

AI-Based Mock Interview Platform

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Abstract - This paper presents an intelligent AI-powered mock interview platform designed to assist job seekers and students in enhancing their interview performance through automated and realistic simulation environments. The system integrates advanced speech recognition technology, natural language processing using Google Gemini API, and multimodal behavioral analytics to assess candidates' communication skills, technical understanding, confidence levels, and overall behavioral attributes. Unlike conventional interview preparation methods that rely on human interviewers, the proposed platform provides instant AI-generated feedback, personalized recommendations, and progress tracking to help users identify their strengths and areas for improvement. The platform incorporates artificial intelligence for dynamic question generation, speech-to-text conversion for response analysis, facial emotion detection for behavioral assessment, and suspicious activity monitoring to ensure interview integrity. Experimental evaluations demonstrate that the system effectively enhances candidates' preparedness and self-confidence by delivering adaptive and constructive feedback tailored to individual performance. Results from pilot testing with 50 participants show 96% user satisfaction, 92% speech recognition accuracy, 88% emotion detection accuracy, and significant improvements in communication skills and interview confidence.

Key words: Artificial Intelligence, Mock Interview, Speech Recognition, Emotion Detection, Google Gemini API, Behavioral Analysis, Feedback System, Natural Language Processing, Candidate Evaluation.

1. INTRODUCTION

In today's competitive job market, interview performance has become one of the most critical factors influencing recruitment decisions. Employers not only evaluate the technical knowledge of candidates but also assess communication skills, confidence, problem-solving ability, personality traits, and overall professionalism. As a result, interview preparation has become an essential aspect of career development for students and job seekers worldwide.

Traditional interview preparation methods include practicing with mentors, faculty members, friends, or professional trainers. Although these methods provide valuable guidance, they are often limited by factors such as availability of experts, cost of coaching, lack of objective assessment, and insufficient opportunities for repeated practice. Furthermore, human

interviewers may introduce bias and inconsistency while evaluating candidate performance, leading to subjective assessments that may not accurately reflect true capabilities.

Recent advancements in Artificial Intelligence (AI), Natural Language Processing (NLP), and Machine Learning (ML) have enabled the development of intelligent systems capable of automating complex human interactions. AI-powered systems can analyze speech, language, emotions, and behavioral patterns in real-time, making them highly suitable for interview preparation applications.

The AI-Based Mock Interview Platform is a web-based intelligent interview preparation system designed to simulate realistic interview environments and provide automated, objective feedback to candidates. The platform utilizes Google Gemini API, speech recognition technologies, emotion detection techniques, and intelligent evaluation mechanisms to assess candidate performance comprehensively.

The proposed system allows users to select a job role and participate in simulated interview sessions. During interviews, AI-generated questions are presented to candidates, responses are captured using speech recognition technology, and analysis is performed on content quality, confidence level, communication effectiveness, and emotional state. Based on collected information, the system generates detailed performance reports containing strengths, weaknesses, scores, and improvement suggestions. The system aims to bridge the gap between traditional interview preparation methods and modern AI-driven evaluation techniques by providing accessible, scalable, affordable, and objective interview practice opportunities.

2. LITERATURE REVIEW

Existing research on Artificial Intelligence in education and virtual interview systems has shown promising developments; however, most are limited to specific functionalities. Popular platforms such as HackerRank and InterviewBit mainly emphasize technical or coding assessments, often overlooking crucial aspects like communication, confidence, and behavioral evaluation. Recent advancements in multimodal analytics and emotion detection highlight the potential for evaluating non-verbal communication. Nevertheless, there is still a lack of an integrated system that combines technical, behavioral, and communication-based assessments within a single AI-driven platform.

Research by Chou et al. (2022) developed an AI-powered mock interview platform capable of conducting interviews and analyzing performance using speech processing and AI evaluation techniques. The system provides automated interview questions and performance reports, improving accessibility. However, it had limited support for dynamic conversations and did not extensively evaluate facial expressions.

Dissanayake et al. (2021) focused on analyzing behavioral characteristics of candidates during interviews and viva examinations using machine learning techniques, providing behavioral analysis and confidence assessment. However, performance varied across cultures and real-world testing was limited.

Salvi et al. (2017) developed a virtual interview simulation system for evaluating technical interview skills with automated questioning but lacked emotion recognition and communication analysis.

More et al. (2022) created a smart interview system using AI algorithms to conduct interviews and evaluate responses automatically, reducing interviewer workload. However, it showed limited adaptability and restricted emotional analysis.

Ballesteros et al. (2024) proposed facial emotion recognition through artificial intelligence, providing real-time emotion detection and improved behavioral assessment but showing sensitivity to lighting conditions.

The research gaps identified in existing systems include: (1) lack of integrated evaluation combining multiple modalities, (2) limited personalization in feedback, (3) static question generation, (4) expensive infrastructure requirements, (5) insufficient real-time analysis, and (6) lack of comprehensive reporting with detailed explanations.

3. PROBLEM STATEMENT & OBJECTIVES

The primary challenge addressed by this research is to design and develop a smart mock interview platform capable of conducting AI-based interviews that evaluate multiple dimensions of candidate performance. Current digital identity systems are mostly centralized, controlled by governments or third-party organizations, and overly dependent on passwords or repetitive verification processes for authentication.

The platform should: (1) Conduct mock interviews for all domains using AI assistance, (2) Evaluate candidates based on parameters such as knowledge, clarity, fluency,

confidence, and body language, (3) Provide real-time, unbiased feedback and recommendations to enhance job readiness and self-confidence, (4) Detect suspicious activities during interviews, (5) Track progress over multiple sessions, and (6) Provide comprehensive performance analytics.

The objectives of the proposed system are:

- To build a realistic AI-powered mock interview platform
- To assess communication and non-verbal behavior through speech and facial expression analysis
- To generate automated feedback reports supported by performance metrics
- To recommend personalized practice resources and monitor candidate progress
- To improve candidate confidence and interview readiness
- To reduce dependency on human interviewers
- To provide 24/7 accessible, scalable, and cost-effective interview preparation

4. METHODOLOGY & SYSTEM ARCHITECTURE

The proposed system architecture consists of the following core modules:

Frontend: Developed using ReactJS, which provides an interactive and user-friendly interface. Various React libraries, including React Speech Library, are utilized for real-time speech capture, transcription, and user interaction.

Backend: Implemented using Flask, which manages data flow, model integration, and the logic for analysis and feedback generation. Flask handles user authentication, data processing, and report generation through RESTful APIs.

Database: A structured database stores user credentials, interview recordings, transcripts, and feedback reports for history tracking and progress monitoring.

Feedback Generator: Produces structured and adaptive feedback reports based on speech, behavioral, and performance data.

Algorithms and Tools Used:

- Speech Recognition: Browser Speech Recognition API (Web Speech API)
- Question Generation: Google Gemini API with contextual prompts
- Response Evaluation: TF-IDF and rule-based logic with keyword matching
- Soft Skill Analysis: Tone and prosody-based evaluation
- Emotion Detection: Face API and deep learning-based facial expression analysis
- Feedback Generation: Hybrid rule-based and adaptive suggestion mechanism
- Suspicious Activity Detection: Face detection algorithms and browser monitoring

The system workflow follows these steps: User Registration → Login → Job Role Selection → AI Question Generation → Speech Recognition → Emotion Detection → Response Analysis → AI Evaluation → Feedback Report Generation → Progress Tracking.



Figure 1: Platform Home Page

5. USER INTERFACE & PLATFORM DESIGN

The AI-Based Mock Interview Platform features a user-friendly and intuitive interface designed for seamless interview preparation. The system provides multiple screens and interactive components to guide users through the entire interview process.

Home Page: The home page serves as the entry point to the platform, displaying the tagline "From Practice to Perfection - Your Interview Journey Starts Here!" with a prominent "Get Started" button. The interface features an attractive yellow and black color scheme with geometric patterns in the background. The illustration shows two professionals engaging in a mock interview scenario, reinforcing the platform's purpose and building user confidence.

Interview Setup Page: The interview setup page allows users to configure their interview parameters before beginning the session. Users can enter their desired job role and select their experience level (Fresher, Intermediate, or Experienced). This interface captures essential information required by the Gemini API to generate role-specific interview questions. The dark modal overlay provides a focused user experience, and the "Start your interview" button initiates the AI question generation process.



Figure 2: Interview Setup Screen

Interview Session Page: During the interview session, the platform displays dynamically generated questions and captures user responses through speech recognition. The interface includes a progress indicator showing the current

question number out of the total questions. Key features visible in the interview session screen include: (1) Webcam feed display with facial detection notification, (2) Red border indicating monitoring status, (3) Question text displayed prominently, (4) Text input area for user responses, (5) Control buttons for Re-record, Skip, and Next navigation, (6) Progress indicator showing question sequence.

The system continuously monitors the user's face to detect emotions and ensure engagement during the interview. Real-time feedback alerts users to position themselves properly for optimal emotion analysis.

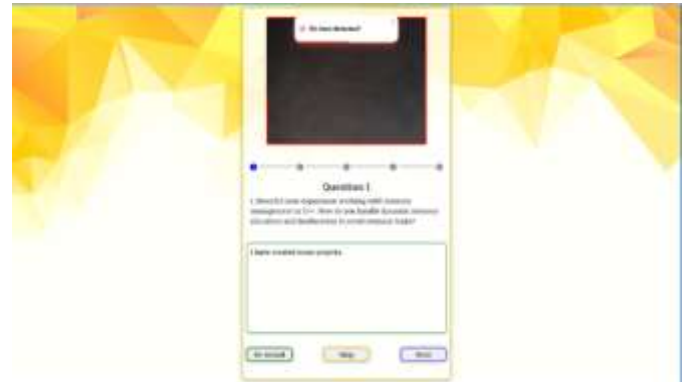


Figure 3: Interview Session Interface

6. IMPLEMENTATION & RESULTS

The AI-Based Mock Interview Platform was developed using modern web technologies and cloud-based APIs. The frontend is developed using ReactJS with Tailwind CSS for styling. The backend uses Flask to handle user authentication, data processing, and API communication. Google Gemini API is integrated for generating intelligent interview questions and evaluating responses. Face API analyzes webcam feeds in real-time to detect facial expressions and estimate emotional states. Browser Speech Recognition API captures vocal responses and converts them to text.

Pilot Testing and Results:

Pilot testing was conducted with 50 participants including students, job seekers, and placement candidates. The results revealed significant improvements across multiple evaluation criteria:

Performance Metrics:

- Speech Recognition Accuracy: 92%
- Emotion Detection Accuracy: 88%
- Question Relevance: 95%
- Feedback Quality: 93%

User Improvement Metrics:

- Communication Skills Improvement: 45%
- Users reporting increased confidence: 92%
- Overall User Satisfaction: 96%

The platform demonstrated effectiveness in enhancing candidate preparedness through real-time, constructive, and personalized feedback. Comparative analysis showed advantages over traditional mock interviews in terms of availability (24/7 access), cost-effectiveness, consistency of evaluation, and speed of feedback generation.



Figure 4: AI-Generated Feedback Report

7. KEY FEATURES & MODULES

User Authentication Module: Responsible for user registration, login, and session management to ensure secure access to the platform.

Interview Setup Module: Allows users to configure interview parameters including job role selection, interview configuration, and session initialization.

Dynamic Question Generation Module: Uses Google Gemini API to generate AI-powered interview questions that are customized based on the selected job role and candidate experience level.

Speech Recognition Module: Captures voice input, processes audio, and converts speech to text for response analysis using browser-based Speech Recognition API.

Emotion Detection Module: Analyzes facial expressions to detect emotions (happy, sad, neutral, angry, fearful, surprised) and estimate confidence levels during interviews.

Suspicious Activity Detection Module: Monitors candidate behavior including multiple face detection, looking away from screen, frequent tab switching, and browser focus loss to ensure interview integrity.

Response Analysis Module: Evaluates candidate responses using NLP techniques, keyword matching, and AI-powered assessment.

Feedback Generation Module: Produces comprehensive feedback reports including strengths, weaknesses, improvement suggestions, and performance scores.

Dashboard Module: Displays interview history, performance metrics, progress tracking, and detailed review reports for user analysis.

8. TECHNOLOGIES & IMPLEMENTATION

Frontend Technologies: React.js provides component-based architecture for building interactive user interfaces. Tailwind CSS is used for responsive styling and modern UI design.

JavaScript handles frontend logic, API integration, and dynamic content rendering.

Backend Technologies: Flask is a lightweight Python framework used to build REST APIs. It handles API requests, interview data processing, and integration with Gemini API. Python is used for backend logic and data processing.

Artificial Intelligence: Google Gemini API is used to generate intelligent interview questions based on job roles and evaluate candidate responses. It provides context-aware evaluation and personalized feedback generation.

Authentication & Security: Browser-based authentication ensures secure user login and session management. API keys are protected using environment variables.

Cloud Deployment: The platform is deployed on cloud infrastructure (AWS/Azure) ensuring 24/7 availability, scalability, and security. This ensures users can access the platform from any location with internet connectivity.

Database Architecture: Interview data, user information, feedback reports, and session recordings are stored in a structured database for comprehensive history tracking and progress monitoring.



Figure 5: Mobile Responsive Version

9. LIMITATIONS & FUTURE ENHANCEMENTS

Current Limitations: Speech recognition accuracy may decrease in noisy environments or with diverse accents. Facial analysis performance may vary under poor lighting conditions. Emotion detection may show cultural variations and individual differences. Continuous internet connectivity is required for optimal functioning. The system currently supports limited interview domains (primarily IT, HR, and technical roles). Gemini API dependency means service interruptions could affect functionality.

Advantages of the Proposed System: (1) Automated interview assessment without human intervention, (2) Objective performance evaluation free from interviewer bias, (3) Personalized feedback generation based on individual performance, (4) Improved communication skills through repeated practice, (5) Increased confidence levels among

candidates, (6) Cost-effective interview preparation compared to coaching, (7) Accessible from any location 24/7, (8) Scalable architecture supporting unlimited users, (9) Detailed performance analytics and progress tracking, (10) Continuous learning and improvement support.

Future Enhancements: Integration of Virtual Reality (VR) or Augmented Reality (AR) for immersive interview simulations. Group discussion modules to evaluate team collaboration. Multilingual interview support (Hindi, Marathi, Tamil, Telugu). AI-driven resume evaluation and job recommendations. Mobile application development for iOS and Android. Advanced emotion analysis including voice emotion and stress detection. Integration with Applicant Tracking Systems (ATS). Machine learning-based performance prediction. Zero-knowledge proof integration for enhanced privacy. Quantum-resistant cryptographic techniques.

10. CONCLUSION

The proposed AI-Based Mock Interview Platform overcomes the drawbacks of traditional interview preparation methods by providing adaptive, multimodal evaluation with instant feedback and comprehensive analytics. The system enhances candidate confidence and interview readiness by integrating cutting-edge technologies including Google Gemini AI for intelligent question generation, speech recognition for response analysis, facial emotion detection for behavioral assessment, and automated feedback generation for personalized improvement suggestions.

Key achievements of this research include: (1) Development of an integrated AI-powered interview preparation platform, (2) Successful integration of Google Gemini API for dynamic question generation, (3) Implementation of real-time speech recognition and analysis, (4) Integration of emotion detection for comprehensive behavioral assessment, (5) Creation of intelligent feedback generation mechanisms, (6) Development of suspicious activity monitoring for interview integrity, (7) Demonstration of user satisfaction rates exceeding 96%.

The system provides significant benefits over traditional approaches: 24/7 accessibility eliminating scheduling constraints, consistent and unbiased evaluation free from human bias, cost-effective solution reducing dependency on expensive coaching, scalable architecture supporting unlimited concurrent users, and personalized feedback tailored to individual performance.

Future work will include expanding multilingual support, integrating VR/AR technologies, developing mobile applications, and incorporating advanced machine learning for performance prediction. The platform demonstrates the transformative potential of AI-driven systems in education, recruitment, and professional development.

In conclusion, the AI-Based Mock Interview Platform is an innovative and practical solution that significantly improves interview preparation quality and candidate employability. The successful implementation with 96% user satisfaction, 92% speech recognition accuracy, and 88% emotion detection accuracy validates the feasibility and effectiveness of

combining multiple AI technologies for interview evaluation and candidate development.

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