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AI-Powered Interview Simulator: A Web-Based Platform for Personalised Interview Practice with ATS Resume Analysis, Voice and Visual Analysis

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Abstract: *Interviews are the decisive stage of recruitment, yet many students and job seekers lack realistic, personalised practice and rarely know how an Applicant Tracking System (ATS) will judge their resume. This paper presents the design of an AI-Powered Interview Simulator, a web-based platform that brings ATS resume analysis, personalised question generation, Technical, Aptitude and HR rounds, voice-based answering and visual behaviour analysis into one application. The uploaded resume is scored using ATS rules, and the Gemini API generates questions from the candidate's own skills, projects and experience. Spoken answers are converted to text with Whisper and evaluated by the Gemini API for relevance, correctness and clarity, while MediaPipe extracts visual indicators from webcam frames. A scoring module combines these results into an overall score and structured feedback. A survey of twenty-three studies shows that existing tools address only one part of interview preparation. The paper presents the proposed architecture and data flow diagrams that form the basis for implementation.*

Keywords: Interview simulator, ATS, resume analysis, large language models, speech-to-text, Whisper, MediaPipe, automated feedback

I. INTRODUCTION

In today's competitive job market the interview is the final and most decisive step of selection. For engineering students, campus placement typically consists of resume screening, an aptitude test, a technical interview and an HR interview. Success depends not only on subject knowledge but also on clear self-presentation, confidence and communication, yet many students get very few chances to experience a realistic interview before facing a real one.

Resume screening has become the first barrier. Many organisations use Applicant Tracking Systems (ATS) that parse resumes and rank them using keywords, formatting rules and section structure, so an incompatible resume may be rejected before a recruiter reads it. Most candidates do not know how an ATS interprets their resume. Interview practice is equally limited: mock interviews depend on the availability of faculty, seniors or friends, feedback is subjective and inconsistent, and online question banks contain generic questions unrelated to the candidate's own projects. Hesitation, filler words, unclear speech and poor eye contact often go unnoticed.

Recent progress in Artificial Intelligence offers a practical solution. Large Language Models (LLMs) can understand a resume, generate context-aware questions and evaluate answers; Speech-to-Text models such as Whisper convert spoken answers into text; and computer vision frameworks such as MediaPipe track facial and body landmarks from a webcam in real time. This work combines these technologies in a single web-based platform that lets a candidate practise at any time without depending on another person.

The objectives of the proposed system are to (i) provide online interview practice without human interviewers, (ii) analyse the resume using ATS rules and report an ATS compatibility score with suggestions, (iii) generate personalised

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questions from the resume, (iv) support Technical, Aptitude and HR rounds, (v) allow voice-based answering through Speech-to-Text, (vi) evaluate answers using AI, (vii) observe visual indicators through the webcam, and (viii) produce an overall score with structured feedback.

The rest of the paper is organised as follows. Section II reviews the literature, Section III presents the system design, including the workflow, architecture, data flow diagrams and requirements, and Section IV concludes the paper and outlines future work.

II. LITERATURE SURVEY

Twenty research papers published between 2023 and 2026 were studied, together with three IEEE works on virtual interview simulators [21]–[23]. They are grouped below by the problem they address; Table I summarises the research gaps.

A. Resume Analysis and Screening

Chowdhury et al. [1] use a multi-agent LLM framework with fine-tuning and prompt engineering for resume evaluation, noting that education, skills and experience are not evaluated separately in detail. Ceovic et al. [2] combine contrastive learning with LLM-based paraphrase augmentation for job–resume matching, but fine-grained semantic matching remains difficult. Ashrafi et al. [3] recommend careers and missing skills from resume data, yet existing systems give no personalised learning paths. Lo et al. [4] propose an explainable multi-agent screening framework, although LLM-based screeners are mostly single-model with limited adaptability. Ling [5] presents a multilingual benchmark for resume parsing, showing that mixed-layout resumes are poorly evaluated, and Peng [16] notes limited handling of long, domain-specific resumes. These studies motivate a resume module that examines sections individually and understands meaning beyond exact keywords.

B. AI-Based Interview Preparation

Ugale [6], Kavyashree [7], Sudharsan [8], Gomathi [9] and Kamble [20] present mock-interview and simulation systems that use AI for question generation, personalisation and automated evaluation. Their common gap is that most systems cover only one aspect, or lack fully integrated resume analysis, adaptive questioning, behavioural monitoring and AI scoring; Gomathi [9] adds that emotional intelligence and voice/video analytics are not fully integrated. Joshi et al. [17] build a voice-based simulator and observe that existing systems are often text-based, while Murali et al. [18] quantify verbal and non-verbal performance but note that speech, facial expression and text are usually analysed separately. Related simulators [21]–[23] confirm growing interest in this area but offer limited analysis.

C. Aptitude Testing, Explainability and Reliability

Kanade et al. [10] automate aptitude testing but offer only objective, non-adaptive assessment. George et al. [12] combine several performance factors using fuzzy inference and explainable AI, and Lo et al. [4] show the value of explainable output. Panfilova et al. [11] report that LLMs can imitate human responses but their reliability for psychological assessment is unclear, with limited non-English validation, and Khan [14] stresses real-world validation of AI systems. Multimodal interview data has also been used for personality prediction [13]. Other AI applications in hiring and human resources include fake-job detection [15] and hospital workforce management [19]. LLM judgements should therefore be treated as guidance rather than final assessment.

TABLE I: Summary of Research Gaps

Focus area	Refs.	Research gap
Resume analysis	[1]–[5], [16]	Section-wise evaluation, semantic matching, varied layouts and learning paths are limited
Mock interviews	[6]–[9], [20]	Mostly single-aspect; resume, adaptive questions, behaviour and scoring not integrated
Voice / multimodal	[17], [18]	Text-based systems; speech, face and text analysed separately

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Focus area	Refs.	Research gap
Aptitude testing	[10]	Objective testing only; no adaptive assessment
Explainability, reliability	[4], [11], [12], [14]	Need explainable output and careful use of LLM judgements

The survey shows that AI is already used successfully for resume screening, matching, mock interviews, aptitude testing and voice simulation, but each work addresses only one part of the problem. Resume-focused studies do not provide interview practice, while interview-focused studies do not fully combine adaptive questioning, speech analysis, behaviour monitoring and explainable scoring. This gap between separate tools and one integrated solution motivates the proposed system.

III. DESIGN

A. Existing System and Problem Statement

Candidates currently use online question banks, mock-interview platforms, peer practice and separate resume checkers. The questions are predefined and identical for every candidate, ATS checking is a separate service disconnected from interview practice, spoken answers receive only basic analysis, visual behaviour is rarely considered together with answer content, and feedback is often a single score. The problem addressed here is to design a smart, automated, web-based simulator that analyses the resume using ATS rules, generates personalised questions, conducts Technical, Aptitude and HR rounds, analyses voice, answers and visual indicators, and gives a score with meaningful feedback.

B. Proposed System and Workflow

The proposed platform uses HTML, CSS and JavaScript/React at the front end and Python at the back end. The Gemini API understands the resume, generates questions and evaluates answers; Whisper performs Speech-to-Text conversion; MediaPipe analyses visual indicators from the webcam. The workflow is: (1) the candidate opens the application and uploads a resume; (2) the system analyses it using ATS rules and returns an ATS score with suggestions; (3) personalised questions are generated from the skills, projects and experience; (4) the candidate selects the Technical, Aptitude or HR round; (5) questions are presented one by one while the candidate answers by voice with the webcam active; (6) Whisper converts the answers to text; (7) MediaPipe processes webcam frames for visual indicators; (8) the Gemini API evaluates the transcripts for relevance, correctness and clarity; and (9) all results are combined into a final score and detailed feedback.

C. System Architecture

The architecture (Fig. 1) has four layers. The Presentation Layer is the web interface through which the candidate uploads the resume, selects the round, answers by voice and views the ATS score, results and feedback. The Application Layer is a Python (Flask) back end that acts as request controller and interview session manager: it receives the resume, selected round and audio/video data, forwards them to the AI modules, tracks the questions asked in the session and collects results, which are stored in a database (Firebase/MySQL).

The Processing and Analysis Layer holds the main AI modules: Resume Analysis and ATS Scoring, Question Generation (Gemini API), the Interview Rounds module, Speech-to-Text (Whisper), Visual Indicator Analysis (MediaPipe) and Answer Evaluation (Gemini API). In the Output Layer the Scoring module combines answer evaluation, speech analysis and visual indicators into a final score, and the Feedback Report module explains strengths and areas for improvement before the results return to the interface. Separating interface, control logic and AI processing allows any module to be improved or replaced without changing the others.

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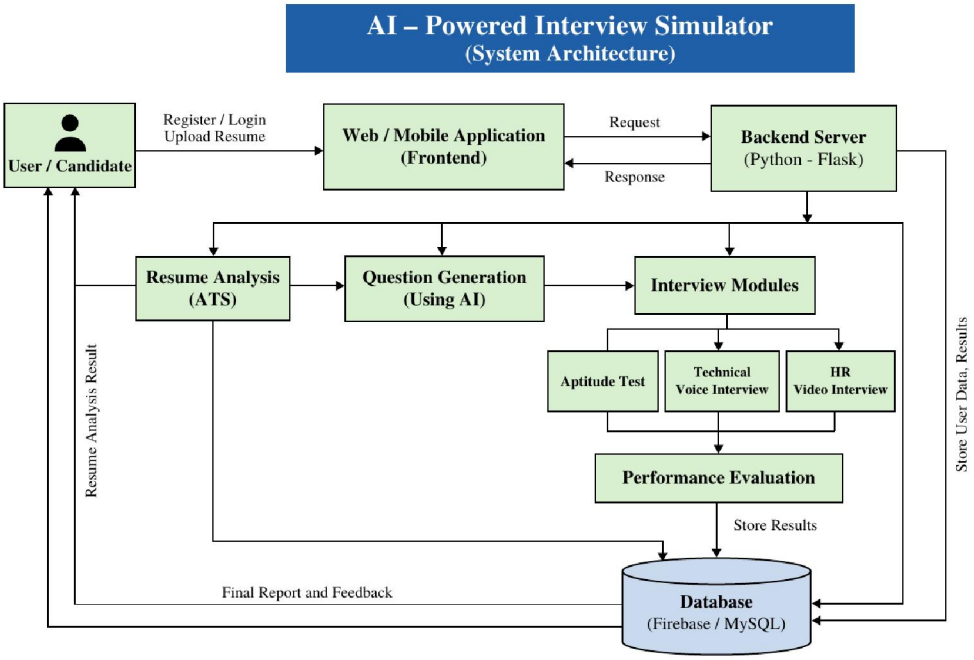


Fig. 1. System architecture of the AI-Powered Interview Simulator.

D. Data Flow Diagrams

The Level 0 DFD (Fig. 2) shows the system as a single process with two external entities. The Candidate supplies the resume, round selection and voice and video responses and receives the ATS score, questions, and final score with feedback. The AI services (Gemini API, Whisper and MediaPipe) receive prompts, audio and video frames and return questions, transcripts and evaluation results.

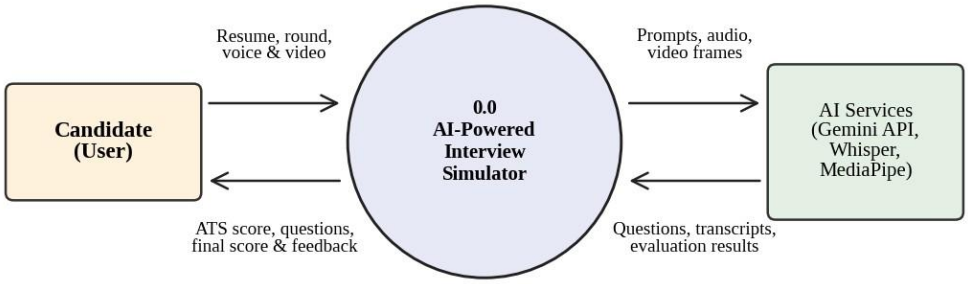


Fig. 2. Level 0 data flow diagram (context diagram).

The Level 1 DFD (Fig. 3) expands this into six processes and four data stores. Process 1.0 analyses the resume using ATS rules, stores the parsed resume in D1 and returns the ATS score. Process 2.0 generates personalised questions from the resume context and stores them in D2. Process 3.0 presents the questions of the selected round and receives answers as voice and video. Process 4.0 converts audio into a transcript and extracts visual indicators, and process 5.0 evaluates the answer text and transcript. Process 6.0 reads the interview data in D3, calculates the final score, stores the report in D4 and sends the score and feedback to the candidate.

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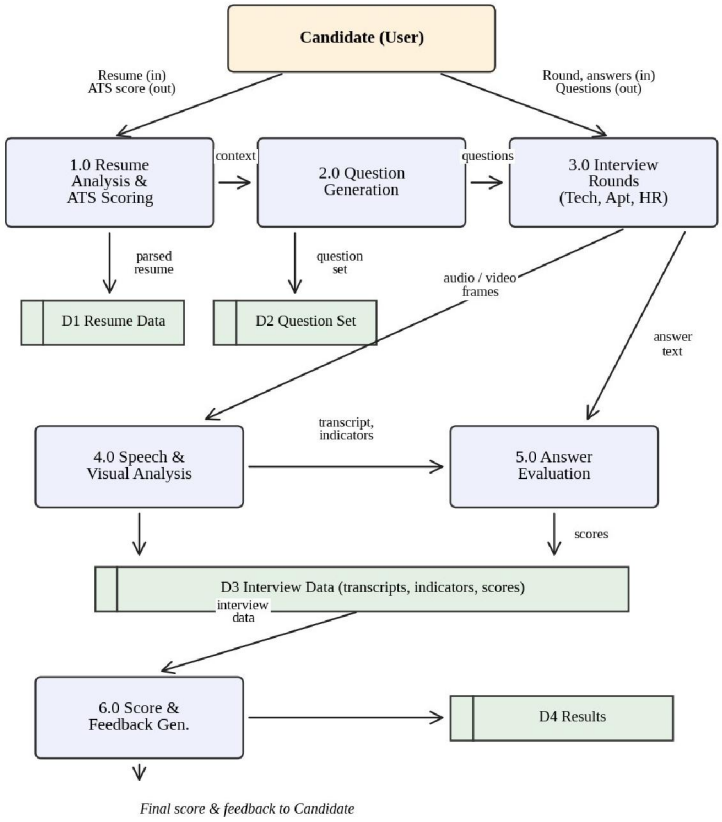


Fig. 3. Level 1 data flow diagram.

E. Hardware and Software Requirements

Because language-model processing is performed through the API, a high-end GPU is not required. The system needs a webcam and microphone to capture video and voice and an internet connection for the Gemini API. Table II lists the requirements.

TABLE II: Hardware and Software Requirements

Component	Specification
Processor	Intel Core i3 or equivalent (min.); Core i5 / Ryzen 5 or higher (recommended)
RAM / Storage	8 GB, 10 GB free (min.); 16 GB, SSD (recommended)
Peripherals	Webcam and microphone (HD webcam, headset recommended); stable internet
Operating system	Windows 10/11, Linux or macOS
Browser	Google Chrome / Microsoft Edge (latest) with camera and microphone access
Back end	Python (Flask); Firebase / MySQL
Front end	HTML, CSS, JavaScript / React
AI components	Gemini API (questions, evaluation); Whisper (STT); MediaPipe (visual analysis)
Tools	Visual Studio Code; Git (optional)

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IV. CONCLUSION AND FUTURE WORK

This paper presented the study and design of an AI-Powered Interview Simulator. Candidates find it difficult to obtain realistic, personalised practice, they seldom know how an ATS judges their resume, and existing tools cover only one part of preparation. A review of the literature showed that resume analysis, mock interviews, voice-based simulation and multimodal assessment are active research areas but that a fully integrated solution is missing. The proposed system analyses the resume using ATS rules, generates personalised questions, conducts Technical, Aptitude and HR rounds, analyses speech, answers and visual indicators, and produces a final score with feedback. The requirements, system architecture and data flow diagrams have been prepared, and the modules will be implemented, integrated and tested with sample resumes and interview sessions in the next phase.

Future work includes:

- emotional intelligence analysis of confidence from voice and facial expression [9], [18];
- multilingual interview practice and resume analysis [5], [11];
- adaptive question difficulty based on earlier answers [10];
- an online coding round with automatic evaluation;
- a progress dashboard storing previous attempts;
- personalised learning paths for missing skills [3]; and
- a mobile application with cloud deployment for many concurrent users.

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