AI Powered Virtual Job Interview Simulator

Krithikka R[1], Jananishree S[2], Lakshmi S[3], Manjusri D[4]
[1, 2, 3, 4] Dept of CSE
[1, 2, 3, 4] K Vivekanandha College of Technology for Women, Tiruchengode, Namakkal, Tamil Nadu, India

Abstract- *The increasing demand for effective interview preparation tools highlights the limitations of traditional methods, which often lack personalization and real-time feedback. This paper presents an AI-powered virtual job interview simulator designed to provide a realistic and adaptive interview experience. The system analyzes user resumes to extract relevant skills and generates context-aware interview questions using natural language processing techniques, ensuring that interview sessions are tailored to individual profiles. User responses are evaluated in real time based on multiple parameters, including grammatical correctness, semantic relevance, fluency, and communication clarity, enabling a comprehensive assessment of candidate performance. A computer vision-based module is integrated for face verification and user monitoring, where a hybrid approach improves authentication reliability. The system also provides structured feedback and performance analytics to support continuous improvement over repeated sessions. Experimental results demonstrate reliable performance in question relevance, response evaluation consistency, and face verification accuracy, while maintaining low response time. Overall, the proposed system offers an efficient and scalable platform for enhancing interview readiness, improving communication skills, and boosting user confidence.*

Keywords: Artificial Intelligence, Virtual Interview System, Natural Language Processing, Resume Analysis, Face Verification, Computer Vision, Interview Preparation

I. INTRODUCTION

Job interviews play a critical role in determining career opportunities, yet many candidates remain underprepared due to the lack of structured practice and effective feedback mechanisms. While academic curricula emphasize technical knowledge, essential skills such as communication, confidence, and adaptive response handling are often overlooked. As a result, candidates struggle to perform effectively in real interview scenarios despite having adequate subject knowledge.

Traditional interview preparation methods, including coaching centers, peer practice, and static question banks, suffer from limitations in scalability, personalization, and feedback quality. These approaches fail to replicate real interview conditions and do not provide detailed, data-driven insights for continuous improvement. Furthermore, access to experienced interviewers is often limited, making consistent practice difficult for many candidates.

Recent advancements in Artificial Intelligence, particularly in Natural Language Processing and computer vision, have enabled the development of intelligent systems capable of simulating realistic interview environments. Such systems can dynamically generate questions, evaluate user responses, and deliver real-time feedback, offering a scalable alternative to conventional methods.

In this paper, an AI-powered virtual job interview simulator is proposed, integrating resume-based question generation, NLP-based response evaluation, and computer vision-based face verification. The system aims to provide a personalized, secure, and interactive platform for interview preparation. By combining multiple technologies into a unified framework, the proposed approach enhances interview readiness, improves communication skills, and enables users to track their performance over repeated sessions.

II. OBJECTIVES

The primary objective of this work is to develop an AI-powered virtual job interview simulator that provides a realistic and interactive platform for interview preparation. The system is designed to replicate real interview scenarios, enabling users to practice effectively in a controlled and adaptive environment without the need for human intervention.

Another key objective is to analyze user resumes to extract relevant skills and generate context-aware interview questions tailored to individual profiles. By leveraging Natural Language Processing techniques, the system ensures that the questions are aligned with the candidate's domain, thereby improving the relevance and effectiveness Ob the interview experience.

The system also aims to evaluate user responses in real time using NLP-based techniques. Multiple parameters such as semantic relevance, grammatical correctness, fluency, and communication clarity are considered to provide a

comprehensive assessment of candidate performance, ensuring accurate and meaningful feedback.

In addition, the objective includes integrating a computer vision-based face verification module to ensure secure user authentication and monitor engagement during interview sessions. A hybrid approach is employed to improve verification accuracy and reliability. The system further provides real-time feedback and performance analytics to help users identify strengths and areas for improvement, ultimately enhancing interview readiness and reducing dependency on human evaluators.

III. PROBLEM STATEMENT

Despite the widespread availability of learning resources, effective interview preparation remains a significant challenge for students and job seekers. While candidates may possess strong technical knowledge, they often lack adequate practice in real interview scenarios, particularly in terms of communication skills, confidence, and structured response delivery.

Traditional preparation methods, such as coaching classes, peer practice, and static question banks, suffer from major limitations in personalization and scalability. These approaches fail to simulate real interview environments and do not adapt to individual user profiles, resulting in a generic and less effective preparation experience.

Moreover, existing digital platforms are often restricted to predefined questions and lack the ability to dynamically generate content based on user skills and experience. Most systems do not evaluate multiple dimensions of responses, such as semantic relevance, grammatical correctness, fluency, and communication clarity, in an integrated and consistent manner.

In addition, the absence of continuous feedback and performance tracking makes it difficult for users to identify their weaknesses and monitor improvement over time. The lack of secure user authentication mechanisms further raises concerns about system reliability and misuse, highlighting the need for a more robust and intelligent solution.

IV. METHODOLOGY

The proposed system is designed as a multi-stage architecture that integrates Natural Language Processing (NLP) and computer vision techniques to simulate a realistic interview environment. The overall workflow includes resume analysis, question generation, response evaluation, face verification, and performance feedback. Each stage is interconnected to ensure a seamless and adaptive interview experience.

A.System Architecture

The AI-powered virtual job interview simulator follows an end-to-end pipeline that begins with user input and concludes with performance evaluation. The workflow, illustrated in Figure 1, shows the transition from resume processing to report generation.

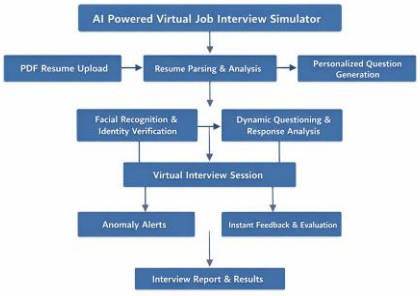

Fig. 1. Procedural workflow of the virtual interview simulator.

The workflow demonstrates how resume parsing, question generation, response evaluation, and feedback modules interact sequentially to form a complete interview pipeline, while Figure 2 presents the interaction between system components, including candidates, AI modules, and feedback mechanisms.

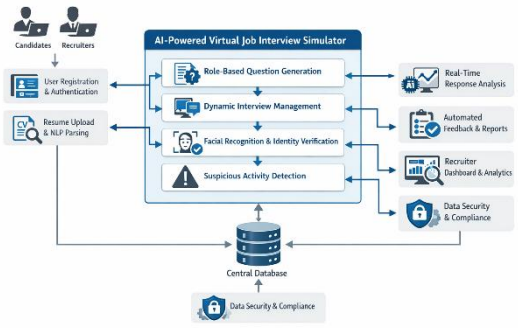

Fig. 2. Integrated system architecture of the proposed system.

This architecture ensures scalability, modularity, and efficient processing of user data.

B. Resume Analysis

The initial phase of the system involves the automated extraction and parsing of user-provided resumes in PDF format. Utilizing Natural Language Processing (NLP) libraries, the system identifies and isolates key sections such

as technical skills, work experience, and educational background. This data is then structured into a machine-readable format to create a comprehensive candidate profile. By mapping these extracted skills against the requirements of the selected job role, the system establishes a contextual foundation for generating personalized interview questions. This ensures that the simulated interview is accurately tailored to the individual's professional background rather than using a generic question bank.

C. Question Generation

Based on the extracted skills and selected job role, the system generates context-aware interview questions using NLP techniques. The question generation module ensures variability by adapting to the candidate's background and experience level. Additionally, follow-up questions are generated dynamically based on previous responses, enabling a more realistic and interactive interview simulation.

D. Response Evaluation

User responses are evaluated in real time using NLP-based analysis. The evaluation considers multiple parameters, including semantic relevance, grammatical correctness, fluency, and communication clarity. Each response is scored based on its alignment with expected answers, and structured feedback is generated. This allows users to understand their performance and iteratively improve their responses.

E. Face Verification and Monitoring

To ensure secure authentication and maintain session integrity, the system incorporates a hybrid face verification model. The model combines multiple image processing techniques, including Local Binary Pattern Histogram (LBPH) for feature extraction, Oriented FAST and Rotated BRIEF (ORB) for feature matching, histogram comparison for intensity analysis, and template matching for structural similarity.

The final similarity score is computed using a weighted combination:

$$\text{Combined Similarity} = 0.50 \times \text{LBPH} + 0.20 \times \text{ORB} + 0.15 \times \text{Histogram} + 0.15 \times \text{Template}$$

This hybrid approach improves robustness against variations in lighting conditions, facial expressions, and pose, thereby enhancing verification accuracy and reliability.

F. Feedback and Performance Analytics

The system provides real-time feedback after each response, highlighting strengths and areas for improvement. Performance analytics are generated based on multiple evaluation parameters, enabling users to track their progress over repeated sessions. This continuous feedback mechanism enhances learning efficiency, communication skills, and overall interview readiness.

V. RESULTS AND DISCUSSION

The proposed AI-powered virtual job interview simulator was evaluated through multiple simulated interview sessions involving users from different technical domains. The evaluation focused on system performance, response analysis consistency, and user improvement over repeated sessions.

A. Performance Evaluation

The performance of the system was measured based on key parameters such as response evaluation accuracy, face verification reliability, question relevance, and system response time. The observed results are summarized in Table I.

Table I: System Performance Metrics

Parameter	Observed Value
Face Verification Accuracy	83%
Response Evaluation Consistency	79%
Question Relevance Score	81%
Average System Response Time	< 2 seconds

The results indicate that the system performs efficiently in generating relevant interview questions and evaluating user responses with acceptable consistency. The low response time ensures smooth and real-time interaction, making the system suitable for practical deployment.

B. Face Verification Analysis

The hybrid face verification model demonstrated improved accuracy compared to single-method approaches. By combining techniques such as LBPH, ORB, histogram comparison, and template matching, the system effectively handled variations in lighting conditions, facial expressions, and head orientation.

The weighted combination approach enhanced overall reliability by reducing false acceptance and false rejection rates during authentication. This confirms that

integrating multiple feature extraction and matching techniques improves robustness in real-world conditions.

C. User Performance Improvement

User performance was evaluated across multiple interview sessions to measure improvement in communication skills and confidence levels. The results are presented in Table II.

Table II: Comparative Analysis of User Performance

Metric	Initial Session	Final Session
Communication Clarity	65%	82%
Response Relevance	68%	84%
Confidence Level	Moderate	High

D. System Interface and Output Visualization

The system interface was designed to provide an intuitive and user-friendly experience during interview sessions. It includes modules for user registration, login with face verification, real-time interview interaction, and performance analysis.

The registration and login modules ensure secure and reliable user access to the system. During registration, users provide essential details along with facial data, which is captured and stored for authentication purposes. The login process incorporates face verification to validate user identity before granting access to interview sessions. This security mechanism ensures that only authorized users can interact with the system, maintaining data integrity and preventing misuse.

The system provides a secure user registration interface integrated with face capture functionality.

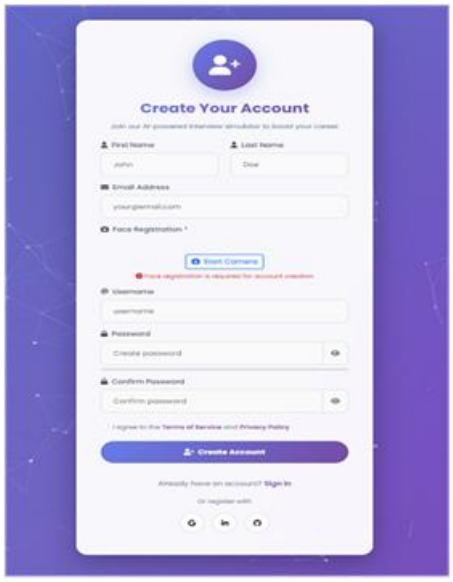

Fig. 3. User registration interface with face verification.

The login module ensures secure access through face verification before initiating the interview session.

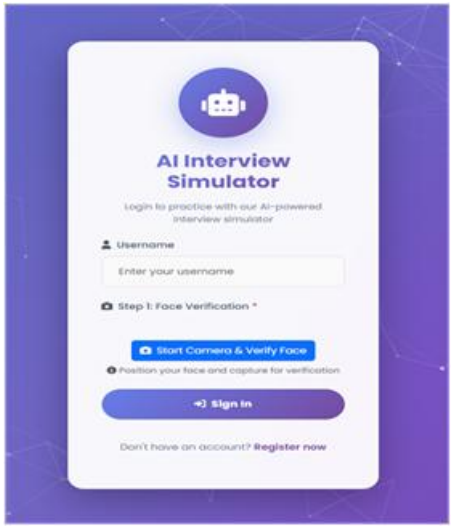

Fig. 4. Login interface with face verification.

The landing page provides navigation for starting interview sessions and accessing guidance resources.

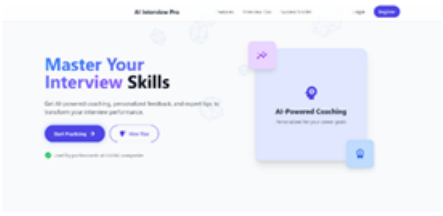

Fig. 5. System landing interface.

The interview interface allows users to respond to dynamically generated questions.

Fig. 6. Interview interface before response analysis.

Real-time analysis provides feedback on facial expression, eye contact, and speech clarity.

Fig. 7. Real-time interview analysis with facial metrics.

The system supports interactive question-answer flow during the interview session.

Fig. 8. Interactive question-response interface.

The system generates detailed feedback including areas for improvement and recommendations.

Fig. 9. Final feedback and performance analysis report.

E. Discussion

The experimental results demonstrate that the proposed system provides a realistic and effective platform for interview preparation. The integration of Natural Language Processing enables structured and multi-dimensional response evaluation, while the computer vision module ensures secure authentication and engagement monitoring.

However, certain limitations exist. The response evaluation depends on NLP capabilities and may not fully capture deep contextual understanding in complex answers. Similarly, face verification accuracy may be affected under extreme lighting conditions or occlusions.

Despite these limitations, the system successfully achieves its objective of providing a scalable, intelligent, and user-centric interview preparation platform.

VI. FUTURE SCOPE

Future enhancements can significantly improve system capabilities. Advanced deep learning models can be incorporated for more accurate response evaluation and emotion recognition. Multilingual support can expand accessibility for diverse users.

Adaptive question generation based on user performance can further personalize learning experiences. Integration with recruitment platforms and job portals can enhance real-world applicability. Additionally, improvements in face recognition using deep learning techniques can increase accuracy under varying environmental conditions.

VII. CONCLUSION

The proposed AI-powered virtual job interview simulator presents an effective and scalable solution for modern interview preparation. By integrating resume-based question generation, Natural Language Processing for response evaluation, and computer vision techniques for face verification, the system successfully creates a realistic and interactive interview environment. The modular architecture ensures adaptability and supports seamless interaction between different components of the system.

The experimental results demonstrate that the system performs efficiently in generating relevant questions, evaluating user responses, and maintaining secure authentication. The observed improvements in user performance across multiple sessions highlight the effectiveness of real-time feedback and performance analytics in enhancing communication skills, response quality, and overall confidence. The system also maintains low response time, ensuring a smooth and user-friendly experience.

Despite certain limitations related to NLP-based contextual understanding and environmental variations in face

verification, the system achieves its primary objective of improving interview readiness. Overall, the proposed solution provides a practical, intelligent, and user-centric platform that reduces dependency on human evaluators and supports continuous skill development for candidates.

REFERENCES

[1] G. S. Rao, M. Jaiganesh, M. A. K, M. A. A. A, N. R and P. K. Parida, "AI Powered Virtual Job Interview Simulator Using Natural Language Processing," 2025 8th International Conference on Trends in Electronics and Informatics (ICOEI), Tirunelveli, India, 2025, pp. 1413-1421, doi: 10.1109/ICOEI65986.2025.11013504.

[2] C. Kessassi, C. Dumas, C. G. L. Cao and M. Chollet, "You're Hired! Effect of Virtual Agents' Social Status and Social Attitudes on Stress Induction in Virtual Job Interviews," 2024 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW), Orlando, FL, USA, 2024, pp. 869-870, doi: 10.1109/VRW62533.2024.00231.

[3] L. -K. Lee et al., "Utilizing Virtual Reality and Generative AI Chatbot for Job Interview Simulations," 2024 International Symposium on Educational Technology (ISET), Macau, Macao, 2024, pp. 209-212, doi: 10.1109/ISET61814.2024.00048.

[4] N. Ashrafi et al., "Enhancing Job Interview Preparation Through Immersive Experiences Using Photorealistic, AI-powered Metahuman Avatars," 2024 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct), Bellevue, WA, USA, 2024, pp. 345-346, doi: 10.1109/ISMAR-Adjunct64951.2024.00083.

[5] P. V. Chintalapati, S. S. Paluri, S. S. Nikhitha, T. S. V. Nanditha, S. T. V. L. Daneswari and P. K. Sree, "A Research Model For Automated Prediction And Analysis Of Job Interview Performance," 2024 Sixth International Conference on Computational Intelligence and Communication Technologies (CCICT), Sonepat, India, 2024, pp. 284-291, doi: 10.1109/CCICT62777.2024.00055.

[6] S. Abdelhay *et al.*, "AI-powered MetaHuman Interviewer for Job Interview Skills," *IEEE Access*, vol. 13, 2025.

[7] Ueda, F., Fujimoto, Y., Sawabe, T., Kanbara, M., & Kato, H. (2024). The influence of perspective on VR job interview training. *Frontiers in Virtual Reality*, *5*, 1506070.

[8] Wilder, T. L., & Stratchan, N. E. (2025). Artificial intelligence-enhanced interview success: Leveraging eye-tracking and cognitive measures to support self-regulation in college students with attention-deficit/hyperactivity disorder. *Education Sciences*, *15*(2), 165.

[9] S. Abdelhay *et al.*, "Impact of Generative AI on Recruitment Efficiency," *Frontiers in Human Dynamics*, vol. 6, 2025.

[10] S. Chen, T. Zhang, and H. Liu, "Developing an Adaptive AI Interviewer Using Large Language Models and Retrieval-Augmented Generation," *2025 IEEE 7th International Conference on Artificial Intelligence and Knowledge Engineering (AIKE)*, Laguna Hills, CA, USA, 2025, pp. 42–49, doi: 10.1109/AIKE63214.2025.00012.

[11] R. Kumar, A. Sharma, and P. Gupta, "Multimodal Sentiment Analysis for Automated Candidate Evaluation in Virtual Interviews," *2024 International Conference on Intelligent Data Communication Technologies and Internet of Things (IDCIoT)*, Bengaluru, India, 2024, pp. 312–318, doi: 10.1109/IDCIoT61152.2024.00052.

[12] M. Tanaka and K. Yamamoto, "Real-time Linguistic Analysis and Feedback Generation in AI-driven Mock Interview Systems," *Computers & Education: Artificial Intelligence*, vol. 6, p. 100215, 2024, doi: 10.1016/j.caeai.2024.100215.

[13] J. L. Gonzalez-Sanchez and M. R. Rodriguez, "Serious Games and AI: Enhancing Soft Skills Through Virtual Recruitment Simulations," *2024 16th International Conference on Education Technology and Computers (ICETC)*, Porto, Portugal, 2024, pp. 155–161, doi: 10.1145/3638421.3638445.

[14] J. Brownlee, *Deep Learning for Natural Language Processing: Develop Deep Learning Models for Your NLP Projects*, Machine Learning Mastery, 2017.

[15] H. Zhao, Y. Wang, and L. Xi, "Ethics and Fairness in AI-Mediated Interviews: A Study on Algorithmic Bias Mitigation," *2025 IEEE International Symposium on Technology and Society (ISTAS)*, Vienna, Austria, 2025, pp. 22–29, doi: 10.1109/ISTAS64120.2025.00018.