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AI Meeting Assistant for Summaries and Tasks

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Abstract: *Due to the rapid growth of the use of virtual meetings in educational and corporate organizations, the need for intelligent meeting management tools has been significantly increased. However, despite the existence of popular meeting platforms like Zoom, Google Meet, and Google Classroom, there are no capabilities of automated maintenance of minutes, tracking of actions, and continuity of discussion across multiple meetings. Therefore, users waste a lot of time on preparation of their notes, Minutes of Meeting (MoM), and gathering information from previous meetings. This paper proposes an intelligent web assistant called AI-Powered Meeting Companion which automatically attends online meetings via the meeting link provided by the user with their consent. The tool records audio of the meeting in real time, transcribes it to text using the Speech-to-Text service, and generates real-time meeting summaries, Minutes of Meeting (MoM), action items, and decisions using Large Language Models (LLMs). One of the innovative features of the proposed solution is Continuous Meeting Memory which helps to connect discussions in multiple meetings or classes on the same topic. The information about the meetings is saved in the centralized database and visualized in an interactive dashboard allowing users to access meeting history, track their assigned actions and get automatic emails about summaries and action points.*

Keywords: Artificial Intelligence, Meeting Summarization, Speech-to-Text, Large Language Models (LLMs), Continuous Meeting Memory

I. INTRODUCTION

The widespread use of virtual meeting platforms has changed the way educational institutions, companies, and organisations communicate and work together. Tools like Zoom, Google Meet, and Google Classroom have made it easier to have remote meetings and provide online learning by allowing participants to interact in real time no matter where they are located. Since the number of online meetings is still increasing, there has become a major difficulty in managing and recording the discussions that take place during meetings.

In the majority of virtual meetings, people have to take the time to write down the key points, prepare Minutes of Meeting (MoM), assign tasks and keep track of any follow-up actions. This method is time-consuming, susceptible to human error and usually leads to documentation that is either incomplete or inaccurate. Moreover, current meeting platforms mainly concentrate on communication and provide only limited assistance with intelligent meeting analysis; although they do produce summaries for individual meetings, they are unable to maintain contextual continuity when dealing with a series of meetings on the same subject. As a result, users often have to go back and look at earlier recordings or notes in order to understand how the current discussions are progressing, which in turn lowers productivity and impairs knowledge retention.

The recent progress made in the fields of Artificial Intelligence (AI), Automatic Speech Recognition (ASR), Natural Language Processing (NLP), and Large Language Models (LLMs) has opened up new possibilities for creating intelligent meeting assistants that can automate both the documentation and the analysis of meetings. Since these AI-powered systems are able to transcribe spoken conversations accurately, summarize the discussions, identify action items, and extract the key decisions from the content of meetings, it follows that they are effective in these areas. The

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problem is that the majority of current solutions regard each meeting as a separate event and do not have the ability to save or make use of information from earlier meetings.

II. RESEARCH GAP ANALYSIS

Virtual meeting services such as Zoom, Google Meet, and Microsoft Teams mainly aim at facilitating communication and collaboration and include only a limited amount of AI functionality for intelligent meeting management. Even though certain third-party applications offer speech transcription and meeting summarization, they regard each meeting as a separate event and therefore do not preserve contextual continuity from one meeting to another, which makes it hard for users to keep track of the progress of ongoing discussions, projects, or academic lectures. Furthermore, these systems give only limited assistance with automatically extracting action items, tracking tasks, and managing meetings in a central manner, usually forcing users to take manual notes and to use a number of separate external tools.

The AI-Powered Meeting Companion overcomes these limitations by combining Speech-to-Text technology, Large Language Models (LLMs), semantic context analysis, and Continuous Meeting Memory within a single AI-based framework. Whereas current solutions are lacking in this area, the proposed system is able to intelligently link together various meetings on the same topic, so that users can access contextual summaries, Minutes of Meeting (MoM), action items, and key decisions from multiple sessions. Productivity is further improved by means of a central dashboard, automatic email alerts, and intelligent task management, thus offering a full-scale solution for effective meeting documentation and knowledge retention.

III. LITERATURE REVIEW

Vanukuru et al. (2025) [4],suggested a Generative AI-based framework for facilitating temporal work in multiple meetings utilizing meeting analysis, Generative AI Content Sandbox, and interactive prototypes. The research showed the potential of AI-driven retrospection and prospection in meetings; however, further investigation in long-term and multimodal meeting assistance is required. This paper motivated cross-meeting summaries and AI insights in our project.

Chen et al. (2024) [1] created a multi-task dialogue summarization algorithm based on Minimum Risk Training, contrastive learning for gender-pronoun discrimination, and exposure-bias reduction. The model showed better results than baselines in three dialogue datasets, even though the summary generation time is still an issue. This study supports the summarization part of our AI-Powered Meeting Companion.

Jin et al. (2025) [9] presented CFAS – the meeting summarization framework focusing on the consensus and based on topic segmentation, consensus detection, and abstractive summarization. This framework was proven to be effective in terms of ROUGE and BERTScore and helped to capture meeting decisions more accurately. This helps us in extracting decisions, agreements, and action items from meetings.

Liu et al. (2025) [7] suggested agenda-aware real-time meeting summarization framework that integrates LLMs with agenda tracking and incremental summarization. It has improved ROUGE-L, BERTScore, and METEOR scores, however, there are still issues with handling long input, topic changes, missing information, and repetition.**TABLE 1. Summary of related work in AI-Based Code Security and Analysis**

Table 1. Summary of Related Work in AI-Based Meeting Summarization and Intelligent Meeting Analysis

No.	Paper Title	Publisher & Year	Methodology	Limitations
01	Dynamic agenda-aware real-time meeting summarization with LLMs	*J. King Saud University – CIS, Springer (2025)*	Agenda-aware meeting summarization using AUG-PDG graph representation integrated with CodeBERT and Large Language Models (LLMs).	Depends on correct agenda input Hallucinates content for missed agenda items

02	A Dialogues Summarization Algorithm Based on Multi-task Learning	*Neural Processing Letters*, Springer (2024)	Multi-task learning framework with context-aware Large Language Models for dialogue summarization	Slow autoregressive generation Only binary gender pronoun handling
03	CFAS: Consensus-focused abstractive meeting summarization	*J. King Saud University – CIS*, Springer (2025)	Agentic AI Misses 1 details: orchestration with consensus-based abstractive summarization using Large Language Models.	Misses finer details (names, facts) Dependent on heuristic labeling
04	Designing Interfaces that Supports Temporal Work Across Meetings with Generative AI	Association for Computing Machinary(2025)	Human-Centered Design (HCD) methodology using Generative AI–assisted interface prototyping and iterative user evaluation.	Focuses on interface development, not ai models creation Protype based research

IV. OBJECTIVES AND SCOPE

A. Objectives

- To learn the concepts and technologies involved in developing an AI-based meeting management platform.
- To design an intelligent system capable of generating accurate meeting summaries and Minutes of Meeting (MoM).
- To develop an AI-powered solution that minimizes dependence on predefined meeting agendas while automating task extraction and follow-up.
- To evaluate the system's performance in terms of summary accuracy, efficiency, and overall meeting productivity.

B. Scope

The proposed system is designed for educational institutions, corporate organizations, and professional teams conducting virtual meetings through platforms such as Zoom, Google Meet, and Google Classroom. It integrates with existing meeting platforms using meeting links and user consent, enabling real-time transcription, AI-powered summarization, task extraction, and meeting documentation without modifying the underlying meeting platform.

V. PROPOSED METHODOLOGY

The proposed model will be trained and tested using open source meeting speech and summary datasets as well as custom datasets for meeting recordings. The first one used is the AMI Meeting Corpus which is an open source dataset for multimodal meeting interactions including multi-speaker meeting recordings, transcription, dialogue annotations, and meeting summaries. This dataset is appropriate for training automatic speech recognition and summarizing models. To enhance speech transcription, LibriSpeech Dataset is used for training and evaluating ASR models which contains clear speech recordings and transcripts in English language. Moreover, QMSum (Query-based Meeting Summarization) is used to train and test the AI Model to create meeting summaries, action items, and main discussion points.

For testing the proposed Continuous Meeting Memory Model, a custom dataset with repeated academic lectures and organizational meetings will be used. In this dataset, multiple meetings are conducted on the same topic allowing the

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model to understand the contextual relationships between different meetings. The above datasets ensure diverse meeting scenarios, multiple speakers, different accents, and long discussions which help in evaluating transcription, AI-generated meeting summary, Minutes of Meeting (MoM), and action items.

A. SYSTEM ARCHITECTURE

The proposed AI-Powered Meeting Companion follows a modular, AI-driven architecture designed to automate meeting documentation while ensuring secure data processing and contextual knowledge management. The system integrates with existing virtual meeting platforms such as Zoom, Google Meet, and Google Classroom through a user-provided meeting link and explicit user consent. Instead of hosting meetings, the framework acts as an intelligent assistant that joins ongoing meetings, captures live conversations, and processes meeting data in real time.

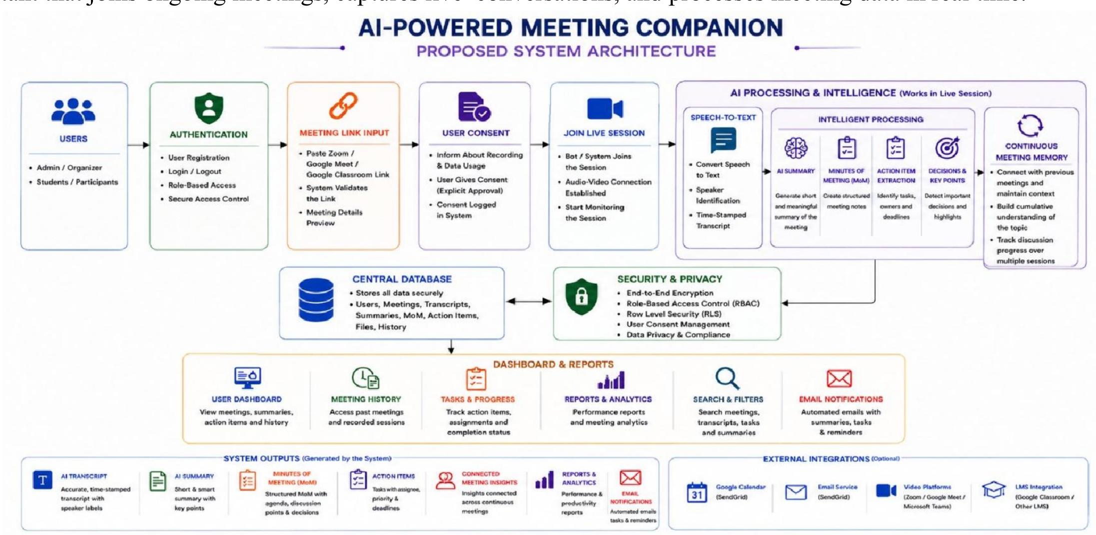

Figure 1. System Architecture

Layer 1: Meeting Integration Layer

This layer is responsible for connecting the application with external meeting platforms. After user authentication and consent verification, the system validates the meeting link and securely joins the live meeting. It continuously captures the meeting audio stream without interrupting the ongoing session.

Layer 2: AI Processing Layer

The captured audio is converted into text using a Speech-to-Text (ASR) model such as Whisper. The generated transcript is then processed by a Large Language Model (LLM), which performs meeting summarization, Minutes of Meeting (MoM) generation, action item extraction, key decision identification, and semantic context analysis. This layer serves as the intelligence engine of the proposed system.

Layer 3: Continuous Meeting Memory Layer

Unlike existing meeting assistants, this layer maintains contextual continuity between recurring meetings or online classes. It compares the current meeting summary with previous meeting records using semantic similarity techniques, allowing users to track discussion progress, retrieve historical context, and maintain a unified knowledge base across multiple sessions.

Layer 4: Storage and Presentation Layer

The AI-generated transcripts, summaries, action items, and meeting history are securely stored in a centralized database. The processed information is presented through an interactive dashboard where users can access meeting records, monitor assigned tasks, and receive automated email notifications containing summaries and follow-up actions. This layer ensures efficient meeting management, collaboration, and long-term knowledge retention.

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B. ALGORITHM

Step 1: Start
Step 2: User (Admin/Student/Employee) logs in through GUI using credentials
Step 3: API Gateway verifies request, authenticates user through JWT token and authorizes based on role
Step 4: If Authentication fails then display error message and loop back to Step 2; otherwise redirect to Dashboard
Step 5: Admin makes or schedules a meeting and/or user joins an existing meeting
Step 6: Meeting Service saves meeting data in Database while Notification Service sends invite through Email Service
Step 7: During the meeting, AI Processing Engine conducts Speech-to-Text, Speaker Recognition, Keyword Extraction, and Sentiment Analysis in real-time
Step 8: Transcripts, Attendees, and Notifications are streamed to GUI through Socket.IO till end of the meeting
Step 9: Post meeting, AI Processing Engine creates Meeting Summary, Minutes of Meeting (MoM), Action Items and Decision points based on full transcript
Step 10: If meeting is part of a series, then system connects past summaries to generate context-based summary
Step 11: Task service prepares tasks from action items and stores them in the database
Step 12: Notification service sends the summary, minutes of the meeting, and tasks through email, and the recordings/notes are stored on cloud storage
Step 13: Analytics service updates attendance information, task information, and productivity information; the Feedback loop checks the performance of the AI
Step 14: Dashboard presents the final output of the Summary, Minutes of the meeting, Tasks, Notifications, and Analytics to the user
Step 15: STOP

C. MATHEMATICAL MODELS

$$S = \{I, P, O, M\}$$

I = Input
P = Processing
O = Output
M = Memory (Database)
Where,
I = {Login Credentials of the User,Meeting Details, Audio of the Meeting, Document/Attachments}
P = {Authentication, Speech to Text Conversion, AI-based summarization,
Task Identification}
M = {Meeting records, Transcript, Summary,User data}
O = {Summary of the Meeting, Meeting minutes (MOM),Assigned tasks, Notifications}

VI. MODULE DESIGN

Module 1: User Authentication & Role Management

Purpose: For securing the application and ensuring that only users with specific clearance can access data.
Main Function: It takes care of registration of users, issuing secure JWT session tokens and Role-Based Access Control (Admin versus Students).
Input: Email and Password and Role Selection.
Output: Secure session token and Routing according to Role to Admin versus Students dashboard.

Module 2: Smart Meeting Management

Purpose: To provide a mechanism for scheduling, tracking and launching meetings.

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Main Function: It allows to create meetings and connect with Google Calendar to schedule it and archive historical data of meetings.
Input: Meeting Metadata (Title, Platform, Scheduled Time, OAuth Google Calendar Token).
Output: Structured meeting record in Database and "join" interface on the dashboard.

Module 3: AI Meeting Intelligence
Purpose: To process unstructured audio live into structured data with the use of Large Language Models (LLMs).
Main Function: To capture live speech via the Web Speech API and process the whole text transcript with Google Gemini API.
Input: Live audio stream (microphone) and raw text transcripts.
Output: JSON object which consists of three parts – executive summary, extracted action items and logged decisions.

Module 4: Dashboard & Task Management
Purpose: Visualizes AI-generated data and allows the user to interact with it and track his/her productivity.
Main Function: Renders role-specific dashboards (Admin system health versus Student personal dashboards) and Kanban-style interface to update task status.
Input: Extracted action items and database metrics (Users number, Meetings number).
Output: Graphical User Interface with upcoming schedules and To-Do list where tasks' statuses (Pending/In Progress/Done) are tracked.

VII. ADVANTAGES OF THE PROPOSED ARCHITECTURE

- Real-Time AI processing: Conversion of live meeting recordings to transcripts, summaries, Minutes of Meeting (MoM) and actions in real-time.
- Continuous meeting context: Ability to make contextual references between several meetings or classes, therefore allowing the user to follow up the progress without the need to refer to previous recordings.
- Decreased workload: Saving time and effort by eliminating the need to take notes and document the meetings.
- Meetings management dashboard: Having all the transcripts, summaries, action items and past meetings recorded within one secure dashboard.
- Action Item & Task tracking: Extraction of action items from the transcripts and summarization of them for tracking the progress on action items.

VIII. Expected Outcomes

AI-Powered Meeting Companion for Summaries and Follow-Up Tasks" will contribute towards the reduction in manual efforts in meeting documentation through the automated generation of reliable summaries and Minutes of Meeting (MoM). This solution will be able to detect the key points of discussion, decisions made, and actions and will assign tasks to different participants of the meeting for follow-up.
Moreover, the solution will be helpful for increasing the efficiency of meetings and cooperation within teams since it will provide an opportunity to store information on meetings and their results in one place. The analytical capabilities of the solution will enable users to get insights into the effectiveness of meetings, attendance, and completion of tasks.

IX. CONCLUSION

The proposed AI-Powered Meeting Companion is an innovative and efficient solution for enhancing the management of virtual meetings via the introduction of Artificial Intelligence (AI), Automatic Speech Recognition (ASR), Natural Language Processing (NLP), and Large Language Models (LLMs). The application will connect to the virtual meeting using the provided meeting link and user permission, record the audio of the live meeting and transcribe it. Transcripts will then be used to create the summary of the meeting, Minutes of Meeting (MoM), list of action items and all

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decisions that were made in the meeting. The key benefit of the proposed architecture is the provision of a Continuous Meeting Memory that will intelligently connect the discussion of several meetings or classes relating to the same topic and enable users to track the progress of the discussion continuously. Data collected in the process will be stored in the central database and presented to the user in an interactive dashboard via emails. The architecture will allow easy integration with popular video call applications, such as Zoom, Google Meet and Google Classroom. The proposed design will allow additional features to be easily added, including multilingual support, speaker identification, calendar integration, enterprise collaboration applications.

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