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Creating a Virtual Event Platform Using MERN Stack

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Abstract: ***This research explores the development of a virtual event platform tailored to academics, industry professionals, and global participants. Built on the MERN stack (MongoDB, Express, React, NodeJS) with integrated augmented reality (AR) and cloud services, the platform enables users to host and attend events such as webinars, conferences, exhibitions, and training programs. Key features include AR for immersive 3D interactions, live Q&A sessions, content customization, and scalable architecture to support diverse user requirements. The platform addresses challenges related to cross-device compatibility, internet bandwidth variability, and user support, ensuring an inclusive and engaging experience.***
Categories: Augmented and Virtual Reality (AR/VR), Security Education and Awareness, Web development
Keywords: virtual event platform, augmented reality (ar), mern stack, web-based application, react js, node.js, express.js, mongodb, ai chatbot, unity ar foundation

I. INTRODUCTION

The integration of Augmented Reality (AR) with the MERN (MongoDB, Express.js, React.js, and Node.js) stack has transformed web development by enabling the creation of highly interactive and immersive applications (2024) [1]. AR enhances user experiences by overlaying digital components onto real-world environments, while the MERN stack provides a reliable framework for efficient data management and dynamic interfaces (2022) [2]. For instance, AR-based furniture ordering platforms combine these technologies, allowing users to visualize products in their physical spaces, thus enhancing engagement and decision-making (2024) [3]. Similarly, AR-integrated travel applications enable immersive trip planning and virtual tours, improving user experiences significantly (2022) [4]; (2023) [5]. Moreover, collaborative tools like video conferencing-enabled chat applications, social platforms, and eLearning systems leverage the adaptability of the MERN stack and the interactivity offered by AR. This combination facilitates more dynamic communication and educational experiences (2023) [6]; (2024).

II. OBJECTIVES

The platform goal is to provide academics, and industry professionals an engaging and interactive space where they can present their findings, network, and collaborate with others throughout the world globally irrespective of physical location. Augmented Reality Integration: To incorporate AR technology which allows users to view 3D objects, simulations, and interactive diagrams which will enhance understanding of complex concepts. Accessible and Scalable Architecture: To develop a scalable platform it is capable of supporting a large number of participants that ensures the accessibility across various devices, network and operating systems. Interactive Sessions: To provide interactive sessions, live Q&A, and discussion forms, fostering meaningful contents, connections and collaborations among different participants. It provides more responsive environment due to which there is user friendly interface for participants which will enhance their engagement towards this platform in a very interesting and innovative way. rative tools like video conferencing-enabled chat applications, social platforms, and e-learning systems leverage the adaptability of the MERN stack and the interactivity offered by AR. This combination facilitates more dynamic communication and educational experiences (2023) [6]; (2024) [7]. The synergy between AR and the MERN stack sets a new benchmark for web applications, meeting modern demands for innovation, engagement, and functionality.

III. LITERATURE SURVEY

The work by Shah O. (2022) [2], it focuses on the development of tourism websites and web apps using the technology MERN stack with the integration of Augmented Reality features. The authors have focused on creating interactive, user-friendly platforms which enhances the user experience while travelling, such as explore destinations virtually, share their journeys, and access real-time location data. The review identified the lack of customizable experiences and limited integration of AR.

In these Dr. D. Thamaraiselvi. (2024)[6], the papers propose full-stack web applications which provide users an ability to explore tourist destinations through AR experiences, real-time maps data, personalized recommendations, and chat-bot features. Use of AR imposed the objects in real world which provided users an immersive experience.

In the study focus on e-learning platform and real-time communication application, both are using MERN stack to create these dynamic, interactive, user-centric experiences. In this A. Nisam (2024)[4] is discussed on the development of an e-learning platform called “Learn-It” which aims to transform online education by giving a personalized experience and adaptive learning environment. The platform contains features like multimedia content, real-world simulations, and collaborative tools, offering the users a comprehensive ecosystem.

The paper identifies the gap in the existing system, such as a lack of personalization, analytics, immersive experiences, chatbots, gamifications etc. which will engage and interact the users. In this Ciri, M. (2023) [3], the design of a real-time communication tool named “PRIVY” is reviewed, which is adding the functionalities like video conferencing and screen-sharing to traditional chat apps. It is also using MERN stack for scalability and responsiveness, and makes it suitable for remote teams, students and professionals. The paper integrated the real-time features like audio/video calls, screen sharing, and group chat, that demonstrates how communication and collaboration can be enhanced in a digital environment.

In [5] it focused on different applications of the MERN stack, and showcased its versatility in modern web development. It discussed the development of social platform using MERN stack, responsive web application where users can share content related to social welfare, healthcare, and community services. MERN stack is used for its use of JavaScript across all components such as frontend, backend, and database facilitating performance optimization, scalability, and ease of use. It highlighted the adaptability of MERN stack in creating high-performance web applications.

In this Chavan O. A. (2024) [1], it presents an AR-based furniture ordering application using the MERN stack and in integration with Three.js and WebXR, giving an immersive Augmented Reality experiences for users. Its focusing on the use of AR to help users to visualize furniture in real-world spaces, overcoming limitation of traditional e-commerce platform. The review here highlights the growing demand for interactive, personalized experiences and positions AR as a key technology in this evolution.

The system design includes features virtual product placement, real-time customization, and secure payment, and all these are managed by the MERN stack. With integration of Three.js for 3D rendering and WebXR for AR interactions which enhances user engagement. It highlights the adaptability of the MERN stack with new technology like augmented reality.

IV. PROPOSED WORK

The paper focuses on creating a virtual event platform using the MERN stack, featuring innovative functionalities such as AR integration, event management, smooth content sharing, user profiling, attendee management, and event customization. The platform utilizes technologies like the MERN stack (M for MongoDB, E for Express, R for ReactJS, N for NodeJS), AR Core which will offer immersive experiences, allowing users to interact in virtual venues for selected events, cloud services like Google Cloud, making it scalable, Chatbot Integration to provide automated support to users using AI (Artificial intelligence), and JWT for security. Platform is highly secure, user-friendly, scalable to meet diverse user requirements.

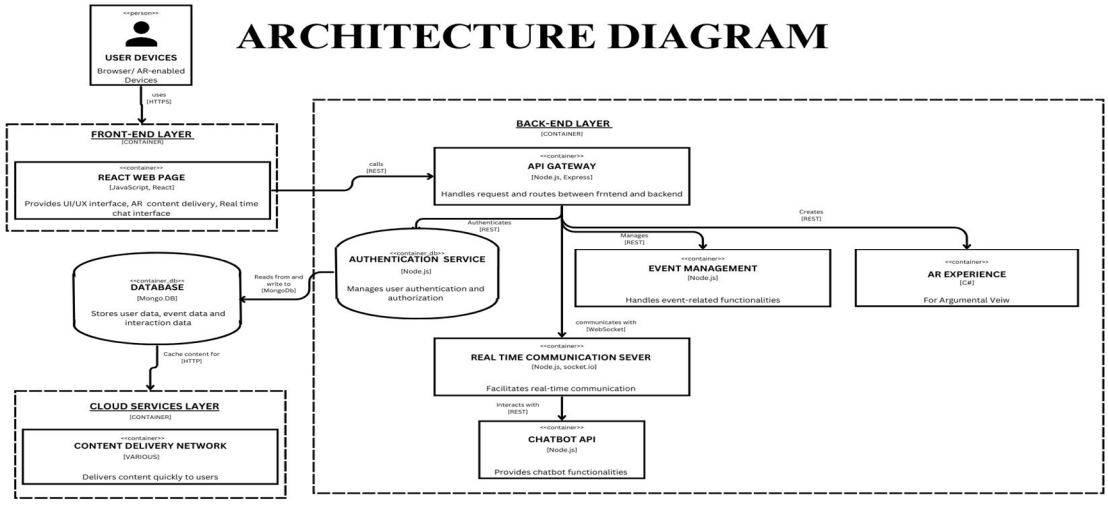


FIGURE 1: The architecture Diagram of the Virtual Event Platform using MERN Stack

The architecture Diagram of the Virtual Event Platform using MERN Stack illustrates in a layer-by-layer approach it consists of three main layers:

1) Front-End Layer - A ReactJs-based interface provides User-interaction, Live-chatting, and AR content delivery.
2) Back-End Layer- Comprises of API Gateway for routing, Authentication for security, and event management for event handling.
3) Database and Cloud- MonogoDB stores User and event data, while CDN ensures fast content delivery across devices.

V. METHODOLOGY

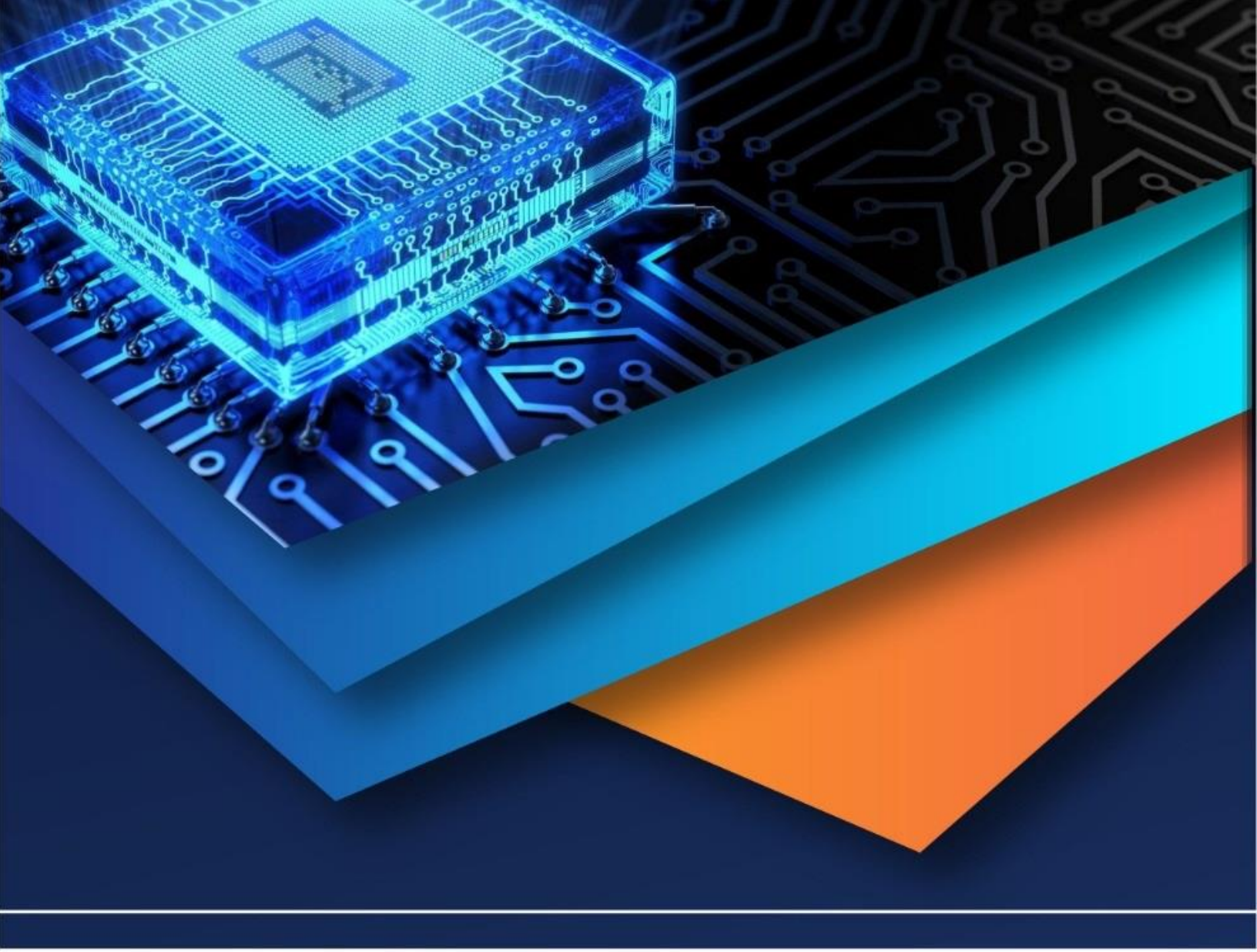
1) Planning and Analysis – In this phase it is focusing on defining project objectives and gathering detailed requirements from stakeholders. It is also involving the access of technical feasibility and planning resource allocation to ensure a smooth development process.
2) Design and Architecture – The architecture of platform, database schema, and API endpoints are designed with scalability and modularity in mind. With this it is ensured that the system can support future enhancements and manage high user demand effectively.
3) Development – Backend development includes implementation of core features like user authentication and event management using Node.js and MongoDB. The frontend includes React.js, ensuring a responsive UI that supports live streaming and content sharing.
4) Integration of Innovative Features – Innovative technologies such as AR integration, and gamification are incorporated to enhance user engagement and provide a cutting-edge experience within the platform.
5) Testing, Deployment and Maintenance – Testing is conducted to ensure functionality and performance. The platform is deployed on a cloud environment with CI/CD pipelines form smooth updates. Maintaining the platform continuously and taking user feedback are being prioritized to keep the platform up-to-date and user-friendly.

VI. CONCLUSION

Virtual event platform has been implemented using MERN Stack technology in the past few years, in this research paper we discussed about MERN integration with AR. This platform gives more scalability and innovative solution which is needed for global knowledge exchange. This platform not only increase user engagement but it also elaborates the deeper understanding of difficult concepts. This solution can transform the overall academic and professional landscape. It provides more scalable and responsive environment which will enhance user engagement. It also increases a lot of collaboration opportunities on overall global scale.

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