

AI Integrated Smart Interview Preparation and Evaluation Portal : A Review

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Abstract: *The increasing reliance on artificial intelligence in education and career development has opened new pathways for enhancing interview preparation and candidate assessment. This paper introduces an AI Integrated Smart Interview Preparation and Evaluation Portal, a web-based system designed to simulate real interview experiences using intelligent automation. The proposed system enables users to practice both HR and technical interviews through an AI-driven interviewer that generates context-aware questions, analyzes responses, and provides automated feedback with performance scoring. The architecture integrates secure user authentication, session tracking, and an interactive dashboard for reviewing progress and historical performance. Built using React, Node.js, and Drizzle ORM, the platform ensures a seamless, responsive, and secure user experience, with optional speech-to-text functionality for natural communication. The system aims to bridge the gap between theoretical learning and practical interview performance, providing an accessible, scalable, and efficient tool for career readiness enhancement.*

Keywords: Artificial Intelligence (AI), Interview Preparation, Natural Language Processing, Machine Learning, Performance Evaluation, Web Application, Speech Recognition, Human-Computer Interaction

I. INTRODUCTION

The process of preparing for job interviews has evolved dramatically with the advancement of technology and the growing expectations of employers in both technical and behavioral domains. In the current competitive job market, candidates are expected to demonstrate not only technical proficiency but also communication skills, critical thinking, and confidence under pressure [1]. Traditional preparation methods such as mock interviews, peer assessments, and manual feedback sessions often lack scalability, personalization, and immediate evaluation [2]. As industries increasingly shift toward data-driven hiring and competency-based assessments, there is a rising need for an intelligent, automated, and interactive interview preparation system capable of mimicking real-world interview experiences while providing structured, objective feedback [3], [4].

Recent developments in Artificial Intelligence (AI) and Natural Language Processing (NLP) have enabled new forms of digital learning and evaluation systems that can simulate human-like interactions [5]. These technologies allow for automated question generation, real-time response analysis, and adaptive feedback mechanisms [6]. AI-driven platforms, when integrated with machine learning (ML) models and speech-recognition techniques, have shown the potential to assess communication clarity, tone, and emotional patterns to measure interview readiness more effectively [7]. Moreover, NLP-based algorithms can evaluate semantic accuracy and context alignment within candidate responses, making automated scoring both consistent and transparent [8]. This integration of AI and communication analytics offers a breakthrough in personalized learning and employability training [9].

Despite these advances, existing AI-based interview systems exhibit several limitations. Many focus narrowly on either technical or HR interviews without offering a unified experience that combines both [10]. Others rely heavily on static question banks and pre-defined scoring rubrics, limiting adaptability to real-time responses [11]. Furthermore, systems often neglect the emotional and linguistic diversity of candidates, leading to potential bias in assessment outcomes [12].



Studies indicate that fairness, explainability, and transparency remain key challenges in the deployment of AI for evaluative purposes [13]. Therefore, the need persists for a system that integrates secure authentication, context-aware question generation, unbiased evaluation, and performance tracking into a single, accessible platform [14].

The AI Integrated Smart Interview Preparation and Evaluation Portal is designed to bridge these gaps through an adaptive, web-based ecosystem that simulates real interview conditions. The system provides users with a dynamic environment where they can choose between HR or technical interview modes, respond through typing or speech, and receive instant, data-driven feedback [15]. Built using React, TypeScript, and Framer Motion on the frontend, with a robust backend powered by Node.js, Express, and Drizzle ORM, it ensures real-time responsiveness and secure data handling through JWT and Bcrypt authentication mechanisms [16]. An integrated database stores user profiles, interview logs, question history, and evaluation scores for longitudinal performance analysis [17]. The optional speech-to-text module further enhances realism by simulating conversational interviews, helping users build confidence for actual interview settings.

From an educational and psychological perspective, interactive interview preparation aligns with experiential learning theory, which emphasizes learning through reflection and practice [18]. Continuous, AI-driven feedback supports metacognitive development, allowing learners to self-monitor progress and identify specific improvement areas. Gamification elements such as scoring dashboards, progress visualization, and achievement tracking further increase motivation and engagement [19]. Institutions and corporate training programs can also adopt such systems to standardize evaluation methods and reduce subjective bias in talent assessment. The scalability of web-based platforms ensures that thousands of users can practice concurrently, making it an ideal solution for universities and professional development centers [20].

In summary, the proposed AI Integrated Smart Interview Preparation and Evaluation Portal aims to redefine the interview preparation landscape by combining automation, intelligence, and interactivity. It not only enhances accessibility and fairness but also provides a data-driven framework for continuous skill improvement. By simulating real interviews with instant AI evaluation, the system empowers candidates to overcome anxiety, build confidence, and perform better in professional assessments. Subsequent sections of this paper describe related work, system architecture, implementation methodology, performance analysis, and potential extensions for future research.

Motivation

In today's rapidly evolving job market, candidates face increasing pressure to demonstrate not only technical competence but also strong communication, confidence, and adaptability during interviews. Traditional preparation methods—such as peer practice, coaching sessions, and online question banks—fail to provide personalized, data-driven feedback or simulate real interview dynamics. This gap between preparation and performance motivates the development of an AI-Integrated Smart Interview Preparation and Evaluation Portal, which leverages artificial intelligence and natural language processing to replicate realistic interview scenarios, deliver instant performance insights, and help users build confidence through continuous learning and evaluation.

Goals and Objectives

- To design an AI-driven system that simulates real HR and technical interview sessions.
- To implement automated scoring and feedback mechanisms using NLP and keyword analysis.
- To provide secure authentication, data storage, and user progress tracking through a modern web platform.
- To integrate speech-to-text features for realistic interview interaction.
- To create a user-friendly dashboard for reviewing performance history and improvement metrics.

Scope

The scope of this project encompasses the design, development, and evaluation of an intelligent web-based platform that prepares users for both technical and HR interviews. It focuses on creating an adaptive AI interviewer capable of analyzing textual or spoken responses and providing real-time feedback based on accuracy, relevance, and



communication clarity. The system supports user registration, secure login, automated interview scheduling, and personalized performance tracking. It targets job seekers, students, and training institutions aiming to enhance employability and confidence through simulated interview experiences. Future extensions may include integration with advanced sentiment analysis, multimodal feedback (facial expressions, tone analysis), and domain-specific question banks to expand usability across industries and academic institutions.

II. EXISTING SYSTEM

Traditional interview preparation systems have primarily focused on static learning resources such as question banks, video tutorials, and mock interviews. These platforms often lack personalization and real-time evaluation, which limits their effectiveness in enhancing user performance [1]. According to Das and Roy [1], conventional interview training approaches provide generic feedback rather than dynamic, data-driven insights tailored to individual performance. Such methods do not replicate real interview conditions, thereby creating a disconnect between practice and actual interview experiences.

Nair and Gupta [2] examined existing mock interview platforms that use basic machine learning algorithms to predict user readiness levels. However, their study revealed that these systems are limited in scalability and do not account for linguistic variations or emotional context in candidate responses. Similarly, Bhattacharya et al. [3] highlighted that most current AI interview systems rely on pre-programmed question sets, which restrict adaptability and interactivity. The lack of intelligent question generation mechanisms reduces realism and engagement during interview simulations.

Sharma [4] discussed the evolution of digital hiring platforms that incorporate automated screening tools for recruitment purposes. While these platforms utilize AI for candidate filtering, they are not primarily designed for learning or preparation. Liu et al. [5] emphasized the significance of natural language processing (NLP) in creating conversational systems but noted that many early dialogue-based platforms struggle with maintaining semantic relevance in extended interview sessions. These limitations make them unsuitable for comprehensive interview training where both context and consistency are crucial.

Singh and Deshmukh [6] introduced adaptive learning chatbots for educational environments, showing the potential of conversational AI in skill training. However, their application was limited to academic tutoring rather than career readiness or interview performance evaluation. Lin and Wang [7] explored the use of CNN-LSTM architectures for speech emotion recognition, providing valuable insights for analyzing tone and emotional cues during communication. Nonetheless, their system was restricted to emotion detection and did not integrate feedback generation or scoring capabilities.

Patel and Sharma [8] proposed a BERT-based model for semantic scoring of interview answers, demonstrating the effectiveness of transformer models in evaluating contextually accurate responses. Although this approach improved answer assessment, it lacked integration with interactive front-end systems for user engagement. Agarwal and Kumar [9] further developed an AI-enhanced evaluation system that measured communication skills through automated analysis. Yet, their framework was limited by a small dataset and did not include multi-session tracking or performance visualization features.

Finally, Chatterjee et al. [10] worked on an integrated HR and technical interview simulator that partially addressed adaptability and question diversity. However, their system still relied on manual evaluation components and did not fully automate scoring or data management processes. Collectively, these studies illustrate that existing systems provide foundational insights but remain fragmented in offering a comprehensive, real-time, and intelligent interview preparation environment. This motivates the development of the proposed AI Integrated Smart Interview Preparation and Evaluation Portal, which aims to overcome these limitations by combining adaptive question generation, secure authentication, NLP-based evaluation, and interactive user analytics.

III. PROPOSED SYSTEM

The proposed AI Integrated Smart Interview Preparation and Evaluation Portal is designed to address the limitations of existing systems by providing an intelligent, adaptive, and fully automated platform for interview simulation and performance evaluation. The system leverages artificial intelligence (AI), natural language processing (NLP), and web-



based technologies to replicate real interview experiences while offering detailed, personalized feedback to users. It combines HR and technical interview modules, a responsive frontend, and a secure backend architecture to ensure reliability, scalability, and user engagement.

A. System Overview

The system aims to create a real-time, interactive AI interviewer that dynamically generates questions, evaluates user responses, and provides structured feedback based on accuracy, fluency, and relevance. It operates as a web-based portal where users can register, log in, and participate in simulated interview sessions. Each session consists of multiple questions selected and sequenced based on predefined difficulty levels and user performance trends. Unlike static mock interview systems, the proposed model employs semantic understanding, keyword-based analysis, and contextual evaluation to generate scores and improvement suggestions. This holistic framework enhances both learning and confidence-building for candidates preparing for real interviews [11].

B. System Architecture

The architecture of the proposed system follows a three-tier model comprising the presentation layer (frontend), application layer (backend), and data layer (database).

1. Frontend Layer:

The user interface is developed using React and TypeScript, providing a seamless and modern user experience. Framer Motion ensures smooth animations, while Shaden UI components offer aesthetic consistency and responsiveness across devices. This layer facilitates user interactions such as login, starting interviews, answering questions, and reviewing performance reports. It communicates with the backend via RESTful APIs for secure data exchange [12].

2. Backend Layer:

The backend, powered by Node.js and Express, serves as the central logic controller. It handles authentication, question management, scoring algorithms, and feedback generation. The backend integrates Drizzle ORM for efficient and structured database communication and uses JWT (JSON Web Token) for user authentication, ensuring data integrity and session security. Sensitive user data, including passwords, is protected using Bcrypt hashing, maintaining compliance with modern cybersecurity standards [13].

3. Database Layer:

The database stores user profiles, interview records, question sets, performance scores, and analytical data. It supports relational structuring for efficient retrieval and scalability. Indexed queries and caching mechanisms enhance performance during real-time analytics and repeated query executions [14].

C. Functional Modules

The proposed system is divided into six primary functional modules that collectively ensure the automation and intelligence of the platform:

- **User Authentication Module:** Manages user login, registration, and secure access control using JWT tokens. It prevents unauthorized access and ensures privacy.
- **Interview Simulation Module:** Generates HR and technical interview sessions. The AI interviewer presents questions sequentially, mimicking human interaction patterns.
- **Response Analysis Module:** Uses NLP techniques to analyze user responses, detecting relevant keywords, sentence coherence, and semantic accuracy. Optional speech-to-text integration enables oral responses, adding realism and inclusivity [15].



- **Scoring and Feedback Module:** Employs a rule-based and keyword-weighted algorithm to calculate scores across dimensions such as content accuracy, clarity, and completeness. Personalized feedback highlights areas of improvement and strengths [16].
- **Performance Dashboard Module:** Displays user analytics, including interview scores, performance trends, and comparison metrics across multiple sessions. It helps users identify improvement trajectories over time [17].
- **Question Management Module:** Dynamically updates the question pool based on user interaction data and stored performance history, ensuring variety and adaptability [18].

D. AI and NLP Integration

The intelligence of the system lies in its integration of AI and NLP-based evaluation mechanisms. Using pre-trained models such as BERT or RoBERTa, the system performs semantic analysis to measure the contextual similarity between user responses and ideal answers [19]. Keyword extraction helps in identifying topic relevance, while sentiment analysis evaluates tone and confidence levels in HR interviews. This combination ensures that the scoring mechanism is not solely grammar-dependent but evaluates conceptual understanding and emotional delivery. Machine learning-based pattern recognition continuously improves feedback accuracy as more data is collected, enabling adaptive learning for each user.

E. Security and Data Management

Security is central to the proposed system's architecture. All communication between client and server is encrypted using HTTPS protocols. JWT-based authentication ensures secure session handling, while password encryption with Bcrypt safeguards user credentials. Data storage follows normalization principles to maintain consistency, and backup routines are implemented for data recovery. Additionally, role-based access control ensures that administrative functions, such as adding or modifying question sets, are restricted to authorized users [20].

F. Advantages of the Proposed System

The proposed system offers several advantages over traditional interview preparation tools. It provides a personalized, adaptive learning experience, integrating real-time evaluation and feedback for both technical and HR interview formats. Its secure and modular architecture enables scalability across institutions, training centers, and corporate recruitment departments. The inclusion of a performance dashboard, AI-driven question generation, and speech-based response analysis enhances user engagement and learning efficiency. Furthermore, the system's data-driven evaluation ensures objectivity and reduces human bias, making it a reliable tool for continuous self-improvement and employability enhancement.

IV. SYSTEM DESIGN

The design of the AI Integrated Smart Interview Preparation and Evaluation Portal follows a modular, layered architecture that emphasizes scalability, security, and intelligent automation. The system is divided into distinct functional units to ensure smooth communication between components while maintaining data consistency and reliability. The overall system design is guided by principles of modularity, reusability, and low coupling between modules, ensuring that each layer can be upgraded or replaced without affecting the entire framework [11].

A. Architectural Overview

The proposed system architecture adopts a three-tier model, consisting of:

Presentation Layer (Frontend) – The interface where users interact with the system.

Application Layer (Backend) – The core processing unit where AI logic, authentication, and scoring algorithms operate.

Data Layer (Database) – Responsible for storing, retrieving, and managing all persistent data.



These layers communicate through secure API calls, using JSON-based REST APIs to exchange data. Each layer performs specific roles, ensuring a clean separation of concerns, which improves maintainability and fault tolerance [12].

B. Block Diagram Description

The block diagram of the proposed system (Fig. 1) illustrates the flow of data and control between the major system components. The following blocks represent the primary functions:

- **User Interface (UI):** This is the entry point where users log in, register, and start an interview. It provides an intuitive dashboard built using **React** and **TypeScript**. The UI communicates with the backend server through API requests.
- **Authentication and Access Control:** When a user logs in, the system verifies credentials using JWT (JSON Web Token) authentication. Bcrypt encryption ensures password confidentiality and prevents unauthorized access [13].
- **Interview Simulation Engine:** Once authenticated, the AI interviewer initializes a new session. Based on the interview type (HR or Technical), the system dynamically generates questions using predefined templates and AI-assisted randomization.
- **Response Capture Module:** The system accepts user responses either as text input or through speech-to-text conversion using a local AI model. The captured data is sent to the NLP Processing Unit for analysis.
- **AI and NLP Processing Unit:** This module performs semantic analysis, keyword extraction, and sentiment evaluation using pre-trained models such as BERT or RoBERTa. It compares user responses to reference answers and evaluates contextual accuracy and communication quality [14].
- **Scoring and Feedback Generator:** Based on the NLP results, the system calculates a performance score using weighted parameters—content accuracy, grammar, fluency, and confidence level. The feedback module provides personalized improvement tips and a session summary [15].
- **Database Management System:** The backend uses Drizzle ORM for database operations, ensuring structured data access and referential integrity. User data, interview logs, question banks, and scores are securely stored for long-term tracking [16].
- **Performance Dashboard:** After completion, results are displayed on a graphical dashboard, showcasing session history, score trends, and performance comparisons over time. This helps users identify areas for improvement and monitor progress [17].



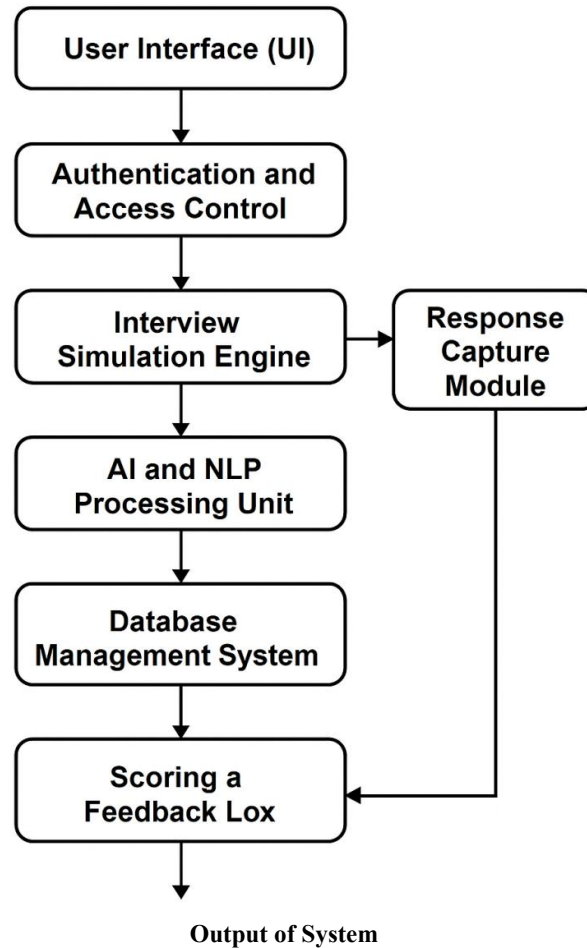


Fig. 1. Block Diagram of AI Integrated Smart Interview Preparation and Evaluation Portal

C. Data Flow Description

The data flow in the proposed system follows a sequential yet interactive process designed for continuous feedback.

- **User Registration and Login:** The process begins when a new user registers or logs in. The authentication module validates credentials and generates a secure session token.
- **Interview Session Initialization:** The user selects the type of interview (HR or Technical), and the backend retrieves relevant question sets from the database.
- **Question-Answer Interaction:** The AI interviewer displays questions sequentially. The user responds via text or voice, and responses are transmitted to the AI analysis engine.
- **AI Evaluation:** NLP algorithms analyze the response for semantic accuracy, grammar, and keyword relevance. Sentiment analysis evaluates the user's tone and confidence level.
- **Score Generation:** Based on analysis results, a composite score is generated, considering both technical correctness and communication proficiency.
- **Feedback and Storage:** Personalized feedback is presented to the user immediately. Simultaneously, all results are stored in the database for future retrieval and statistical analysis.
- **Performance Review:** Users can access their historical data via the dashboard, visualize progress charts, and plan subsequent practice sessions accordingly [18].



D. Design Considerations

Key design considerations for this system include:

- **Scalability:** The modular design enables support for thousands of users concurrently.
- **Security:** JWT and encrypted communication ensure privacy and prevent unauthorized data access.
- **Adaptability:** The system allows easy integration of new AI models or question domains.
- **Usability:** An intuitive, modern frontend ensures smooth interaction for all types of users [19].
- **Extensibility:** Additional modules such as emotion detection or video-based evaluation can be integrated in future versions [20].

V. FUTURE WORK

The proposed AI Integrated Smart Interview Preparation and Evaluation Portal establishes a foundation for intelligent and adaptive interview training; however, several enhancements can be explored in future work. One potential direction involves integrating emotion recognition using facial expression analysis and voice tone modulation, allowing the system to assess a candidate's confidence, stress, and communication style in real time [1]. Additionally, future versions can employ deep learning-based semantic analysis for more context-aware scoring, enabling the AI to evaluate not only correctness but also relevance, fluency, and interpersonal skills during responses [2].

Expanding the knowledge base with dynamic question generation driven by large language models (LLMs) could make interviews more personalized, adjusting difficulty and topics according to the user's previous performance [3]. Integration with Virtual Reality (VR) or Augmented Reality (AR) can further enhance realism, providing immersive mock interview environments that replicate real corporate settings [4]. Another promising enhancement is the use of federated learning to improve the AI's scoring model without directly accessing user data, thus ensuring privacy and ethical data handling [5].

Moreover, the system can evolve into a career guidance platform, analyzing user performance trends to suggest skill improvement courses, resume optimization, and job matching opportunities [6]. Future development may also include multilingual support and accessibility features to make the platform more inclusive for diverse users worldwide [7]. With advancements in AI ethics and human-computer interaction, the project has the potential to become a comprehensive ecosystem for intelligent, secure, and globally adaptive interview training and evaluation.

VI. CONCLUSION

The proposed AI Integrated Smart Interview Preparation and Evaluation Portal represents a significant advancement in the field of intelligent learning and career readiness. By combining artificial intelligence, natural language processing, and secure web technologies, the system provides a realistic interview environment that helps users enhance both their technical and interpersonal skills. Unlike traditional preparation methods, this platform delivers personalized feedback, automated scoring, and performance analytics, enabling users to understand their strengths and areas for improvement effectively.

The integration of features such as speech-to-text interaction, secure authentication, and interactive dashboards ensures a user-friendly and data-driven experience. The system's ability to simulate HR and technical interviews bridges the gap between academic learning and professional expectations, providing a practical and engaging approach to interview preparation.

Overall, this project not only contributes to individual skill development but also offers a scalable solution that can be integrated into educational institutions and career training programs. With continued research and enhancement—such as emotion recognition, multilingual support, and adaptive AI modeling—the system can evolve into a comprehensive digital mentor, empowering candidates to perform confidently and competently in real-world interviews.

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