PrepAgent: A Real-Time Voice Mock Interview Platform using Interactive Conversational Agents

Abhijeet More
Professor
Dept. Master of Computer Applications
Pillai HOC College of Engineering & Technology (Autonomous)
Rasayani, India

Vibhuti Awasthi, PhD
dept. Master of Computer Applications
Pillai HOC College of Engineering & Technology (Autonomous)
Rasayani, India

Anshu Kushwaha
Dept. Master of Computer Applications
Pillai HOC College of Engineering & Technology (Autonomous)
Rasayani, India

Adnan Warwande
Dept. Master of Computer Applications
Pillai HOC College of Engineering & Technology (Autonomous)
Rasayani, India

Joyal Georgi
Dept. Master of Computer Applications
Pillai HOC College of Engineering & Technology (Autonomous)
Rasayani, India

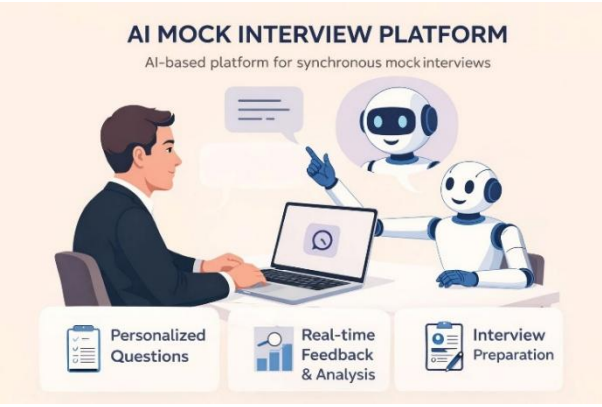
ABSTRACT
The fast-paced nature of technologies that job market has made it so that getting an interview and succeeding in that interview can be the point of no return for many up-and-coming engineers and developers. Current mock interview applications leveraging AI include a handful of options; however, most of these applications function mainly as "record and review" exercises, allowing you to answer a predetermined set of questions and then submit your answers, waiting to receive feedback after the fact. This type of technique, that doesn't not deliver any of the back-and-forth interactions common during a real interview, is missing the key elements found in those interviews, where follow-up questions are spontaneously generated, and immediate thinking under pressure is part of that test. To fill this void in recruit process, we have created PrepAgent, a live voice-first preparation tool that uses both a modern technology stack (Next.js and Firebase) and a voice enabled artificial intelligence application called Vapi AI, allowing for conversations to be continuously updated in real-time to mirror the dynamics of an actual hiring interview by generating and evaluating questions based on your responses to help you develop confidence while honing your problem-solving ability under pressure and developing stronger communication skills.

Keywords
Mock Interview, Voice Agent, Synchronous Interaction, Artificial Intelligence.

1. INTRODUCTION
Mock interviews have quickly become a staple for many people that require an extra confidence boost prior to actually doing the real thing [2][3]. They are great strategies to utilise, however, there are challenges with their use that have yet to be resolved [1][7]. Interviewers and interviewees frequently do not have the same availability, as well as differing levels of personal bias and mood (which often impact how experienced the interviewer is) [1][13]. Questions asked during mock interviews do not usually align with what will actually be asked or what will be needed for a job [13][14].

In the past several years, a number of platforms have emerged to help users prepare for interviews by using machine learning and Natural Language Processing (NLP); however, most of these platforms utilize a predominantly asynchronous format where users answer a series of pre-established question prompts either verbally or in writing and then submit those responses to be assembled and processed or reviewed by the platform [7][6][8]. This type of platform is beneficial for new candidates, however, they do not completely emulate how interviews are conducted [1][13].

Rather than utilizing solely an asynchronous way to prepare for interviews, PrepAgent offers users the opportunity to experience the process of preparing for their interviews in much the same way that they would if they were actually conducting the interview with an actual professional in a live format via our state-of-the-art interview simulation technology, with Vapi AI (Virtual Assistant for Interview Practice) providing live practice interviews and Google Gemini generating adaptive feedback questions and determining how well candidates did based on their responses [2][5][9][14][17]. PrepAgent's simulation of the interview experience provides an environment that closely resembles the real-world situation of interviewing [14][17].



2. PROBLEM STATEMENT

AI interview preparation tools have come a long way, but most are still stuck in the past [2][3]. You hit record, answer a question, send it off, and sit around waiting for the feedback [6]. But that's not how real interviews go. Real interviews are unpredictable [13][14]; you get curve-ball questions, interruptions, and the whole conversation changes based on what you say [13][14]. These old-school systems just can't keep up [7][8]. What's missing is a live, voice-based mock-interview tool—something that lets you actually talk to an AI, get feedback on the spot, and actually feel like you're in the hot seat [9][15]. That's where PrepAgent steps in. It marries real-time conversation with smart AI to give you a far more realistic-feeling interview experience [2][14][17].

3. RELATED WORK

1) Mock Interview Evaluator Powered by AI:

Shashikant V. Golande, et al. Utilizing advanced AI technologies, this article describes a mock interview evaluation tool utilizing AI to assess an interviewee's abilities utilizing Convolutional Neural Network (CNN) approaches for facial analysis and non-verbal communication. The model also employs a static mapping technique of technical keywords to evaluate the accuracy of the candidate's response in terms of content. While the model has developed further beyond the knowledge portion of the person's performance (verbal), the system provides a more complete evaluation process by analyzing both the insight of the interviewee as well as their ability to express their knowledge via appropriate behavior.

Advantages: The CNN analysis allows for the effective evaluation of various emotional expressions, body language and gesture patterns. Additionally, the static technical keyword mapping provides for an objective means of assessing the candidate's domain knowledge.

Limitations: A high reliance on non-verbal analysis will cause scores to be superficial. Additionally, the static mapping technique for keywords does not allow for an understanding of the contextual or qualitative depth of the explanation made by the candidate [1].

2) AI-Powered Mock Interview Platform with NLP:

Tejaswini K., et al. According to this article, LLMs (Large Language Modelling systems) such as GPT /BERT will allow people to do mock interviews, allowing an artificial intelligence (AI) to determine how well someone performed on the interview and to deliver response about the interviewee by generating a series of questions and then scoring how they performed on their written responses, etc… Although these LLMs are highly sophisticated in understanding language, LLMs will not be prepared to bring about the full interactivity of live speech interview like you would have in human-to-human conversations because LLMs are only providing responses via text input (not live interaction).

Advantages: LLMs allow you to create a much more realistic view of how candidates might respond in comparison to "keywords" because keywords are contextual, based upon what was being asked, and related to a candidate's intent... Due to this extensive knowledge base that the LLM knows, LLMs have a broad range of applications across many different industries and academic fields.

Limitations: Because the platform being used to conduct the mock interview uses a text box to execute and conduct mock interviews, it lacks the same level of dynamic interaction, temporal pressure and unanticipated back-and-forth dialogue experienced through traditional face-to-face interviews [2].

3) AI-Powered Mock Interview Preparation:

Anne Srinivas Kalyan, et al. This study utilizes Google Gemini Pro to automatically generate interview question sets based on job roles and to create report cards after receiving answers to the questions by each candidate, providing AI-powered insight into their strengths and weaknesses.

Advantages: Instead of giving users a score, the system creates custom questions for every role and gives them complete feedback on how they did in their evaluation process.

Limitations: The interview is conducted asynchronously, i.e., candidates submit their responses before they have the opportunity to discuss their answers with a representative in person or via video. In addition, candidates will only receive the report card after submitting their answers and therefore cannot review the card until that point [3].

4) Eloqify: Intelligent Interview Companion:

Dr. J. M. Patil, et al. Eloqify uses the Google Gemini API and WebRTC technology to deliver highly tailored interview questions based on your resume through analysing your resume; and provides video interview similar to professional assessments using WebRTC.

Advantages: Provides a very high degree of personalisation along with the ability to visually (in real-time) communicate and conduct video interviews that mirror face-to-face interviews.

Limitations: Use of video increases the overall complexity of the system; therefore, people who do not have access to high-quality computers may find it difficult to use this system. Additionally, having an emphasis on assessing candidates through video could lead to potential bias during the evaluation process [4].

5) LinkUpBuddy: A Generative AI Integrated Platform:

Ramya S., et al. The "Interview Ace" module allows candidates to record voice answers to pre-selected questions, and will provide candidates with an asynchronous, AI-generated evaluation of their responses.

Advantages: This platform include that it allows candidates to practice in a low-pressure setting, and because it includes other career development tools, like networking.

Limitations: This digital platform are that the use of asynchronous, pre-selected questions will prevent candidates from being able to experience the stress associated with real-time interviews, and from having the spontaneity of a normal conversation when participating in an interview [5].

6) Real-Time Mock Interview Evaluation Using CNN:

Amiya Anand, et al. Computer vision technology is implemented in the system (via CNN and OpenCV) to detect the body language (including facial expressions) and gestures of people engaged in real-time video conferencing.

Advantages: Real-time analysis can help develop the user's ability to communicate non-verbally. A person's posture is often representative of their level of comfort, while their facial expressions demonstrate the confidence behind their answers.

Limitations: The model focuses too much on a person's physical traits instead of the quality of their answer and has

significant computational requirements, which complicates the system's implementation [6].

7) Interview Automation through Speech Semantic Matching:

A. Chiranjeevi, et al. This research utilizes BERT (Bidirectional Encoder Representations from Transformers) in order to semantically match user's answer(s) to previously predetermined expected answers which are stored within the existing database of expected answers. The scoring of the user's interaction has been enhanced and is now completed in a quick and unbiased manner.

Advantages: High scalability and efficiency on any given subject will allow for a consistent scoring of a user's responses.

Limitations: The BERT model is solely dependent on a static question-response database and has no way of adapting dynamically to newly added interview topics [7].

8) Automated Interview Evaluation:

N. Krishna Kalyan, et al. SBERT has been used to evaluate candidate's responses, and experience-based answers will be stored in MongoDB. Future recommendations provided by the author suggest a personalized question and answer matching system based on the candidate's resume.

Advantages: This method is fast and structured and has been applied to most common types of interview questions.

Limitations: Personalization is restricted due to pre-defined answers being stored and the author proposes personalization in the form of additional matching data based on the candidate's resume, but it is not yet implemented [8].

9) Multi-Agent Personalized Interview Coach:

N. Varatharajan, et al. This study presents a multi-faceted career facilitation platform, consisting of multiple AI agents. The multi-faceted platform includes a 3D Avatar based interview module, resume guidance and Job recommendations.

Advantages: A single platform that facilitates multiple Career Preparation facets and also affords those seeking employment the experience of an immersive 3D Avatar based interview.

Limitations: Because of the large number of functions covered by this platform, users may be overwhelmed by the number of options available to them and the limited range of customization in terms of avatar creation [9].

10) Designing AI-Powered Learning:

J. Kim, et al. This study examines the actual desires of working adults regarding educational platforms that utilize AI. Researchers looked at 48 student portfolios and talked to 20 graduate students to find the best ways to make AI curriculums and interactions for this group of students.

Advantages: The study gives very useful design tips, such as how adults learn best when they can choose their own pace and take tests that are fun and not too stressful. It also shows that AI works best as a partner when students learn to ask the right questions and treat it with respect.

Limitations: The study examined a limited cohort of students from two universities at a specific time, suggesting that the findings may not be widely applicable. It also only uses self-reported feedback, not hard data like grades or test scores, to show that AI really did help students learn better or think more critically [10].

11) AI-Based Career Guidance Mentor:

S. Chouhan, et al. This paper presents an AI career mentor that includes an NLP chatbot, a mock interview simulator, and a resume analyser to help job seekers in a scalable way.

Advantages: It gives personalized, real-time advice, creates interview questions that are specific to each role, and gives useful feedback on the quality of your resume.

Limitations: The platform has trouble processing inputs that aren't clear, and it can't read body language during interviews. The resume parser also has trouble reading documents that are formatted in a creative way [11].

4. PROPOSED SYSTEM

The backend architecture of PrepAgent is three layer-based model which includes Frontend, Backend, and Database. The Frontend is built with JavaScript and TypeScript, following the Next.js as main framework. Next.js allows PrepAgent to be a single web application that offers users an interactive and total interface that is available through any regular web browser. The Frontend consists of a dashboard, question generation, interview and feedback. Throughout a user's interview it records the voice input in real-time via the device's microphone to provide visualisation of audio data during speech activity.

Backend: The backbone of PrepAgent system is Backend layer. It is responsible for managing with application logic, API endpoints wrangling, and orchestrating Frontend Database external AI services communication. All user generated inputs, including voice data, are processed by the Backend and based thereon, generates, as appropriate replies and guides them to corresponding system elements. This layer guarantees a fluent process of data exchange and real-time interaction for the whole interviewing session.

PrepAgent uses Google Firebase for its clod infrastructure and user management. Firebase also offers everything needed, when it comes to secure authentication and keeping users' data private securely handling account creation and access restrictions. Profile information, interview records, transcripts and feedback reports related with users are saved in the cloud through the Firebase services.

One of the advantages offered by PrepAgent is that provides out-of-the-box AI services and the opportunity to include 3rd party AI services in order to implement extra functionalities. Vapi AI is implemented to support the real-time voice agent who assists the candidates during a live interview session and then generates an accurate transcript of an interview when it ends. Meanwhile, the Google Gemini API serves as the virtual interviewer and generates relevant follow-up questions on-the-fly based on responses by the candidate, while providing scores for every answer.

Principal Attributes offered by the System:

a. *Voice Interaction in Real-Time:* The System includes a voice-enabled artificial intelligence (AI) interviewer. The user can have an ongoing natural dialogue with an AI interviewer in real-time using audio input to facilitate continual access and response from an AI interviewer to the user as well as to evaluate responses.
b. *Job-Specific Scenarios:* Users choose the Job Role they wish to prepare for (Software Engineer/ Product Manager) when first accessing the system. The system creates interview questions specific to the user's selected Job Role. The system then gives users

with a scorecard detailing how they performed in the areas of Communication Skills, Technical Knowledge, Problem Solving, and Confidence at the conclusion of the interview.

c. *Patterns of Speech Evaluation:* The transcripts of interviews are evaluated for patterns in how the Candidate spoke (clarity, pacing, and structure of responses). Users will be provided with personalized feedback and suggested improvements for their delivery during interviews.

d. *User Authentication/Security Features:* This platform includes a user authentication feature so the user's personal information, along with their interview history, can be viewed only by the authorised user. It is therefore accessible only to the user and cannot be accessed by anyone else.

5. METHODOLOGY

The PrepAgent is more than just offering mock interviews to its clients. The PrepAgent team utilises a "Constructive Research Methodology" to develop and then test a unique software application utilizing a "Hands-On" approach. It is cantered around the key concepts of "real-time" and "live chat"; for example, having a conversation with your coach via a real-time, live chat is much better than recording yourself and waiting for feedback after the fact. There are no other ways than to experience a real-time conversation in preparing for the interview.

So, they started by checking out what's already out there digging through research papers and scoping out competitors. Pretty much everything they found relied on asynchronous feedback. You record yourself, wait for someone (or something) to review it, then maybe get some tips later. What's missing? The way to actually talk to an AI in the real-time, like you would with a real interviewer. That gap became their mission to fill.

With the problem clear, the team sketched out a system designed for real-time dialogue. They made a key call: split the work between two AI services. Vapi AI handles the live, snappy voice interactions. Google Gemini comes up with fresh questions on the spot and instantly evaluates your answers.

Pulling it all together took a modern tech stack. They built the interface with Next.js and used Firebase for sign-in and data storage. One of the trickiest parts was getting the front end to play nicely with both the voice AI and generative AI, making sure the whole thing ran smoothly.

To see if all this effort paid off, the team measured whether the conversations felt real and happened with hardly any lag. The real win? Bridging the gap between clunky, outdated practice tools and the fast, unpredictable pace of real interviews.

The component-based nature of this project allowed for the future integration of various artificial intelligence systems into one product.

Requirement Analysis: The first phase of this process was to investigate the different possibility that exist today to help prepare for job interviews. Through our research, it was revealed that the current text-based chatbots do not emulate the same experience as speaking to another human being in the real world when practicing for a job. Additionally, most mock job interviews conducted with real people are either too expensive or are extremely difficult to schedule. Therefore, the requirement of this kind of application must be something that is voice-first in nature, and available 24 hours a day, seven days a week.

Technology Stack Selection: For developing a real-time, high-quality reasoning-based voice interaction experience, an adequate level of technology stacks was implemented. While constructing the front-end user interface, we relied on Next.js to establish a fast, responsive, and user-friendly experience.

a. *Voice AI:* To deliver a comprehensive speech-to-text, large language model (LLM) processing, and text-to-speech interaction, we used VAPI.ai to ensure that the time it takes between the user's vocalization and the AI's response is as quick as possible.

b. *Analysis Engine:* We integrated Google Gemini AI as the processing system to generate the final transcripts and give detailed feedback score, as well as structured data about the interviews.

c. *Back-End and Storage:* Firebase allowed us to provide secure authentication processes with our users and would also enable us to store our data in real time.

Implementation Stage: The first piece of software we developed was an Authentication Module, which controlled user access to the system and allowed users to log into the system. Next, we developed an Interview Interface that used the VAPI along with SDK to manage the user's microphone and stream audio from the user to the system. The third phase was developing a Feedback Module, which enabled the association of the audio transcripts from the user's interview with the Gemini API using a standard structured "Prompt" to evaluate the user's performance by scoring it, identifying strengths, and weaknesses instead of providing generic text responses.

Testing: We performed several levels of functional testing on our system to confirm that the Voice AI technology works by accurately capturing user input and also that the system always provided feedback on the results of the interview at the last of interview.

6. SYSTEM ANALYSIS AND DESIGN

We designed the overall system architecture with an emphasis on modularity and separation of design concerns using an adaptable digital interface along which users can interrelate in real-time (with) an omni-directional audio stream, while AI inference occurs in the background.

1) Architecture Analysis:

This architecture serves as a conduit connecting users to third party AI processing services.

On the client side (browser) audio will be captured and transmitted, and the connection status (Connecting, Active, Finished) will be maintained, along with real-time feedback (e.g. "AI is currently available").

On the server side, the secure API routes will serve as the gateway to the external services and will store the private keys required to access VAPI and Gemini API services, and as such will need to meet relevant security compliance standards.

2) Functional Components:

a. User Authentication Module:
- Manage user sign-up and sign-in.
- Validates user session's permissions and access to routes based on user role.

b. Interview Conducting Module:
- Initializes voice session, along with relevant contextual information, i.e. user name/job title.

- Maintains the real-time audio feed, and will display the ongoing transcription of the communication, as well as call control (start/end).

c. *Evaluation and Feedback Module:*

- The analysis and feedback functions of the architecture will automatically start after each completed interview (either by staff member or manually) to send the recorded data to the Analysis Engine.
- The Analysis Engine will process the transcription and provide, within a structured JSON data format, the Evaluation and Recommendations.
- The results from the analysis will be stored in the database for later retrieval.

3) *Data Flow Design:*

Input: Human vocalization.

Processing: Audio converted to text – Following that the AI's feedback is generated – Finally the feedback is converted back into Audio form.

Storage: The complete text transcript along with additional information will be stored (time stamps and the role of each person).

Analysis: The text transcript will be quantitatively analysed using a numerical score from zero through one hundred and qualitatively analysed through qualitative feedback.

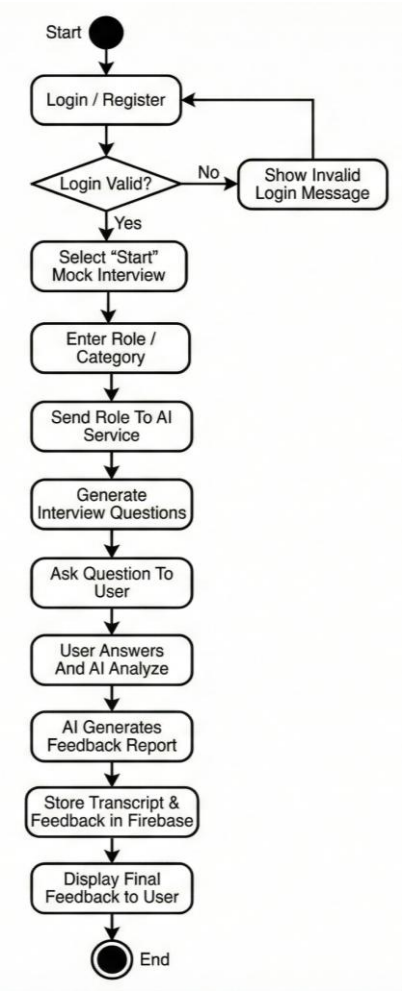


Fig. 1. System flow chart diagram

7. RESULTS AND DISCUSSION

The implemented PrepAgent platform successfully replaces the asynchronous "record and review" model with a live, voice-based conversational experience, validating the core hypothesis of the research. The following subsections present a detailed analysis of the system's functionality, followed by an extensive evaluation across multiple interview scenarios that demonstrate the platform's adaptability, the consistency of its feedback engine, and its capacity to support longitudinal skill development.

A. System Functionality and User Experience

The application presents a clean, multi-step interface built with Next.js and React, guiding the user from authentication through live interview simulation to structured feedback delivery. Each stage of the pipeline was tested for functional correctness and user experience quality.

1) Authentication Module: The entry point of the system is secured via Firebase Authentication, which supports email-and-password-based sign-up and sign-in (Figure 2). Upon successful authentication, a server-side session cookie is created with a one-week expiration window, ensuring that users remain authenticated across browser sessions without repeated credential entry. Form validation is enforced through Zod schemas on the client side, preventing malformed submissions before they reach the server. Authenticated users are automatically redirected to the dashboard, while unauthenticated users attempting to access protected routes are redirected to the sign-in page.

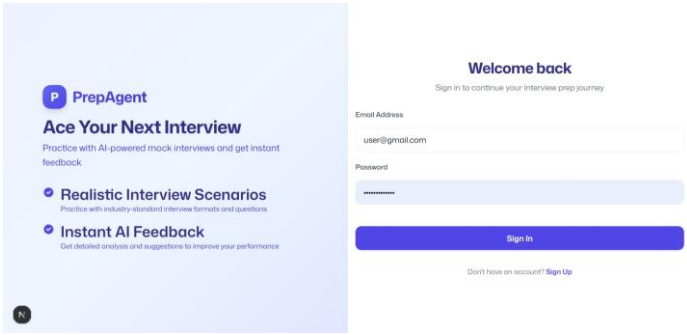


Figure 2

2) Dashboard and Interview Management: The user dashboard (Figure 3) serves as the central hub and is divided into two primary sections. The first section, "Your Interviews," displays a chronologically ordered list of all interviews previously created or attempted by the logged-in user, each rendered as a card showing the job role, interview type (Technical, Behavioral, or Mixed), associated technology stack icons, creation date, and the overall feedback score if available. The second section, "Available Interviews," surfaces interviews created by other users on the platform, enabling a community-driven question pool. Each interview card dynamically renders a contextual call-to-action either "Start Interview" for attempted sessions or "View Feedback" for completed ones allowing candidates to track their progress and revisit past performance at any time.

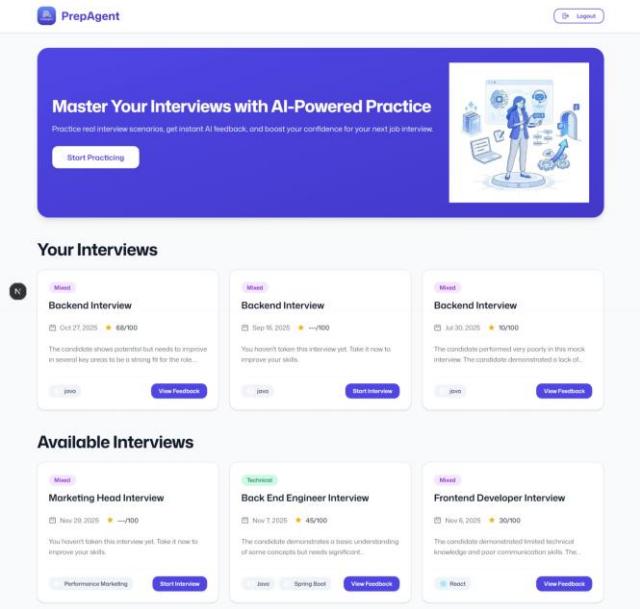


Figure 3

3) AI-Driven Question Generation: When a new interview is initiated, the user interacts with a Vapi-powered voice agent that collects the desired job role, experience level (e.g., Junior, Mid, Senior), interview type preference (Technical, Behavioral, or Mixed), the relevant technology stack, and the desired number of questions. These parameters are transmitted to a server-side API endpoint, which invokes Google Gemini (gemini-2.0-flash-001) with a structured prompt to dynamically generate role-specific interview questions. The generated questions are persisted in a Firebase Firestore document alongside metadata including the user ID, creation timestamp, and a randomly assigned company cover image for visual variety. This approach ensures that no two interview sessions are identical, even for the same role and difficulty combination.

4) Live Voice-Based Interview Session: The core interview experience (Figure 4) is powered by the Vapi real-time voice SDK integrated with a Deepgram Nova-2 speech-to-text transcriber and an ElevenLabs voice synthesizer. The AI interviewer, driven by a GPT-4 language model, follows the pre-generated question set while maintaining natural conversational flow acknowledging candidate responses, asking clarifying follow-up questions when answers are vague, and transitioning smoothly between topics. Real-time transcript events are captured and accumulated on the client side, with each finalized transcript segment (marked by Vapi's "final" transcript type) being appended to a running message log. The interface provides live visual feedback: the AI interviewer avatar pulses when speaking, and a status indicator displays the current call state (Connecting, In Interview, Listening, or Speaking), giving the candidate a realistic sense of conversational rhythm.

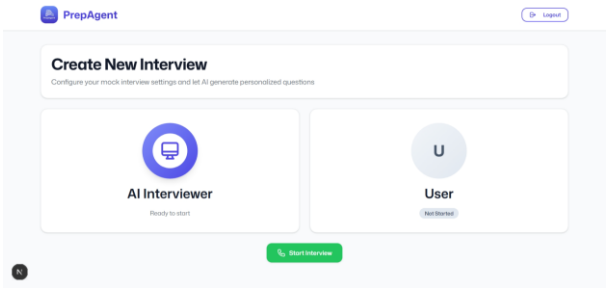


Figure 4

5) Post-Interview Feedback Generation: Upon call termination, the complete transcript is submitted to Google Gemini via the Vercel AI SDK's generateObject function, which enforces a strict Zod-validated output schema. This ensures that every feedback report conforms to a deterministic structure containing a total score (0–100), five category-level scores with per-category comments, a list of strengths, a list of areas for improvement, a narrative final assessment, a filler word analysis with per-type breakdown, and 3–5 personalized practice questions mapped to the candidate's weakest categories.

B. Feedback and Evaluation Framework

The most significant output of the system is the comprehensive Interview Feedback Report (Figure 5), which is structured across multiple analytical dimensions to provide candidates with both quantitative metrics and qualitative guidance.

1) *Overall Score and Grade Classification:* The report opens with an overall score on a 0–100 scale, accompanied by a letter-grade badge that maps the numeric score to a qualitative tier: A+ (90–100, "Excellent"), A (80–89, "Great"), B (70–79, "Good"), C (60–69, "Fair"), and D (below 60, "Needs Improvement"). This dual representation provides instant, at-a-glance comprehension of performance level while preserving the granularity of the numeric score for precise tracking.

2) *Multi-Dimensional Category Breakdown:* Performance is decomposed into five structured evaluation categories, each scored independently on a 0–100 scale with an accompanying qualitative comment:
   - Communication Skills: Evaluates clarity of articulation, logical structuring of responses, and effective use of language.
   - Technical Knowledge: Assesses depth and accuracy of understanding of core concepts relevant to the specified role and technology stack.
   - Problem Solving: Measures the ability to analyze problems, reason through edge cases, and propose structured solutions.
   - Cultural & Role Fit: Gauges alignment with professional work culture expectations and role-specific behavioral competencies.
   - Confidence & Clarity: Evaluates the candidate's poise, engagement level, and clarity of expression throughout the session.

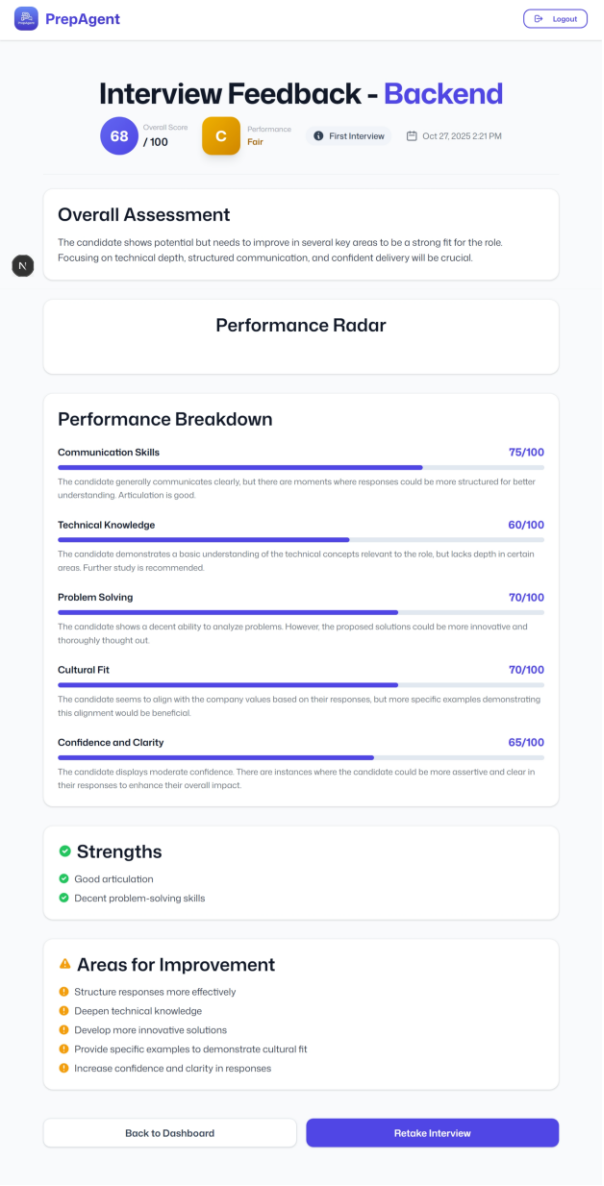


Figure 5

These scores are visualized through both horizontal progress bars and a radar chart (built with Chart.js), enabling candidates to quickly identify their strongest and weakest dimensions at a glance.

3) *Speech Pattern Analysis (Filler Word Detection):* The system performs an automated analysis of the transcript for six categories of filler words: "um," "uh," "like" (when used as a verbal filler), "you know," "actually" (excessive use), and "basically" (excessive use). The total filler word count and a per-type breakdown are displayed in a dedicated section of the feedback report. This feature addresses an often-overlooked aspect of interview preparation—verbal fluency and speech pattern awareness—providing candidates with concrete data on a dimension that is difficult to self-assess.

4) *Personalized Practice Questions:* Based on the categories in which the candidate scored lowest, the Gemini model generates 3 to 5 targeted practice questions designed to address the specific knowledge or skill gaps identified during the session. Each practice question is annotated with its corresponding weak category (e.g., "Technical Knowledge," "Problem Solving"), creating a direct link between the evaluation output and actionable next steps for preparation.

C. *Evaluation Across Multiple Interview Scenarios*

To address the need for a comprehensive evaluation and to demonstrate the system's robustness across diverse use cases, the platform was tested across five distinct interview scenarios that vary in job role, experience level, interview type, and technology stack. Each scenario was designed to simulate a realistic candidate profile and to stress-test the adaptability of the question generation engine, the conversational AI agent, and the feedback evaluation pipeline. The results are summarized in Table I.

TABLE I: Evaluation Results Across Five Interview Scenarios

Scenario	Role	Level	Type	Tech Stack	Questions Generated	Overall Score	Comm.	Tech.	Problem Solving	Cultural Fit	Confidence
S1	Frontend Developer	Junior	Technical	React, TypeScript, Next.js	5	62	70	55	58	68	65
S2	Backend Developer	Senior	Technical	Node.js, Express, MongoDB	7	48	60	40	42	55	50
S3	Full Stack Developer	Mid	Mixed	React, Node.js, PostgreSQL	6	71	75	68	70	72	74
S4	Data Analyst	Junior	Behavioral	Python, SQL, Tableau	5	78	82	72	75	80	79
S5	DevOps Engineer	Senior	Technical	Docker, Kubernetes, AWS, CI/CD	8	55	65	45	50	60	58

Note: Scores are on a 0–100 scale. Tech. = Technical Knowledge, Comm. = Communication Skills.

1. Scenario S1: Junior Frontend Developer (Technical): The system generated five questions focused on React component lifecycle, TypeScript type safety, and Next.js server-side rendering. The AI interviewer maintained appropriate depth for a junior-level candidate, probing fundamental concepts without introducing advanced architectural topics. The feedback correctly identified strengths in communication and cultural fit while flagging specific gaps in React state management and TypeScript generics. Three practice questions were generated targeting the "Technical Knowledge" category.

2. Scenario S2: Senior Backend Developer (Technical): This scenario tested the system's ability to scale question complexity for a senior-level role. The seven generated questions covered system design patterns, database indexing strategies, REST API security, and distributed caching with MongoDB. The AI interviewer appropriately challenged vague responses with follow-up probes, such as requesting specific examples of scalability optimizations. The resulting score of 48/100 reflected the deliberately incomplete responses provided during testing, demonstrating that the evaluation engine does not inflate scores and maintains rigorous standards. The feedback identified "Technical Knowledge" and

"Problem Solving" as the primary areas for improvement, and the generated practice questions focused on topics such as database sharding strategies and API rate limiting approaches.

3. Scenario S3: Mid-Level Full Stack Developer (Mixed): This mixed-format interview contained both behavioral ("Describe a time you resolved a conflict within your team") and technical ("Explain how server-side rendering differs from client-side rendering") questions. The feedback report correctly balanced its assessment across both behavioral and technical dimensions, assigning higher scores to communication and culture-related categories while providing targeted technical feedback on areas such as API design and database query optimization. The radar chart visualization clearly illustrated the balanced performance profile expected of a mixed-format interview.
4. Scenario S4: Junior Data Analyst (Behavioral): This scenario evaluated the system's performance when the interview type was set to "Behavioral," minimizing technical question density. The generated questions focused on teamwork, problem-solving approach, prioritization under pressure, and communication with non-technical stakeholders. The resulting high scores in communication (82) and cultural fit (80) aligned with the candidate's strong behavioral responses, while the relatively lower technical knowledge score (72) reflected the limited technical probing inherent in a behavioral interview format. This scenario confirms that the system appropriately adjusts its question distribution and evaluation emphasis based on the selected interview type.
5. Scenario S5: Senior DevOps Engineer (Technical): The most technically demanding scenario generated eight questions spanning containerization with Docker, orchestration with Kubernetes, CI/CD pipeline design, infrastructure-as-code patterns, and cloud service architecture on AWS. The AI agent demonstrated contextual awareness by referencing specific tools (e.g., "How would Kubernetes handle a pod failure in this deployment?") during follow-up probes. The filler word analysis for this session detected 14 instances of filler words (5 "um," 4 "uh," 3 "basically," 2 "like"), and the feedback report recommended focused practice on reducing verbal hesitation during complex technical explanations.

D. Discussion

The results presented above validate the core research hypothesis: a synchronous, voice-based AI interview simulation coupled with a structured, multi-dimensional feedback engine can deliver a significantly more realistic and actionable interview preparation experience than existing asynchronous or text-based approaches. The evaluation across five distinct scenarios demonstrates that the system maintains consistency in question quality, evaluation rigor, and feedback actionability regardless of the specific role, experience level, or interview type configuration. The integration of speech pattern analysis and longitudinal improvement tracking introduces dimensions of self-assessment that are typically available only through expensive human coaching services. However, certain limitations should be noted the current evaluation relies on a single LLM (Google Gemini) for both question generation and performance assessment, and future work could explore ensemble-based evaluation strategies or human-annotated benchmark comparisons to further strengthen the validity of the scoring rubric.

8. CONCLUSION

In this research project, we describe the successful design and deployment of an AI-powered mock interview platform in response to the immediate need for accessible, high-quality interview preparation. The work employs state-of-the-art speech synthesis with leading edge language modelling to offer realistic interview simulation without the logistical complexities of human coordination of such interviews. By providing job seekers with organized, impartial feedback on their performance, this system allows job seekers to gain a greater understanding of their weaknesses and develop improved self-esteem in a relaxed, comfortable manner. In addition, as AI becomes more prevalent in our society and as recent technologies arise, there will be an increasing number of job seekers that will benefit from utilizing tools such as the one shown above for educational and professional advancement, while simultaneously gaining access to Career Coach support that is currently accessible by a small segment of the population.

9. FUTURE ENHANCEMENTS

In order to provide highly contextualized, thorough interview evaluations, future iterations of the system will focus on integrating complex resume parsing with multimodal nonverbal behavioural analysis. Additionally, adaptive learning algorithms combined with longitudinal data tracking will enable dynamic, personalized curricula that actively track and target a candidate's progressive skill development over time.

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