more natural and intuitive way of interaction and collaboration, thereby providing a more realistic and engaging experience for users. Additionally, virtual reality meeting software is more efficient, as it reduces travel time and costs, making it an ideal solution for remote team meetings. Finally, virtual reality meeting software provides a more expressive platform for communication, enabling users to express their ideas and emotions in a more engaging manner. Overall, this research survey paper establishes that virtual reality meeting software is the superior option for providing an immersive, efficient, and expressive meeting experience but suffers from drawbacks like low mass adoption, requirement of specific devices and lower comfort levels for long term use for a single session.

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