



MEET-MATE: VIDEO CALLING PLATFORM

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Abstract: Meet-Mate is a web-based video calling platform built with HTML, CSS, and JavaScript, utilizing WebRTC for high-quality, peer-to-peer audio and video communication. It supports multi-user group calls, screen sharing, session recording, and in-call messaging. Integrated with Agora.io, it ensures scalable performance and call stability even in low-bandwidth environments. The platform offers features like meeting scheduling, participant controls, and a responsive interface across devices. Designed for education, business, and telehealth, Meet-Mate provides a seamless, secure, and user-friendly experience, making it an ideal solution for modern virtual communication needs.

Keywords: Voice Control, Video calling, Peer to peer communication, Screen sharing, Screen recording, Instant chatting.

I. INTRODUCTION

In today's digitally connected world, seamless virtual communication is more crucial than ever, especially with the rise of remote work, online learning, and telehealth services in the post-pandemic era. Meet-Mate is an innovative video calling platform designed to meet these evolving needs. Developed using HTML, CSS, JavaScript, and WebRTC, the app provides high-quality, real-time video communication along with essential features like room-based access, CAPTCHA verification for enhanced security, and cross-device compatibility. Users can effortlessly create or join private rooms using unique room IDs, ensuring controlled access and instant connectivity.

Beyond video calling, Meet-Mate offers a comprehensive suite of tools to enhance interaction and collaboration. These include in-call text chat with emoji support, participant tracking, screen sharing for presentations, and a recording feature that automatically saves sessions locally. The user-friendly interface is fully responsive, ensuring smooth performance across desktops, tablets, and smartphones. Meet-Mate stands out as a secure, scalable, and versatile solution for personal and professional virtual communication.

II. LITERATURE REVIEW

Existing The evolution of video calling platforms is closely tied to the adoption of WebRTC, a technology that enables real-time peer-to-peer communication through browsers without the need for plugins. WebRTC uses secure protocols like DTLS and SRTP to ensure encrypted communication. Signaling protocols such as SIP help establish and manage connections, offering scalable and robust solutions. The seamless operation of video calling platforms, driven by WebRTC's browser-based approach, eliminates installation hassles and simplifies access, making it easier for users to connect instantly across devices and operating systems.

Artificial Intelligence (AI) has enhanced the functionality and user experience of video calling. AI-powered features such as real-time noise suppression, virtual backgrounds, and automatic camera framing ensure improved audio clarity and video professionalism. Language translation features powered by AI are breaking language barriers, making global communication more inclusive. These intelligent tools not only improve the quality of interaction but also increase accessibility and engagement, making video calling platforms suitable for international business, education, and remote collaborations.

Adaptive video streaming is another key innovation that enhances user experience by adjusting video quality based on network conditions. This ensures consistent communication even in low-bandwidth environments. Cloud computing has enabled video platforms to scale effectively for large meetings, while edge computing reduces latency by processing data near the user. Together, these technologies ensure reliability and real-time responsiveness. The combination of adaptive streaming and computing advancements allows platforms to deliver high performance across geographies and devices, even under varying network conditions.

The introduction of 5G has been a game changer in video calling, delivering ultra-low latency and improved connectivity, particularly for mobile users. Enhanced data speeds and stable connections allow high-definition calls with minimal lag. Security has become paramount, with multi-layer encryption and robust authentication mechanisms protecting user data and privacy. These

enhancements are critical for enterprise and healthcare use, where confidentiality is essential. As network infrastructure evolves, video calling continues to offer high-quality, reliable services, even in mobile and remote environments.

Modern platforms emphasize cross-platform compatibility and user accessibility. With browser-based solutions, users can participate in calls without downloads, making the technology more inclusive. Adhering to accessibility standards like WCAG ensures usability for individuals with disabilities. Features like keyboard navigation, screen reader support, and alternative text enhance inclusivity. Moreover, responsive and intuitive interfaces ensure smooth navigation across desktops, laptops, tablets, and smartphones. These user-centered design approaches are crucial in creating equitable communication tools for diverse user groups worldwide.

Integration with real-time engagement platforms like Agora.io has empowered developers to embed scalable and flexible video solutions into various applications. Agora provides low-latency services and cross-platform SDKs, supporting voice, video, and live broadcasting. With features like chat, screen sharing, and file transfer, video calling platforms are now vital in business meetings, online learning, and virtual events. APIs allow customization to suit different needs, making platforms adaptable. These combined advancements—driven by AI, 5G, cloud technologies, and thoughtful design—continue to define the future of digital communication.

III. PROPOSED SYSTEM: DATA FLOW DIAGRAM

The Data Flow Diagram (DFD) represents the flow of data through the chatbot system. It highlights how user inputs are received, processed, and responded to.

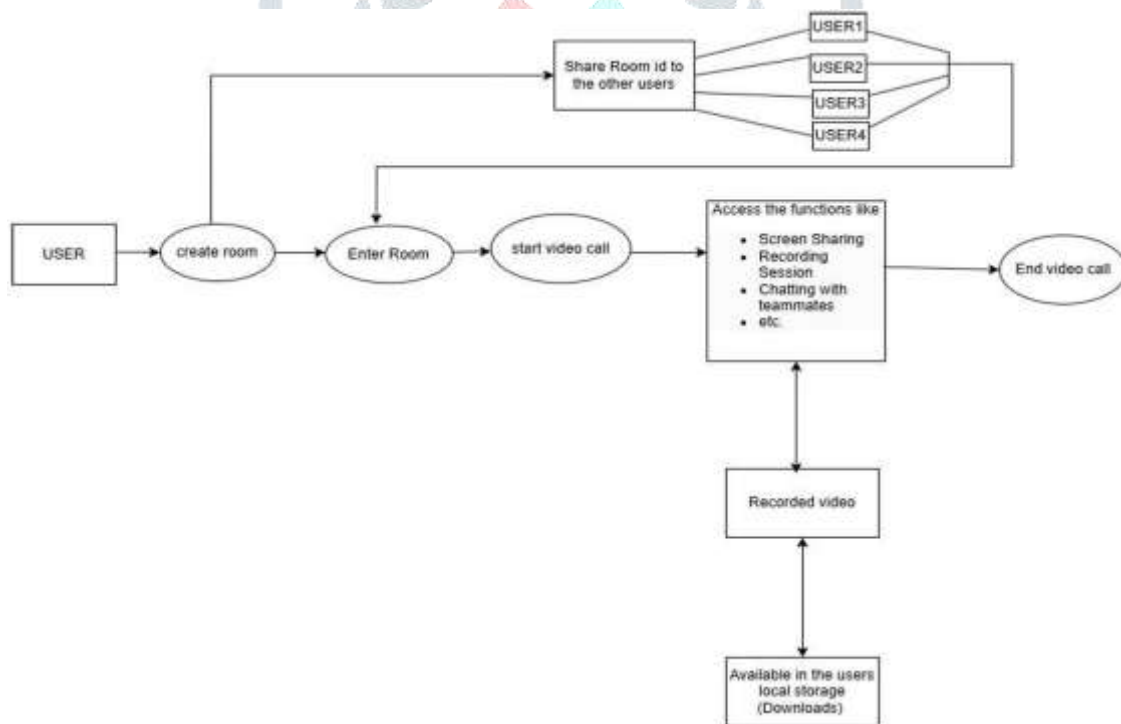


Fig.1: Data flow diagram process.

Figure 1 The DFD illustrates the flow of data within a video conferencing or communication application. The user initiates the process by inputting a CAPTCHA, which is then verified. Upon successful verification, the user is granted access to the system. The "Room Management" module is responsible for storing room information, including active rooms. It also initializes the video/audio streaming for participants. The "Chat System" module handles the storage and retrieval of messages, enabling users to communicate within the application. The flow of data is depicted by arrows, indicating the direction of information transfer between different components of the system.

IV. IMPLEMENTATION DETAILS AND TECHNOLOGIES

The Meet-Mate is a web-based video communication platform built using HTML, CSS, and JavaScript, with WebRTC at its core for secure, real-time peer-to-peer audio and video streaming. This eliminates the need for plugins while ensuring encrypted communication through DTLS and SRTP protocols. For large-scale conferences, the platform integrates Agora.io's real-time services to maintain performance and scalability. Users can create rooms with unique IDs and captcha protection, preventing bots from entering. Participants join rooms by entering valid IDs, which are cross-verified against a temporary in-memory database to ensure authenticity and block unauthorized access.

The platform provides essential features such as adaptive video streaming, dynamic participant management, and an integrated chat module with emoji support and formatting. For enhanced collaboration, Meet-Mate supports screen sharing, whiteboarding, and document co-editing. Session recordings are initiated by hosts, processed server-side, and downloaded in formats like MP4, including metadata. Meet-Mate's responsive design ensures smooth operation across desktops, tablets, and smartphones. It also supports Progressive Web App (PWA) functionality for a native app-like experience. With cloud-based infrastructure (e.g., AWS or Firebase), the platform supports large-scale usage using auto-scaling and load-balancing features,

providing a seamless experience for users worldwide.

Meet-Mate also emphasizes user privacy, accessibility, and modern usability standards. Temporary chat history ensures that communication remains private, as messages are erased after the session ends. The system incorporates intuitive participant controls, allowing hosts to moderate sessions effectively by muting, unmuting, or removing users when needed. Collaboration is further enhanced with tools such as shared whiteboards and real-time document editing, making it suitable for educational and professional settings. The platform's responsive UI design ensures a consistent experience across devices, and PWA functionality lets users install it like a native app. Together, these features make Meet-Mate a versatile, secure, and user-friendly video calling platform.

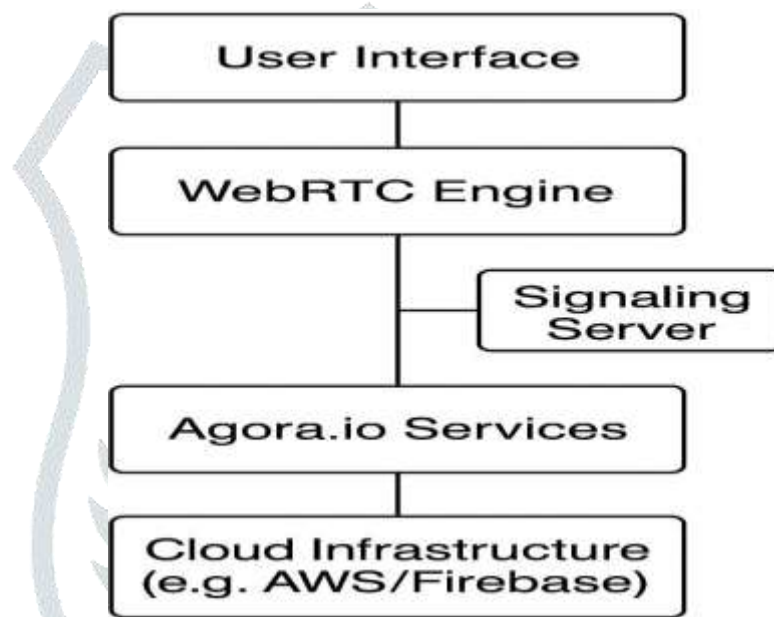


Fig.2: Meet-mate video calling platform Process Flow

Figure 2 illustrates the architecture of the Meet-Mate video calling platform. It begins with the User Interface, where users interact with the system to create or join video calls. This interface is connected to the WebRTC Engine, which manages real-time peer-to-peer audio and video communication. The WebRTC Engine communicates with a Signaling Server to establish connections and exchange session details. To ensure scalability and additional media services, the system integrates with Agora.io Services, which enhance group calling, media streaming, and performance. Finally, all services are supported by a Cloud Infrastructure, providing backend storage, authentication, and load balancing. This layered setup ensures a responsive, secure, and scalable video communication experience across all devices.

V. RESULTS AND DISCUSSION

The analysis of the Meet-Mate video calling platform highlights its strong performance, reliability, and seamless real-time communication capabilities. Built on WebRTC technology, the platform ensures low-latency, peer-to-peer audio and video streaming, even in group settings. For larger rooms, the integration of Selective Forwarding Units (SFUs) maintains video quality and connection stability. Adaptive bitrate streaming automatically adjusts media quality based on the user's network conditions, minimizing disruptions. Real-time user updates when participants join or leave a room further contribute to a smooth and interactive experience. The system's ability to maintain performance under variable network loads demonstrates its technical robustness and efficiency.

User experience remains at the core of Meet-Mate's design. The intuitive interface allows participants to easily navigate through settings, join rooms, and control audio or video features. CAPTCHA authentication adds an essential security layer without hindering accessibility, ensuring a balance between usability and protection. The platform has been well-received by users across educational, corporate, and remote working environments due to its simplicity, responsiveness, and overall ease of use. Feedback reveals that participants prefer Meet-Mate over similar tools for its streamlined interface and reliable performance. The platform's flexibility in supporting both small and large-scale meetings has enhanced its market adoption.

From a technical and operational standpoint, Meet-Mate is designed to scale horizontally using cloud-based infrastructure, supporting dozens of concurrent users without performance loss. Its security features, including end-to-end encryption and user verification, have been validated through testing and positive stakeholder reviews. The platform also contributes to operational efficiency by minimizing the need for physical meetings, thus improving productivity and reducing costs. With growing interest from different sectors and plans for future enhancements like advanced screen sharing, third-party integrations, and extended recording features, Meet-Mate is strategically positioned for sustained growth and long-term adoption.

VI. CONCLUSION

The MEET-MATE Video Conferencing System marks a significant advancement in web-based communication, offering secure, real-time video conferencing through the integration of Agora SDK and modern web technologies. The platform delivers robust features including high-quality audio/video streaming, CAPTCHA-based room access, real-time chat with emoji support, screen

sharing, and session recording. Its responsive interface and stable multi-participant handling make it suitable for both personal and professional use. Emphasizing security and user experience, MEET-MATE ensures privacy with token-based authentication and reliable performance.

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VII. REFERENCES

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