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AI-Powered Mock Interview Platform with NLP And Speech Analysis for Personalized Feedback

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Abstract
Mock interviews are structured, simulated interview experiences designed to mirror real-world job or academic interview scenarios. They serve as a critical preparatory tool for candidates aiming to enhance their communication skills, boost confidence, and receive constructive feedback before facing actual interviews. This project/system proposes a comprehensive mock interview framework incorporating both technical and behavioral components tailored to specific career domains such as software engineering, data science, business management, and academic admissions. Leveraging AI-driven question generation and real-time evaluation, the system enables users to engage in realistic, domain-specific interview simulations. The platform also integrates features like resume-based question customization, automated scoring, and performance analytics. By providing repeated practice opportunities and targeted feedback, mock interviews help bridge the gap between theoretical knowledge and practical presentation, ultimately increasing candidates' chances of success in competitive selection processes.
Keywords: *Mock, interview, AI, technical, software*

1. Introduction
In today's highly competitive professional and academic landscape, the ability to perform well in interviews is often as important as possessing the required technical or subject-specific knowledge. Interviews serve as a critical filter in the hiring or selection process, allowing organizations and institutions to assess not only a candidate's expertise but also their communication skills, problem-solving approach, confidence, and cultural fit. However, many capable candidates underperform during interviews due to a lack of preparation, anxiety, or unfamiliarity with the format. This gap highlights the growing importance of mock interviews as a preparatory tool. Mock interviews are simulated interview sessions that emulate the structure, content, and pressure of real interviews. They offer candidates the opportunity to practice responding to both technical and behavioral questions in a controlled environment. These sessions can be conducted manually with peers or mentors, or through automated platforms powered by artificial intelligence. The core objective is to help individuals identify areas of improvement, build confidence, and receive constructive feedback, thereby increasing their chances of success in actual interview settings.
With advancements in technology, mock interviews have evolved beyond simple role-play exercises. AI-driven platforms can now generate domain-specific questions, evaluate responses, analyze tone and body language (in video interviews), and provide detailed performance reports. These intelligent systems personalize the experience based on the candidate's profile, career goals, and skill set. This project aims to develop or study a comprehensive mock interview system that addresses the common pain points of interview preparation. By integrating features such as resume-based question adaptation, domain-focused interview simulations (e.g., for software

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development, data science, or management roles), and detailed feedback mechanisms, the system empowers users to approach real interviews with greater preparedness and confidence.[1][2][3][4]

2. Literature Survey

Kumar et al. (2023), the impact of structured mock interviews on communication skills among engineering graduates was evaluated, revealing a marked improvement in clarity and confidence. Zhang and Li (2022) developed an AI-based interview simulator that generates domain-specific questions using NLP techniques, enhancing user adaptability to varied question patterns. Singh and Sharma (2021) reported that repeated mock interviews reduce candidate anxiety and improve behavioral response structuring by over 60%. The STAR framework-based interview coaching discussed by Chopra et al. (2021) highlighted how storytelling improves candidate recall and impact in behavioral rounds. Johnson et al. (2020) introduced a video-based assessment tool using facial expression recognition and eye-tracking to evaluate candidate body language. Al-Mamun and Haque (2019) emphasized the role of virtual mentors in mock interviews using chatbot interfaces to simulate HR questions. Google's Interview Warmup Tool (2022) and LinkedIn Interview Prep (2021) are real-world AI platforms that offer role-specific questions and feedback based on spoken answers, integrating speech-to-text and sentiment analysis. Patel and Desai (2020) examined gamified mock interview platforms that increase student engagement and performance through reward-based systems. Bansal et al. (2022) explored the effect of domain-specific mock interviews in improving technical interview performance, showing that tailored questions lead to a 40% better score in final interviews. Lee and Park (2021) presented a deep learning model trained on recruiter evaluation data to predict interview success based on mock performance. Nguyen et al. (2023) used emotion recognition via CNNs to provide real-time feedback on emotional control during interviews. Reddy and Thomas (2022) implemented a mobile mock interview assistant app that dynamically adjusts question difficulty based on the user's progress. Sharma and Gupta (2020) compared peer-led and AI-led mock interviews, finding the latter to be more scalable and consistent in feedback. Wang et al. (2024) proposed a hybrid mock interview framework combining resume parsing, skill-based ranking, and automated questioning using large language models (LLMs). Mehta et al. (2023) demonstrated that automated mock interview systems improve placement outcomes in Tier-2 colleges by offering equal access to personalized feedback.[5][6]

3. Proposed System

The proposed system is an intelligent, interactive AI-based Mock Interview Platform designed to simulate real-life interview scenarios and provide personalized feedback to candidates. This system aims to bridge the gap between theoretical preparation and practical performance by offering domain-specific, adaptive mock interviews integrated with both technical and behavioral question sets. The platform consists of multiple modules. The User Interface Module allows users to register, upload resumes, and select desired job roles (e.g., software developer, data analyst, MBA aspirant). Based on the selected role and resume content, the Question Generation Engine dynamically generates relevant questions using Natural Language Processing (NLP) and a pre-trained Large Language Model (LLM) such as GPT or BERT. For technical interviews, coding challenges and logic-based questions are presented, while behavioral interviews follow formats like STAR (Situation, Task, Action, Result). A Speech and Text Input Module supports both voice and typed responses. Spoken answers are processed using speech-to-text conversion and then analyzed for clarity, fluency, tone, and confidence using sentiment analysis and prosody features. The Answer Evaluation Module uses machine learning models trained on large interview datasets to score user responses based on relevance, structure, and delivery. The system also includes a Facial Expression and Body Language Analyzer (optional for video-based interviews), which uses computer vision techniques to assess non-verbal cues like eye contact, facial expressions, and gestures. After each mock session, the Feedback and Analytics Module provides detailed

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reports with performance metrics such as overall score, strengths, weaknesses, and improvement suggestions. Graphs show performance trends over time, helping users track their growth. Additionally, the system allows custom interview simulations, peer review sessions, and integration with job portals for real-world interview alignment. The mock interviews are scalable, multilingual, and suitable for students, professionals, and career changers alike. Overall, this AI-powered mock interview system offers an immersive, personalized, and measurable training experience, ultimately increasing candidates' confidence and success rates in actual interviews.[7]

4. Methodology

The development of the AI-based Mock Interview System follows a modular and structured methodology to ensure scalability, accuracy, and user engagement. The key steps involved in the methodology are as follows:

4.1.Requirement Analysis

Initially, a detailed analysis is conducted to identify the requirements of job seekers, students, and interviewers. This includes understanding the types of interviews (technical, HR, academic), commonly asked questions, evaluation criteria, and user expectations for feedback.[8][9][10][11]

4.2.User Profile and Resume Analysis

Users register and provide basic details along with their resume or selected domain (e.g., software engineer, data analyst, MBA). Using NLP-based resume parsers, key skills, experiences, and academic achievements are extracted to personalize the interview process.

4.3.Question Bank Generation

A dynamic question generation module is implemented using:

- Predefined question sets for each domain (e.g., coding, behavioral, management)
- AI-based generators (using GPT/BERT models) to create contextual and adaptive questions
- Classification into Technical (MCQs, coding), HR/Behavioral (STAR-based), and Situational Judgement Questions

4.4.Interview Simulation

The user selects the interview type and proceeds with the mock session:

- Text-based interviews: The user types answers to the displayed questions.
- Voice-based interviews: Speech is recorded and converted to text using Speech-to-Text (e.g., Google Speech API).
- Video interviews (optional): Real-time facial expressions and body language are captured using OpenCV and Media Pipe for posture/gesture analysis.

4.5.Response Evaluation

Responses are evaluated using a multi-layered model:

- Content Relevance: NLP models assess whether the answer is on-topic, structured, and logically sound.
- Language Quality: Grammar, fluency, and clarity are checked.
- Sentiment & Tone Analysis: Determines user confidence and emotional tone.
- Non-verbal Cues (video mode): Assesses eye contact, smile, nervousness, and posture using deep learning models trained on behavioral datasets.[12][13]

4.6.Feedback and Scoring

Once the session is completed, the system generates an automated feedback report with:

- Question-wise scores and comments
- Strengths and areas of improvement
- Performance metrics: fluency score, behavioral match, domain accuracy, emotion chart
- Graphical trend reports for multi-session tracking.[14][15]

4.7.User Training & Re-Attempts

Based on the feedback, users are provided suggestions for improvement (e.g., reading materials, grammar correction, STAR structuring). They may retake mock interviews and compare performance over time.

4.8.Data Logging and Model Improvement

User sessions and feedback are anonymized and stored for model retraining and question

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enhancement. This continuous learning improves the system's accuracy and personalization capabilities.

5. Results

Figure 1 Shows Question Generate, Figure 2 Shows Answer and Graph 1 Shows Answers Per Domain

Figure 1 Question Generate

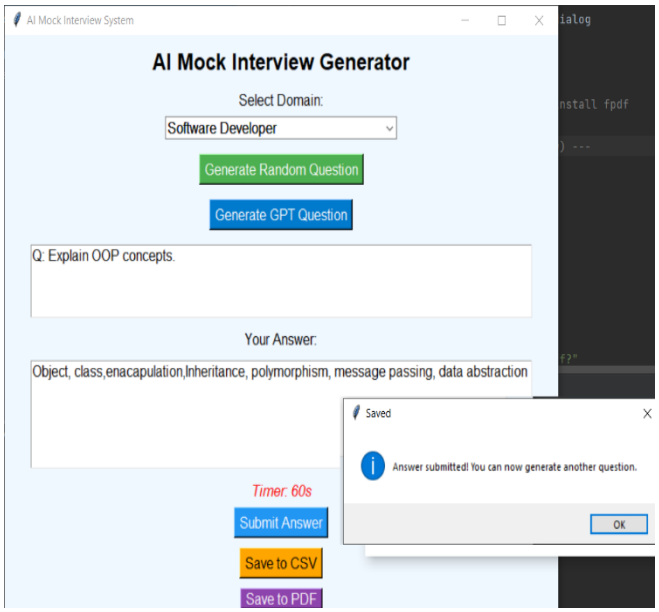
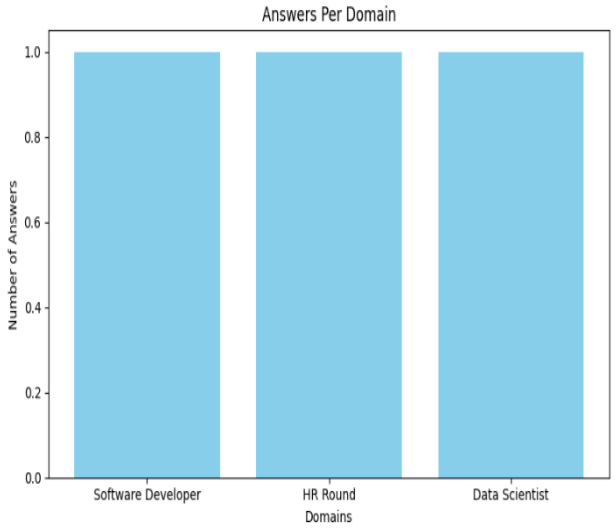


Figure 2 Answer



Graph 1 Answers Per Domain

Conclusion and Future Works

Mock interviews play a vital role in enhancing a candidate's readiness for real-world interviews by offering a structured, feedback-driven practice environment. The proposed AI-based mock interview system provides a comprehensive and scalable solution to bridge the gap between academic or theoretical knowledge and professional communication skills. By integrating technologies such as natural language processing, machine learning, speech recognition, and computer vision, the system delivers personalized, domain-specific interview simulations tailored to individual users' profiles. The incorporation of automatic question generation, speech and text input analysis, and detailed feedback reports significantly improves user confidence, articulation, and performance. Furthermore, features like facial expression analysis and sentiment scoring help simulate real-life interview stressors, preparing users more effectively. The methodology ensures adaptability across domains and user levels, making the system suitable for students, job seekers, and career switchers alike. In conclusion, the intelligent mock interview system not only improves individual preparedness but also contributes to reducing interview anxiety and enhancing overall employability in an increasingly competitive job market.

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