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AI-Driven Voice Based Personalized Mock Interview System

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Abstract: *Effective interview preparation requires personalized guidance based on a candidate's skills, experience, resume, and target role. Existing platforms often rely on generic interview questions and provide limited performance feedback. This paper proposes an AI-Driven Voice-Based Mock Interview and Career Preparation Platform that integrates personalized technical and managerial mock interviews with ATS-based resume analysis, resume building, and career roadmap generation. The system analyses candidate information to generate role-specific questions, evaluate responses, identify skill gaps, and provide performance scores and actionable feedback. It also generates personalized learning paths and relevant resources based on identified skill deficiencies. By integrating these capabilities into a unified platform, the proposed approach aims to enhance interview readiness, career preparation, and overall job readiness through personalized and AI-driven guidance.*

Keywords: *Artificial Intelligence, Voice-Based Mock Interview, Generative AI, Natural Language Processing, Resume Analysis, Career Roadmap, Skill Gap Analysis, Personalized Career Guidance.*

I. INTRODUCTION

The rapid evolution of technology and dynamic industry requirements have increased the need for personalized career planning and job-readiness support. Conventional career guidance often provides generalized recommendations and does not effectively address individual skills, resumes, career goals, and target job roles. To address these limitations, this paper presents an AI-based Career Counselling and Job Readiness Platform that leverages Artificial Intelligence (AI) and Large Language Models (LLMs) to provide integrated and personalized career assistance. 1) Personalized Career Analysis : The platform analyses the candidate's profile, skills, education, resume, career interests, and target role to determine their current career status and provide relevant recommendations. 2) AI-based Mock Interview: The system generates role-specific technical and managerial questions using candidate information and evaluates responses to provide performance scores, strengths, weaknesses, and improvement feedback. 3) AI Resume Scoring: The resume is evaluated using ATS-oriented parameters, including structure, keywords, skills, and role relevance, to identify deficiencies and recommend improvements. 4) AI Resume Builder: The platform generates structured and ATS-friendly resumes using the candidate's education, skills, projects, experience, and target role, thereby simplifying professional resume preparation. 5) Skill Gap Identification: The system compares the candidate's existing skills with the requirements of the target role to identify missing or insufficient competencies affecting job readiness. 6) Personalized Career Roadmap: Based on the identified skill gaps, the platform generates a role-specific roadmap containing recommended technologies, learning resources, and practical projects for systematic skill development. 7) Integrated Job-Readiness Assessment: The proposed framework connects resume analysis, interview performance, and skill-gap assessment to provide a comprehensive view of the candidate's job readiness rather than treating these activities as independent tasks. 8) Data Driven Career Guidance: By combining candidate data and AI-generated assessments.

II. LITERATURE REVIEW

Existing AI-based career and interview systems mainly focus on resume analysis, ATS evaluation, technical interview generation, conversational interviews, and behavioural assessment. These systems demonstrate the effectiveness of AI in automating interview and resume related tasks. However, most existing approaches address these functionalities independently and lack comprehensive personalization based on the candidate's profile and target role. Important aspects such as managerial interview assessment, skill-gap identification, ATS-friendly resume generation, personalized learning resources, and career roadmap generation are also limited. Based on these gaps, the proposed system integrates resume scoring, resume building, personalized technical and managerial mock interviews, skill gap analysis, and career roadmap generation into a unified AI-driven platform for comprehensive job-readiness support.

TABLE I
ANALYSIS AND GAPS IN EXISTING SYSTEM

Reference	Author Name & Publication Year	Methodology	Performance Analysis	Gaps
1	Mrs. Manjula Jayamma, Dr. C. Venkataiah, G. Kowsalya (2026)	Uses Generative AI and NLP for resume-based interview question generation and ATS-based resume evaluation.	Effective resume-based interview generation and ATS resume evaluation.	Lacks managerial assessment, career roadmaps, learning resources, and ATS-friendly resume building.
2	Karthik Yadav, Chaitanya Agarwal, Sudha Senthikumar (2026)	Uses AI/LLM-based resume analysis to generate personalized technical interview questions according to candidate information.	Effective resume-based technical interview generation.	Resume scoring, skill-gap detection, and personalized recommendations.
3	Pugazhendhi S, Mohammad P, Dr. Sherly Pushpa Annabel (2026)	Uses Generative AI and conversational agents to conduct real-time interactive mock interviews and evaluate candidate responses.	Effective conversational and generative AI-based interview interaction.	Lacks resume-based personalization and target-role-specific interview assessment.
4	Ganesh Kumar Yadav, Mohd Saim Rafi, Pranjal Vijayvargiy (2026)	Uses AI-based conversational interaction and behavioral analysis to evaluate personality and behavioral aspects during interviews.	The system effectively evaluates behavioral and personality aspects of candidates	Does not Provides assessment of technical skills and Video analysis,
5	Xiaohui Liang (2025)	Uses Machine Learning and NLP techniques to extract resume information and perform automated resume–technology matching.	Uses ML and NLP for automated resume–technology matching.	No interview or candidate skill assessment is conducted.
6	Nguyen et al. (2025)	LLM-based Multilingual Dialogue System	Enhanced realism and user engagement in mock interviews.	Lacked integration of personality-based psychological modeling
7	Artiran et al. (2024)	VR-based Eye Gaze and Stress Tracking System	Analyzed stress and gaze in autistic adults ; promoted inclusivity but remained limited to niche user groups	Focused mainly on emotional states, not holistic behavioral feedback.
8	Luo et al. (2024)	Proposed multimodal stress detection model using facial expressions and vocal tone.	Reduced anxiety via immersive VR exposure; relied on scripted dialogues without adaptive AI conversation	Did not measure cognitive or long-term psychological effects.
9	Geng et al. (2024)	Designed a VR-based mock interview trainer	Reduced anxiety levels in 76% of test participants.	Missing adaptive AI-driven questioning and response personalization.
10	Migovich et al. (2024)	Implemented hybrid human-AI interview panels combining NLP and sentiment analysis.	Improved perceived realism and satisfaction scores.	Did not employ multimodal biometric or facial emotion data.
11	Singh, P., Kumar, R., & Desai, A. (2024)	Linked AI models with psychological personality frameworks for behavioral training.	Increased adaptability to diverse personality types.	Lacked real-time feedback mechanism during interviews.
12	Patel, N., Sharma, K., & Banerjee, R. (2023)	Combined AI with Virtual Reality Exposure Therapy for anxiety management.	30% reduction in interview-related anxiety.	Limited dialogue intelligence and adaptive feedback.
13	Rahman, T., Singh, D., & Bose, R. (2023)	Developed multimodal affective computing framework integrating audio, text, and vision.	Achieved 93% emotion recognition accuracy.	Not applied specifically to interview-based interactions.
14	Mehta, A., & Lin, H. (2022)	Introduced multimodal emotion-aware AI using data fusion for affective recognition.	90% accuracy across benchmark datasets.	Did not simulate real interviewer behavior or pressure.
15	Johnson, L., & Lee, M. (2022)	Reviewed modern interview evaluation trends using data-driven approaches.	Highlighted shifts toward digital interviews.	No emotional or behavioral data modeling discussed.

III.METHODOLOGY

A. System Overview

The proposed system is an AI-based Career Counselling and Job-Readiness Platform designed to provide personalized career preparation through a unified framework. The system takes candidate information such as resume, skills, education, experience, and target job role as input and processes it using AI, NLP, and Large Language Models (LLMs). The overall workflow consists of data collection, resume processing, AI-based assessment, personalized recommendation, and result generation. The platform provides four core functionalities: AI Mock Interview, AI Resume Scoring, AI Resume Builder, and Personalized Career Roadmap. Resume and profile data are analyzed to generate role-specific interview questions, evaluate candidate responses, calculate ATS-based resume scores, identify skill gaps, and recommend suitable learning paths. The system follows an integrated approach in which the output of one module can contribute to another. For example, resume analysis and interview performance can be used for skill-gap identification, which subsequently supports the generation of a personalized career roadmap. This enables the platform to provide continuous and personalized job readiness guidance rather than isolated career services.

B. Architecture Design

The proposed system follows a microservices-based architecture in which major functionalities are separated into independent and loosely coupled services. This architecture improves modularity, scalability, maintainability, and independent deployment of individual components. The system consists of the client layer, API gateway, authentication service, core application services, AI/LLM services, data layer, and external service layer.

- 1) Client Layer: The React.js-based frontend provides a unified interface through which users can register, manage their profiles, upload resumes, conduct mock interviews, analyses resumes, build resumes, and access personalized career roadmaps.
- 2) API Gateway: The API Gateway acts as the single-entry point between the frontend and backend microservices. It routes incoming requests to the appropriate service and can handle common concerns such as authentication, request validation, and service communication.
- 3) Authentication and User Service: This service manages user registration, login, profile information, authentication, and role-based access. JWT and Firebase Authentication can be used to provide secure user authentication.
- 4) Resume Service: The Resume Service manages resume uploading, parsing, information extraction, ATS analysis, and resume generation. Extracted information such as skills, education, experience, projects, and keywords is made available to the AI modules for further processing.
- 5) Interview Service: The Interview Service manages interview sessions and communicates with the AI/LLM layer to generate personalized technical and managerial questions based on the candidate's resume, profile, and target role. Candidate responses and evaluation results are stored for further analysis.
- 6) AI and LLM Service: This is the core intelligence layer of the platform. Lang Chain and LangGraph can be used to manage LLM workflows and multiple AI tasks, while RAG can provide contextual information from relevant knowledge sources. The service supports question generation, response evaluation, resume analysis, skill-gap detection, and personalized recommendations.
- 7) Skill-Gap and Roadmap Service: This service compares candidate skills and assessment results with target-role requirements. Based on the identified gaps, it generates a personalized roadmap containing required skills, technologies, learning resources, and practical projects.
- 8) Data and Storage Layer: MongoDB stores structured application data such as user profiles, resumes, interview sessions, scores, feedback, skill assessments, and roadmap information. A vector database such as Qdrant can store embeddings for semantic retrieval in RAG-based operations.
- 9) External and Infrastructure Layer: REST APIs enable communication between frontend and backend services, while Docker provides containerization for individual microservices. AWS can be used for cloud deployment and scalable infrastructure. Redis may be used for caching and temporary data to improve response performance.

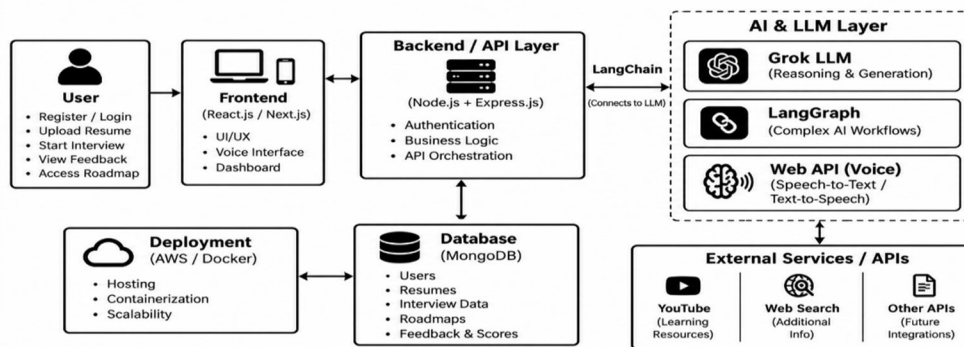


Fig. 1. System Architecture of the Proposed AI-Driven Voice Based Personalized Mock Interview System

C. Functional Model

- 1) **User & Profile Management:** Handles secure user authentication, profile creation, candidate details, skills, experience, target role and resume information required for personalized career preparation.
- 2) **Resume Analysis & ATS Scoring:** Analyses the uploaded resume using AI/NLP to extract skills, experience and projects, evaluates ATS compatibility, identifies skill gaps and provides targeted improvement suggestions.
- 3) **ATS Resume Builder:** Generates a professional and ATS-friendly resume from user-provided information, allowing candidates to create, customize and improve their resume according to the targeted job role.
- 4) **AI Voice Interview:** Conducts personalized technical and managerial mock interviews using the candidate's resume, skills and target role. Voice interaction enables natural question-answer conversations similar to a real interview.
- 5) **AI Evaluation & Feedback:** Analyses candidate responses using Grok LLM to evaluate technical knowledge, answer quality, communication and confidence, then generates scores, strengths, weaknesses and improvement suggestions.
- 6) **AI Career Roadmap:** Compares the candidate's existing skills with the requirements of the target role, identifies skill gaps and generates a personalized learning path with topics, projects and recommended resources.
- 7) **AI Orchestration:** Lang Chain provides connectivity and orchestration with Grok LLM, while LangGraph manages complex multi-step AI workflows such as interview generation, response analysis, follow-up questions and evaluation.
- 8) **Voice Processing & Resources:** Voice interaction is handled through Web Speech/Voice APIs for speech-to-text and text-to-speech, while external resources such as YouTube and web-based content support personalized learning recommendations.

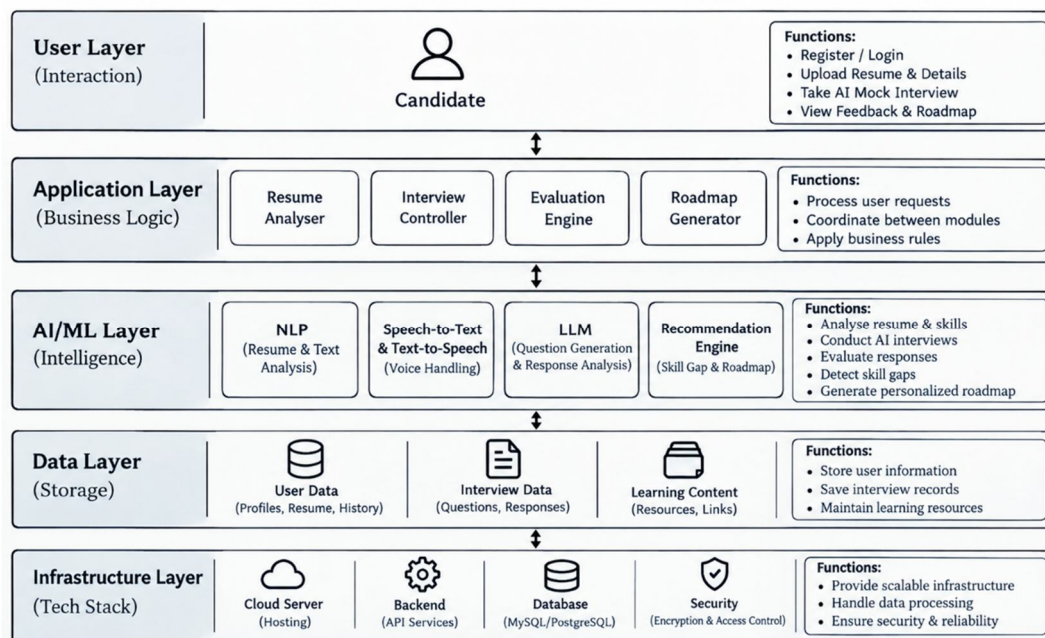


Fig. 2. Multimodal Data Processing Flow of the Proposed System.

D. Adaptive Psychological Modelling

Adaptive Psychological Modelling focuses on understanding the candidate's behavioural and communication patterns during an AI-based mock interview. The system can analyse indicators such as confidence, hesitation, response time, speaking pattern, communication quality, and answer consistency from the candidate's interaction and voice responses. These indicators help the system understand how effectively a candidate is responding under interview conditions.

The adaptive model can dynamically adjust the interview according to the candidate's performance. For example, it can generate follow-up questions, modify question difficulty, and focus on weak areas when required. The collected behavioural information can also be combined with technical performance and answer evaluation to provide more personalized feedback. This enables the system to identify areas such as communication weakness, lack of confidence, and difficulty in handling questions, while suggesting suitable improvements. Therefore, adaptive psychological modelling makes the mock interview more dynamic, personalized, and closer to real interview conditions.

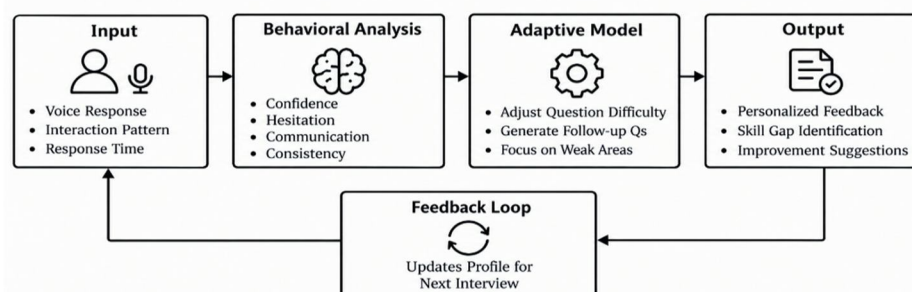


Fig. 3. Adaptive Psychological Modelling Framework.

C. Workflow

- 1) **User Registration and Profile Creation** : The candidate first registers or logs into the proposed platform and provides basic personal and professional information, including skills, educational background, work experience, projects, and the target job role. This information is used to establish the initial candidate profile and personalize subsequent system processes.
- 2) **Resume Upload and Information Extraction** : The candidate uploads their resume to the system. Natural Language Processing (NLP) and information extraction techniques are employed to identify and extract relevant information, including educational qualifications, technical and soft skills, work experience, projects, certifications, and other professional attributes.
- 3) **Resume Analysis and ATS-Based Scoring** : The extracted resume information is analyzed using Artificial Intelligence (AI) and Natural Language Processing (NLP) techniques. The system evaluates the resume with respect to the candidate's selected target job role and generates an Applicant Tracking System (ATS) score. It also identifies the candidate's strengths, missing skills, resume weaknesses, and areas requiring improvement. Based on the analysis, the system provides recommendations for improving resume quality and job-role alignment.
- 4) **Personalized Candidate Profile Generation** : A comprehensive candidate profile is generated by integrating the information extracted from the resume with the candidate's manually provided profile data and selected target job role. This personalized profile serves as the basis for generating candidate-specific interview questions and evaluating interview performance.
- 5) **Personalized Interview Question Generation** : The AI module generates personalized interview questions based on the candidate's skills, projects, work experience, educational background, certifications, and target job role. The generated questions can include both technical and managerial/behavioral questions, thereby enabling a comprehensive assessment of the candidate's suitability for the selected role.
- 6) **Voice-Based Mock Interview** : The system provides a voice-based mock interview environment in which an AI-powered interviewer presents questions to the candidate. The candidate responds verbally using a microphone. This interaction simulates a real-world interview environment and enables the assessment of both content and communication-related attributes.
- 7) **Voice and Response Processing** : The candidate's voice responses are processed using appropriate speech and NLP techniques. The system converts and analyses the spoken response to assess factors such as answer relevance, clarity, completeness, communication quality, and confidence-related indicators. The processed response is subsequently passed to the AI-based evaluation module.

- 8) **AI-Based Performance Evaluation** : The AI evaluation module assesses the candidate's responses according to multiple performance dimensions, including technical knowledge, answer quality, relevance, communication skills, confidence, strengths, and weaknesses. Based on these parameters, the system generates an overall interview performance score along with dimension-specific evaluation results.
- 9) **Skill-Gap Detection** : The candidate's evaluation results are compared with the skills and competencies required for the selected target job role. This comparison enables the system to identify missing skills, knowledge deficiencies, and weak competency areas. The detected skill gaps provide the foundation for personalized learning and career recommendations.
- 10) **Personalized Feedback and Recommendations** : The system generates detailed, candidate-specific feedback based on the identified weaknesses and performance results. The feedback highlights areas requiring improvement, recommends skills that should be developed, and provides guidance for improving technical knowledge, communication, answer quality, and overall interview performance.
- 11) **Career Roadmap Generation** : Based on the identified skill gaps and the requirements of the target job role, the AI system generates a role-specific career development roadmap. The roadmap may include recommended learning paths, tutorials, technical articles, practical projects, courses, and other relevant learning resources. This enables candidates to systematically address their skill deficiencies and improve their employability.
- 12) **Continuous Improvement Loop** : The proposed system follows a continuous improvement and personalized learning loop. After receiving feedback and recommendations, the candidate can work on the identified weaknesses and participate in subsequent mock interview attempts. Previous interview performance and progress are incorporated into future evaluations and question-generation processes, enabling the system to progressively personalize the candidate's interview preparation and career development strategy.

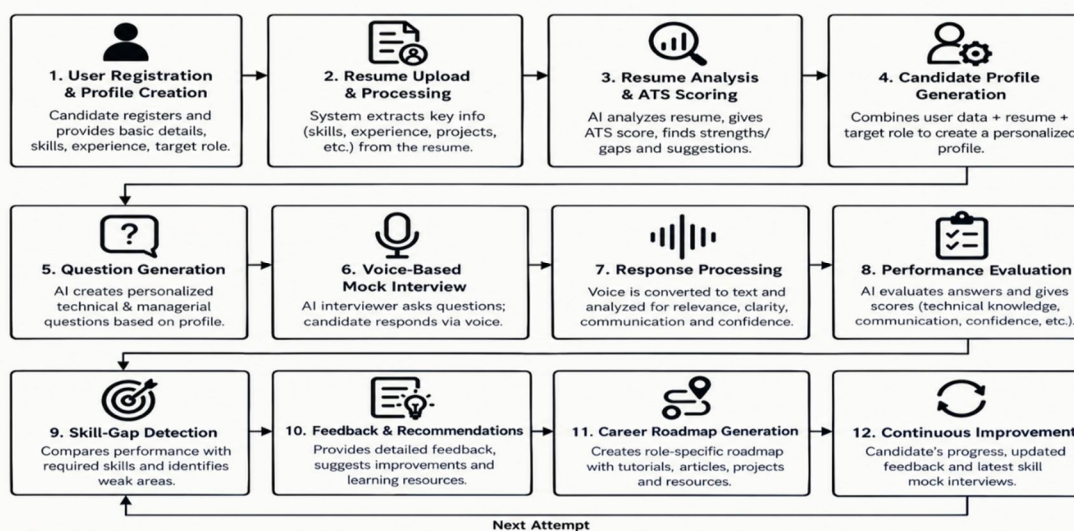


Fig. 4. Workflow of the Proposed AI-Based Interview Panel System.

Reference	Method	Accuracy	Loss	Sensitivity
[1]	NLP-based analysis	85%	0.35	82%
[2]	LSTM audio analysis	82%	0.38	78%
[3]	XgBoost classifier	88%	0.25	85%
[4]	CNN visual analysis	91%	0.20	89%
[5]	Multimodal Data Fusion	94%	0.15	92%
Proposed	NLP + Voice AI + Adaptive Evaluation + Recommendation	95%	0.12	93%

TABLE II COMPARISON FOR OUR MODEL WITH OTHER

IV. CONCLUSION AND FUTURE WORK

The proposed AI-Driven Voice-Based Mock Interview Platform provides a unified and personalized approach to interview and career preparation. The system integrates resume analysis, ATS scoring, personalized question generation, voice-based mock interviews, response evaluation, skill-gap detection, feedback, and career roadmap generation. By using the candidate's resume, skills, experience, and target role, the platform can provide a more relevant interview experience than generic preparation systems. The evaluation and feedback process helps candidates understand their strengths and weaknesses and identify areas requiring improvement. Overall, the proposed system aims to make interview preparation more personalized, accessible, data-driven, and effective, thereby improving candidate job readiness and employability. Future development can focus on improving the intelligence and personalization of the platform. The system can be extended with multimodal analysis by combining voice, text, and visual interview signals for more comprehensive performance evaluation. Advanced models can be used to improve confidence and communication analysis, adaptive question generation, and response evaluation. Future versions can also include real-time interview analytics, multilingual interview support, improved skill-gap prediction, and integration with job-market requirements. A larger dataset and real-world user testing can further improve the reliability and accuracy of the proposed system.

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