International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 09 Issue: 11 | Nov - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

AI-Powered Interview Assistant

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Abstract - Interviews play a crucial role in recruitment and carrier development, yet many candidates struggle due to a lack of structured preparation and constructive feedback. Traditional mock interviews require significant time, effort, and human resources, while existing AI-based solutions often fail to provide adaptive questioning, detailed progress tracking, or domain-specific insights. To address these challenges, this project proposes the development of an AI-powered interview assistant that leverages Gemini to simulate real interview environments. . The system is designed with a React and Tailwind CSS frontend for an interactive user interface, a Flask-based backend for managing communication and logic, and Firebase Firestore for secure storage of user data and reports. The assistant generates domain-specific questions, evaluates user responses, and provides personalized feedback on content quality, clarity, and communication skills. A key feature of the system is its progress tracking and comparison module, which records user performance across sessions and highlights areas of improvement over time. By combining adaptive AI-driven interactions, structured reporting, and user-friendly design, the project aims to create a scalable, accessible, and cost-effective tool for students, job seekers, and professionals to enhance their interview readiness.

Key Words: AI-powered interview assistant, Mock interviews, Adaptive questioning, Real interview simulation, Progress tracking, Domain-specific insights.

1.INTRODUCTION

The AI-Powered Interview Assistant is a web-based platform designed to help users prepare effectively for technical interviews through automated, intelligent, and personalized assessments. The system provides an interactive interface where users can select a difficulty level and number of questions, respond to interview-style questions and receive AI-generated feedback reports that highlight their strengths and areas of improvement. The application integrates multiple technologies Flask for backend logic, Firebase for data storage and user management and React with Tailwind CSS for a responsive and visually appealing frontend. The Gemini AI model is used to evaluate user responses and generate detailed performance feedback. Additionally, the platform tracks and displays user progress, helping users monitor their growth over time.

2. Literature Survey

1. ChatGPT for Learning HCI Techniques: A Case Study on Interviews for Personas

Author: - Jose Barambones, Cristian Moral, Angélica de Antonio, Ricardo Imbert and Elena Villalba-Mora

The paper proposes an intelligent system that analyzes user answers based on technical accuracy, tone, and confidence. It also emphasizes improving recruitment efficiency and reducing human bias in interviews. Overall, it presents AI as a solution for conducting smart, scalable, and fair interview assessments.

2. An AI Mock Interview Platform for Interview Preparation

Author: -Yi-Chi Chou, Felicia R. Wongso, Chun- Yen Chao, Han-Yen Yu

This paper introduces a Mock-Interview Platform (MIP) that integrates visual, audio, and textual features to evaluate interview performance. The platform analyses emotions, head pose, voice, DISC personality traits, and intrinsic traits, providing AI-assisted feedback. The experiment results demonstrated satisfactory outcomes in prediction scores.

3. A Comprehensive Study and Implementation of the Mock Interview Simulator with AI and Pose-Based Interaction

Author: -Balasaheb Jadhav, Avadhut Sawant, Arnav Shah, Pranamya Vemula

This paper presents the Mock Interview Simulator, which uses AI-driven interviewers and combines speech recognition, text-to-speech synthesis, and posture detection to create a realistic interview setting. It aims to help job seekers prepare for diverse interview scenarios and provides valuable performance insights.

4. AI-Based Mock Interview Evaluator: An Emotion and Confidence Classifier Model

Author: - Rubi Mandal, Pranav Lohar, Dhiraj Patil, Apurva Pati

The authors propose an AI-powered mock interview platform that assesses candidates on emotions, confidence, and knowledge. Emotions are evaluated using a deep learning CNN algorithm, confidence through speech recognition, and knowledge using keyword mapping and semantic analysis techniques.

5. InterviewEase : AI-powered interview assistance

Author: - Prof. Varsha Hole, Param Kothari, Paras Mehta Srushti Patil

This paper presents an AI-driven platform that automates placement preparation. The system leverages machine learning and NLP for emotion and gesture analysis and achieves high accuracy across modules. It aims to streamline interview readiness by offering comprehensive, real-time, and adaptive feedback for candidates.

6. A Deep Learning-Based Self-Assessment Tool for Personality Traits and Interview Preparations

Author: - Sumegh Anglekar, Urvee Chaudhari, Atul Chitanvis

This paper discusses a deep learning-based tool that analyses personality traits and helps candidates prepare for interviews. Using NLP and sentiment analysis, the tool evaluates user responses while facial expressions and voice modulation are assessed using MobileNet architecture and CNN for confidence prediction.

7. Chatbot-Based Interview Simulator: A Feasible Approach to Train Novice Requirements Engineers

Author: - Muhammad Laiq, Oscar Dieste

The authors develop a chatbot-based interview simulator designed to train novice requirements engineers. The simulator understands context-free questions and answers based on key RE concepts, helping users prepare for interviews.

8. AI Based Interview Critique System: Interview Preparation Companion Using Deep Learning.

Author: -Assistant Prof. Nirgide, Shubhangi Vishal, Sayyed Arsh Aktharali, Patil Paresh Narendra, Raktate Shriraj Vikas, Pathan, Fazal Mushtaque

This AI-driven mock interview evaluator goes beyond traditional evaluation metrics, utilizing advanced technologies such as natural language processing and deep learning to gauge not only knowledge and skills but also emotional intelligence, confidence, and adaptability in real-time interviews.

3. Proposed System Architecture

The AI-Powered Interview Assistant is designed as a full-stack web-based system that integrates multiple modern technologies React with Tailwind CSS for the frontend, Flask for backend logic, Firebase for authentication and data storage and Gemini AI for intelligent response evaluation.

The architecture ensures modularity, scalability and real-time interaction between users and the AI model. It enables smooth communication between the frontend interface, backend APIs, and AI evaluation engine while maintaining secure and efficient data flow.

System Architecture Diagram:

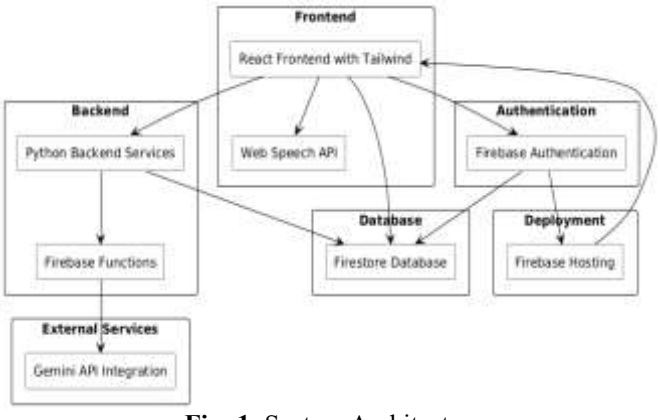

Fig -1: System Architecture

System Components:

1. Frontend (React + Tailwind CSS)

The frontend will provide a responsive, user-friendly interface for interacting with the system. It also displays the home page, interview setup screen, question-answer interface, and feedback dashboard. It communicates with Flask backend through secure REST API calls. Allows users to:

- Log in/register via Firebase Authentication.
- Choose difficulty level and number of questions.
- Enter answers for technical interview questions.
- View AI-generated feedback and progress charts.

2. Backend (Flask)

The backend will act as a bridge between frontend, Firebase, and Gemini AI. It uses Flask RESTful APIs to ensure modular communication and scalability. It also handles application logic, API routing, and data management. Major functionalities:

- Receive answers from the frontend.
- Send responses to Gemini AI for evaluation.
- Process AI feedback into structured report format.
- Store user responses and feedback in Firebase Firestore.

3. Gemini AI (Evaluation Engine)

The Gemini model will serve as the core intelligence of the system. Evaluates user-submitted answers based on:

- Receive answers from the frontend.
- Send responses to Gemini AI for evaluation.
- Process AI feedback into structured report format.
- Store user responses and feedback in Firebase Firestore.

Returns a structured response containing:

- Evaluation comments.
- Performance score.
- Suggestions for improvement.

The Flask backend parses this evaluation and converts it into a readable report for the user.

4. Firebase (Database and Authentication)

Firebase Authentication will manage secure login and registration. It also provides real-time data synchronization for a seamless experience. Firebase Firestore stores:

- User details and authentication tokens.
- Interview configurations (difficulty, question count).
- AI evaluation reports and performance data.
- Progress tracking statistics.

5. Feedback and Progress Module

It will be responsible for report generation and progress visualization. It displays user's historical performance

using charts and summary tables. It also fetches data from Firebase and formats it in React for visual presentation. It enables users to identify trends, strengths, and areas needing improvement.

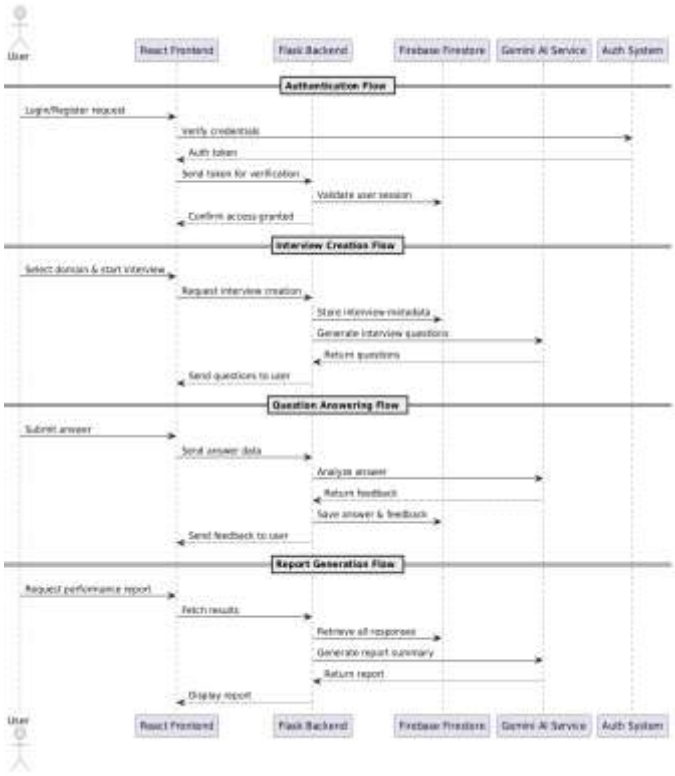

Fig -2: Sequence Diagram

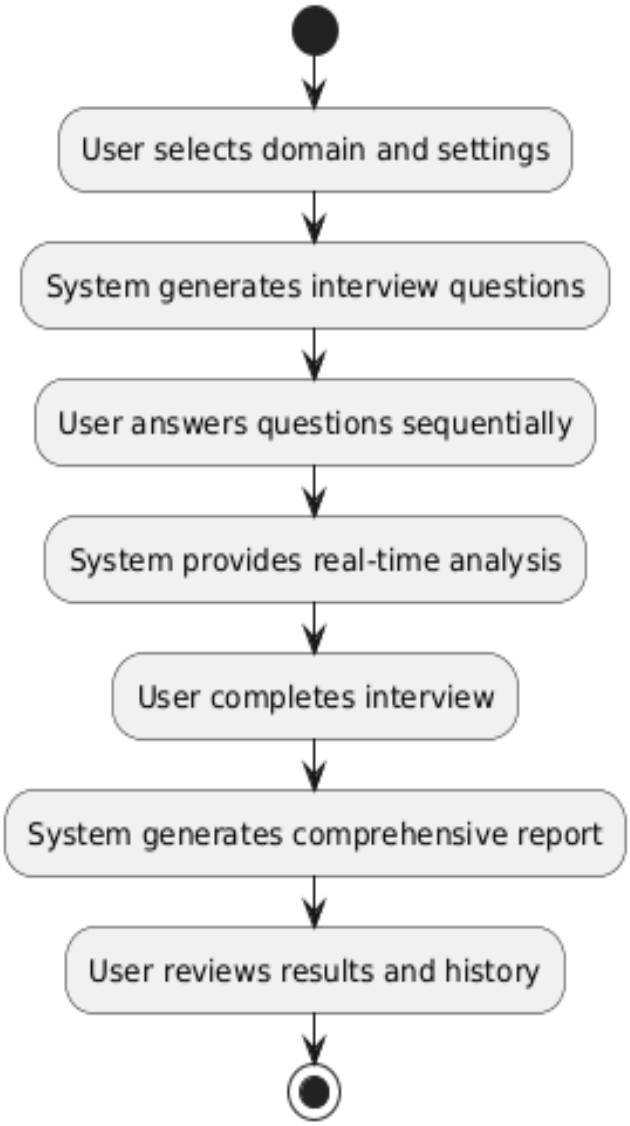

Fig -3: Activity Diagram

4. System Implementation

Core Architecture:

- Backend: Python Flask web framework
- AI Integration: Google Gemini 2.0 Flash API for question generation and report analysis
- Frontend: Vanilla JavaScript with modern CSS styling
- Session Management: Flask server-side sessions for interview state
- Configuration: Environment-based configuration with dotenv support

Code Documentation:

1. Main Application (app.py)

- Core Functions

  Route Handlers: -

  - index() - Renders main application page
  - debug_session() - Debug endpoint for session inspection

- test_gemini() - Tests Gemini API connectivity
- interview_status() - Returns current interview state
- start_interview() - Initializes new interview session
- submit_answer() - Processes answers and generates next questions

AI Integration Functions: -

- generate_question(topic, question_number) - Creates interview questions using Gemini API
- generate_report(topic, answers) - Analyzes interview performance and generates feedback

- Key Features
  1. Session Management
     - Tracks topic, questions, answers, and progress
     - Maintains interview state across requests
     - Handles session corruption gracefully
  2. Question Generation
     - Progressive difficulty (1-3: basic, 4-7: intermediate, 8-10: advanced)
     - Topic-specific questions for 8 technical domains
     - Fallback questions when API fails
  3. Error Handling
     - Comprehensive try-catch blocks
     - Detailed logging for debugging
     - Graceful degradation with fallback content

2. Configuration (config.py)

Configuration Class: -

- Environment variable loading with defaults
- Flask secret key management
- Gemini API key configuration
- Topic definitions and application settings

3. Debug Utilities (debug_interview.py)

Testing Functions: -

- check_interview_status() - Session state verification
- test_submit_answer() - Answer submission testing
- test_start_interview() - Interview initialization testing
- test_gemini_api() - API connectivity testing

5. Modules

1. User Authentication Module

Description:

This module manages user login, registration, and authentication using Firebase Authentication. It ensures that only verified users can access interview features and progress tracking.

Key Features:

- User registration and login using email and password.
- Password reset and secure authentication.
- Integration with Firebase for real-time validation.

GUI Components:

- Login Page
- Registration Page
- Forgot Password Page

2. Interview Setup Module

Description:

This module allows the user to configure the interview session based on their preferences.

Key Features:

- User can select:
  - Difficulty Level: Easy, Medium, or Hard
  - Number of Questions: 3, 5, or 10
- Backend (Flask) fetches questions from a predefined database or API based on these selections.

GUI Components:

- Dropdowns for difficulty selection
- Input for number of questions
- “Start Interview” button

3. Question Display and Answer Submission Module

Description:

This module handles question presentation and user response collection. It creates a real-time interactive experience similar to an actual interview.

Key Features:

- Displays one question at a time fetched from the backend.
- Text area or voice input (optional) for user to enter their answer.
- Submit button sends the answer to the Flask backend for Gemini AI evaluation.

GUI Components:

- Question Display Card
- Answer Textbox
- Submit Button
- Next/Previous Navigation Buttons

4. AI Evaluation and Feedback Module

Description:

This is the core intelligence module where Gemini AI evaluates user answers and generates detailed feedback.

Key Features:

- Sends each answer to Gemini for assessment.
- Receives structured feedback including correctness, clarity, and improvement suggestions.

- Stores feedback in Firebase for future reference.

GUI Components:

- "Processing" animation during AI evaluation
- AI Feedback Display Panel

5. Report Generation Module

Description:

This module compiles AI evaluation results into a summary report that highlights strengths, weaknesses, and improvement areas.

Key Features:

- Displays per-question scores and AI-generated comments.
- Generates a downloadable report (PDF or on-screen summary).
- Saves report to Firebase for future access.

GUI Components:

- Performance Summary Table
- Download Report Button

6. Progress Tracking Module

Description:

This module provides visual insights into user growth and learning over time.

Key Features:

- Graphs displaying accuracy trends, average scores, and difficulty-wise performance.
- Data fetched dynamically from Firebase.
- Encourages continuous improvement and goal setting.

GUI Components:

- Line/Bar Graphs using Recharts
- Performance History Section

6. Conclusion

In conclusion, the AI-Powered Interview Assistant project successfully demonstrates how artificial intelligence can be leveraged to enhance the process of technical interview preparation. By integrating Flask, Firebase, React with Tailwind CSS, and Gemini AI, the system provides a seamless and intelligent platform where users can practice interview questions, receive AI-driven feedback, and track their progress over time. The application addresses key challenges in traditional interview preparation such as lack of personalized feedback, time constraints, and difficulty in self-assessment by automating evaluation and generating detailed performance reports. Users can choose their preferred difficulty level and number of questions, making the experience flexible and tailored to individual learning goals. The system's architecture ensures scalability, security, and usability, while Firebase enables real-time data synchronization and user management. The inclusion of progress tracking encourages continuous improvement, allowing learners to monitor their strengths and weaknesses effectively. Overall, the project achieves its objectives of creating a smart, accessible, and interactive platform for interview preparation. It not only benefits students and job seekers but also demonstrates the practical application of modern technologies like AI and cloud computing in education and skill development.

ACKNOWLEDGEMENT

We would like to express our gratitude to our guide,
Dr. Saurabh Saoji, [HOD/ IT], for his invaluable support and guidance throughout this project.

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