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AI-POWERED CONVERSATION ASSISTANT

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Abstract - The AI Agentic Meeting Platform is an intelligent, real-time collaboration system designed to enhance virtual meetings using AI-powered agents. Developed using modern web technologies, the platform enables users to conduct meetings with automated assistance such as real-time transcription, summarization, and smart search. It integrates AI agents capable of understanding conversations, generating summaries, and assisting users during meetings. The system utilizes real-time communication frameworks for video and chat, along with a scalable backend powered by Neon Database. Authentication and session management are handled securely using Better Auth. The platform improves productivity by reducing manual note-taking, enhancing accessibility, and enabling efficient meeting analysis. Future enhancements include advanced agent decision-making, multilingual support, and deeper analytics.

Keywords - AI Agents, Meeting Automation, Real-time Communication, Speech-to-Text, Summarization, Neon Database, Better Auth, WebRTC, Conversational AI.

I. INTRODUCTION

With the rapid growth of remote work and online collaboration, virtual meetings have become an essential part of communication in organizations and education. However, traditional meeting platforms lack intelligent assistance, requiring users to manually take notes, track discussions, and extract key insights.

To address these limitations, this project introduces an AI Agentic Meeting Platform that leverages artificial intelligence to automate and enhance meeting experiences. The platform integrates AI agents that can listen to conversations, generate real-time transcripts, summarize discussions, and provide contextual assistance. In addition to transcription and summarization, the AI agents provide contextual assistance during meetings by answering queries, offering insights, and helping users stay aligned with the discussion. This intelligent automation not only reduces the need for manual note-taking but also improves productivity, accessibility, and decision-making efficiency, making meetings more structured, interactive, and outcome-driven.

The system uses real-time video and chat technologies to enable seamless communication, while backend services ensure secure data handling and storage. By combining AI, real-time systems, and modern web technologies, the platform transforms conventional meetings into intelligent, efficient, and interactive experiences.

The platform's user interface is designed using Tailwind CSS and shadcn/ui, ensuring a responsive, accessible, and seamless experience across devices. This paper presents the design, development, and integration of the AI Agentic Meeting Platform, evaluates its effectiveness in enhancing meeting productivity and collaboration, and explores future enhancements for advancing AI-driven meeting systems.

II. LITERATURE SURVEY

Recent advancements in Artificial Intelligence, real-time communication, and conversational systems have significantly transformed virtual collaboration platforms. Research in this domain highlights how AI-powered systems can enhance meeting productivity, automate repetitive tasks, and improve user engagement through intelligent assistance.

1. Evolution of AI in Meeting Systems

Traditional meeting platforms primarily focused on video conferencing and basic communication features. With the introduction of AI, modern systems now incorporate intelligent assistants capable of transcription, summarization, and contextual understanding. Recent studies show that AI-driven meeting tools reduce manual effort and improve information retention by automatically capturing key discussion points.

2. Speech Technologies: STT and TTS

Speech-to-Text (STT) and Text-to-Speech (TTS) technologies play a crucial role in AI meeting platforms. Advanced neural models have improved transcription accuracy, even in noisy environments and multi-speaker scenarios. Real-time transcription enables automatic documentation of meetings, while TTS allows AI agents to interact with users naturally, making the system more accessible and user-friendly.

3. Conversational AI and Large Language Models

Large Language Models (LLMs) have revolutionized conversational AI by enabling systems to understand context, generate human-like responses, and perform complex reasoning tasks. In meeting platforms, LLMs are used for summarization, action item extraction, and answering user queries based on conversation history.

4. Real-Time Communication Systems

Technologies such as WebRTC and real-time streaming APIs have enabled low-latency video and audio communication. These systems support seamless interaction between participants while allowing integration with AI services for live processing of conversations. Scalability and reliability are key factors in designing such systems, especially for handling multiple concurrent users.

5. Meeting Summarization and Information Retrieval

Automatic summarization techniques extract key insights, decisions, and action points from meeting transcripts. Research in Natural Language Processing (NLP) focuses on improving extractive and abstractive summarization methods to generate concise and meaningful summaries. Additionally, semantic search enables users to quickly find specific information within large transcripts.

6. Data Management and Backend Systems

Modern AI platforms require scalable and efficient backend systems for storing transcripts, user data, and session history. Serverless databases like Neon provide high performance, automatic scaling, and reliability. Real-time data synchronization ensures that meeting updates and transcripts are instantly available across devices.

7. Authentication, Security, and Privacy

Secure authentication and data protection are critical in meeting platforms. Systems implement token-based authentication, role-based access control, and encryption to safeguard user data. Compliance with data privacy standards ensures that sensitive meeting information is handled securely and responsibly.

8. Challenges and Limitations

Key Despite advancements, several challenges remain:

- Handling multiple speakers and overlapping conversations
- Ensuring accuracy of AI-generated summaries
- Maintaining low latency in real-time processing
- Protecting sensitive user data
- Improving contextual understanding of AI agents
- Handling network issues and maintaining stable real-time communication
- Providing real-time updates without delays

9. Evaluation Metrics and Performance

Evaluation of AI meeting systems involves both technical and user-centric metrics. Technical metrics include transcription accuracy, response latency, and summarization quality. User-focused metrics include satisfaction, usability, and productivity improvement. Studies indicate that AI-assisted meetings significantly enhance efficiency and reduce cognitive load.

10. Research Gap and Contribution

Existing systems provide limited AI capabilities and lack fully integrated intelligent agents for real-time assistance. This project addresses these gaps by combining AI agents, real-time communication, transcription, summarization, and scalable backend systems into a unified platform. It aims to deliver a more intelligent, efficient, and user-centric meeting experience.

III. EXISTING SYSTEM

Current virtual meeting and collaboration platforms have significantly improved remote communication by providing video conferencing, screen sharing, and chat functionalities. However, despite their widespread adoption, most existing systems lack deep integration of artificial intelligence to automate and enhance meeting workflows.

➢ Zoom

Zoom is one of the most widely used video conferencing platforms, offering features such as high-quality video calls, screen sharing, recording, and breakout rooms. While it provides basic transcription and recording capabilities, it lacks advanced AI-driven features such as real-time contextual assistance, intelligent summarization, and automated action item extraction. Users are still required to manually review recordings and take notes, which can be time-consuming.

➢ Google Meet

Google Meet offers seamless integration with productivity tools and provides live captions for accessibility. However, it does not include advanced AI-driven contextual understanding

or intelligent automation for summarizing and managing meetings.

➢ **Microsoft Teams**

Microsoft Teams combines communication and collaboration features, including chat and file sharing. While it includes basic transcription and meeting recap features, it lacks fully automated AI-driven insights and real-time decision-making support.

➢ **ChatGPT**

ChatGPT is a powerful conversational AI tool capable of generating text, answering queries, and summarizing content. It can assist users in understanding discussions and generating meeting summaries when provided with transcripts.

However, it is not directly integrated into real-time meeting environments and does not automatically capture or process live conversations. Users must manually input data, making it less efficient for real-time meeting assistance.

Limitations of Existing Systems

- Lack of real-time AI agents for active meeting participation
- Dependence on manual note-taking and post-meeting analysis
- Limited contextual understanding and automation
- No seamless integration of AI within live meeting workflows
- Absence of smart transcript search and real-time insights
- Reduced productivity due to fragmented tools

Evaluation of Existing Systems

The evaluation shows that while current platforms are effective for communication and basic collaboration, they lack intelligent automation and real-time AI-driven assistance. Tools like ChatGPT provide strong AI capabilities but are not seamlessly integrated into live meeting systems. This gap highlights the need for an AI Agentic Meeting Platform that combines real-time communication with intelligent agents to improve productivity, efficiency, and user experience.

IV. PROPOSED SYSTEM

The proposed system introduces an AI Agentic Meeting Platform designed to transform traditional virtual meetings into intelligent, automated, and highly interactive experiences. The system integrates advanced AI agents, real-time communication technologies, and scalable backend infrastructure to enhance productivity and reduce manual effort during meetings.

The platform enables users to conduct meetings with built-in AI assistance that can listen, understand, and process conversations in real time. Unlike existing systems, this solution provides automated transcription, intelligent summarization, and contextual insights during and after meetings, allowing users to focus on discussion rather than note-taking.

Key Features of the Proposed System

- AI-Powered Meeting Agents

The system incorporates intelligent AI agents capable of understanding natural conversations, answering queries, and assisting users during meetings. These agents act as virtual assistants that enhance collaboration and decision-making.

- **Real-Time Speech-to-Text and Transcription**

The platform converts live speech into accurate text using advanced speech recognition technologies. This ensures that every discussion is captured and stored for future reference.

- **Automatic Meeting Summarization**

AI models generate concise summaries of meetings, including key points, decisions, and action items, reducing the need for manual documentation.

- **Smart Search and Playback**

Users can search through meeting transcripts using keywords and instantly access specific parts of recorded conversations, improving information retrieval efficiency.

- **Real-Time Video and Chat Integration**

The system supports seamless communication through integrated video conferencing and chat functionalities, ensuring smooth interaction between participants.

- **Secure Authentication and Subscription Management**

User authentication and access control are managed securely, ensuring data privacy and controlled feature access based on subscription plans.

- **Scalable Backend with Neon Database**

The backend is powered by a serverless PostgreSQL database that supports real-time data storage, session management, and efficient handling of concurrent users.

- **Responsive and User-Friendly Interface**

The platform is designed with a modern, mobile-responsive interface to ensure accessibility across different devices and improve user experience.

- **Background Processing and Automation**

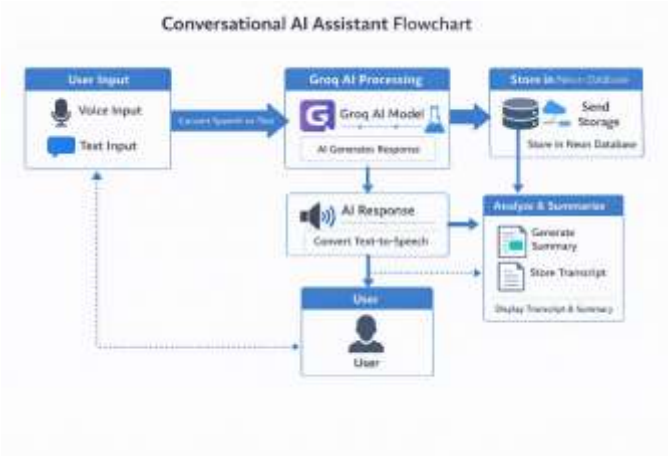
The system uses background job processing to handle tasks such as summary generation, data synchronization, and notifications without affecting real-time performance.

Working of the Proposed System

When a meeting starts, the system captures audio and video streams in real time. The audio is processed using speech-to-text technology to generate live transcripts. AI agents analyze the conversation continuously, identifying key topics, extracting important information, and generating summaries. These insights are stored in the database and made accessible through search and playback features. Users can interact with AI agents during the meeting to get clarifications or insights, making the meeting more efficient and interactive.

V. RESULTS AND DISCUSSION

The developed AI Agentic Meeting Platform demonstrates a significant improvement in the efficiency and effectiveness of virtual meetings by integrating intelligent automation and real-time processing. The system successfully captures live conversations, converts them into accurate transcripts, and generates meaningful summaries, reducing the need for manual note-taking and post-meeting analysis.



Flow Diagram

From a performance perspective, the backend powered by management, and concurrent user interactions. The authentication system ensured secure access and protected user data throughout the application.

Overall, the results indicate that the platform significantly improves productivity, reduces cognitive load, and enhances user experience compared to traditional meeting systems. However, certain challenges remain, such as improving transcription accuracy in noisy environments, enhancing AI contextual understanding, and reducing latency in real-time processing. Future improvements can focus on these areas to further optimize system performance and reliability.

VI. CONCLUSION

The AI Agentic Meeting Platform successfully demonstrates how artificial intelligence can transform traditional virtual meetings into intelligent, automated, and highly efficient collaboration experiences. By integrating AI agents with real-time communication technologies, the system enables automatic transcription, intelligent summarization, and contextual assistance, significantly reducing manual effort and improving overall productivity.

The platform enhances user experience by allowing participants to focus on discussions while AI handles note-taking, information extraction, and insights generation. Features such as smart transcript search, playback, and real-time interaction contribute to better decision-making and efficient meeting management.

In conclusion, the AI Agentic Meeting Platform effectively combines AI agents with real-time communication to deliver a smarter and more efficient meeting experience.

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