

# IntelliHire – AI-Powered Interview Simulation and Preparation System

*Personalized Company-Specific Interview Training using MERN Stack and AI*

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**Abstract**—IntelliHire is an AI-powered interview preparation and simulation platform designed to provide personalized, company-specific, and role-oriented guidance for job seekers. The system allows users to input their target company and job role, based on which it automatically generates a structured preparation roadmap. This includes day-wise study plans, relevant technical subjects, aptitude modules, human resource (HR) topics, and revision strategies tailored to individual goals. In addition to preparation guidance, the platform generates realistic and original interview questions aligned with actual company patterns and role expectations. These questions cover coding problems, computer science fundamentals, behavioral questions, and scenario-based assessments, ensuring a comprehensive learning experience. A key feature of IntelliHire is its AI Mock Interview Module, which simulates real-time interview scenarios. The system conducts live interviews, asks dynamic questions, evaluates user responses, and provides detailed feedback on strengths, weaknesses, clarity, depth of knowledge, and overall performance. Furthermore, the platform includes features such as progress tracking, user dashboards, session history, and personalized insights, enabling continuous improvement. By integrating intelligent guidance, real-time assessment, and performance analytics, IntelliHire offers a complete and effective solution for end-to-end interview preparation, replacing traditional generic learning approaches with a highly customized experience.

**Index Terms**—AI Interview, MERN Stack, Mock Interview, Online Assessment, Proctoring, Personalized Learning, CSV Question Upload, Code Evaluation, Interview Preparation System.

## I. INTRODUCTION

Effective interview preparation is a critical factor in achieving success in the modern competitive job market. Conventional preparation approaches depend on generic resources that do not align with specific company expectations or job role requirements. Such limitations lead to inefficient preparation and reduced performance in real interview environments.

IntelliHire represents an AI-powered interview preparation and simulation system designed to deliver personalized, company-specific, and role-oriented guidance. User input, including target company and job role, enables generation of a structured preparation roadmap. The roadmap includes day-wise study plans, relevant technical subjects, aptitude modules, and human resource (HR) interview topics.

A comprehensive assessment framework forms an integral part of the system. The framework includes multiple evaluation rounds such as aptitude testing, coding assessments, and AI-based mock interviews supported by camera-enabled proctoring. This structured evaluation process ensures simulation of real-world interview conditions.

The AI Mock Interview Module performs real-time interview simulation by generating dynamic questions, analyzing responses, and providing detailed feedback on clarity, technical depth, and overall performance. Administrative functionality enables efficient management of question banks through CSV-based uploads, supporting scalable and flexible test creation.

Integration of intelligent preparation guidance, automated evaluation, and performance analytics establishes IntelliHire as a complete platform for end-to-end interview readiness. The system bridges the gap between theoretical learning and practical interview expectations through a personalized and adaptive approach.

## II. LITERATURE SURVEY

Chavan and Jadhav (2026) proposed [1] an AI-based mock interview system that provides structured interview preparation using resume analysis and NLP techniques. The system conducts HR, technical, and aptitude rounds to evaluate candidate performance. AI-based semantic analysis is used to assess responses and generate detailed feedback reports. The approach improves interview readiness through personalized evaluation and repeated practice.

Sharma and Pant (2025) proposed [2] an AI-based online exam proctoring system to improve exam integrity. The system uses visual and audio analysis to detect cheating activities such as phone usage and speaking. Advanced models like CNN and LSTM improved detection accuracy from 87% to 94% at a low false alarm rate. The approach provides a scalable and reliable solution for secure online examinations.

Bhokare et al. (2025) proposed [3] an AI-based interview platform developed using Android technologies and Firebase database for real-time interaction. The system integrates Artificial Intelligence and Natural Language Processing to analyze spoken and textual responses. Performance evaluation includes communication clarity, grammar, confidence, and technical accuracy. Generative AI provides personalized feedback, improving interview preparation and user performance.

Ramesh et al. (2025) proposed [4] an AI-powered resume analyzer and interview preparation system using NLP, machine learning, and large language models. The system extracts skills from resumes, performs job-role matching, and generates personalized

interview questions. A web-based interface provides insights and real-time feedback through mock interviews. The approach improves recruitment efficiency and enhances candidate preparation.

Verma et al. (2025) proposed [5] an AI-powered mock interview system using MERN stack, NLP, and speech recognition for automated skill assessment. The system evaluates responses using semantic similarity techniques and provides real-time personalized feedback. Experimental results showed a 23% improvement in performance and 85% increase in user confidence. The approach ensures scalable and effective interview preparation.

Hosbet et al. (2025) presented [6] a survey on AI-based proctoring systems focusing on maintaining integrity in online examinations. The study reviews techniques such as deep learning, biometric authentication, gaze tracking, and facial recognition for cheating detection. Challenges including privacy concerns and scalability are also discussed. The survey highlights the need for secure, efficient, and user-friendly proctoring solutions.

Mishra et al. (2024) developed [7] an AI-driven virtual mock interview system to simulate real interview scenarios. The system uses machine learning techniques to generate questions and evaluate candidate responses. Personalized feedback is provided based on performance analysis. The approach improves interview preparation through adaptive and scalable learning.

Latha et al. (2023) proposed [8] an automated interview evaluation system using artificial intelligence to simulate real interview scenarios. The system uses speech recognition and machine learning techniques to analyze user responses and compare them with expected answers. Performance is evaluated based on accuracy and displayed through structured reports. The approach improves interview practice by providing instant feedback and scalable evaluation.

### III. METHODOLOGY

The IntelliHire system follows a structured approach for interview preparation and evaluation using the MERN stack and AI techniques. The workflow includes user authentication, question management, multi-round assessment, and performance evaluation. CSV-based data handling enables efficient question storage and retrieval. The system ensures realistic interview simulation through AI-based evaluation and proctoring mechanisms.

#### A. System Overview

The system is designed as a client-server architecture consisting of frontend, backend, and database layers. The frontend is developed using React for user interaction, while the backend uses Node.js and Express for handling business logic. MongoDB is used to store user data, questions, and results. This architecture ensures scalability, flexibility, and efficient data processing.

#### B. User Authentication and Enrollment

User authentication is implemented using secure login mechanisms such as JWT-based authentication. Registration allows users to create accounts, and login enables access to system features. After authentication, users can enroll in tests based on selected company and job role. Session management ensures secure and continuous user interaction.

#### C. Question Management using CSV

The administrator uploads question banks in CSV format containing structured data such as questions, options, and correct answers. The backend parses the CSV files and stores the data in MongoDB. This approach enables bulk upload, easy modification, and efficient organization of questions for different assessment rounds.

#### D. Assessment Modules

##### 1) Aptitude Round

The aptitude module presents multiple-choice questions to evaluate logical reasoning, quantitative ability, and analytical skills. Automatic scoring is performed based on correct responses, and results are stored for further analysis.

##### 2) Coding Round

The coding module provides programming problems that test problem-solving and coding skills. User-submitted code is executed against predefined test cases to verify correctness and efficiency. Results are evaluated based on output accuracy and execution performance.

##### 3) AI Mock Interview Round

The AI interview module simulates real interview scenarios by generating dynamic questions based on job roles. Natural Language Processing techniques are used to analyze responses. Evaluation is performed based on semantic similarity, clarity, and technical relevance, followed by feedback generation.

#### E. Proctoring Mechanism

Camera-based proctoring is used to monitor user activity during assessments. Techniques such as face detection and movement tracking are applied to identify suspicious behavior. This ensures fairness and maintains the integrity of the examination process. Alerts are generated when abnormal activity is detected, enabling further review and action.

#### F. Performance Evaluation

User performance is evaluated using multiple parameters including accuracy, response quality, and time taken. Scores are calculated for each round and aggregated to produce overall performance metrics. The evaluation process ensures objective and consistent assessment.

#### G. Feedback and Reporting

The system generates detailed performance reports after test completion. Reports include scores, strengths, weaknesses, and improvement suggestions. Visual dashboards help users analyze performance trends and track progress over time.

#### IV. MODELING AND ANALYSIS

The IntelliHire – AI-powered Interview Preparation System is designed and analyzed to provide an efficient, secure, and scalable framework that supports personalized learning, company-specific guidance, and AI-driven mock interviews. The system architecture is modular, allowing future enhancements, additional features, or integration with other services without disrupting existing functionality.

##### A. System Architecture Design

IntelliHire is built on a multi-layer architecture consisting of Frontend, Backend, Database & Storage, AI/External Services, and Deployment. This model ensures seamless interaction between students, admins, and companies while maintaining secure data access and real-time monitoring.

###### Frontend:

- Developed using React.js, the frontend provides a responsive and user-friendly interface.
- Key components include the Landing Page, Student Dashboard for test enrollment and progress tracking, Admin Panel for test management, and Company Portal for candidate analytics and shortlisting.

###### Backend:

- Implemented using Node.js and Express, the backend handles all core functionalities:
  - **Authentication Service** – JWT-based login and role management
  - **Test Management** – CRUD operations for tests, rounds, and questions
  - **Coding Engine** – Integration with Judge0 API for real-time code execution
  - **AI Interview Engine** – NLP-based AI mock interview generation and evaluation
  - **Proctoring Service** – Camera monitoring, face detection, tab switch alerts, and audio monitoring

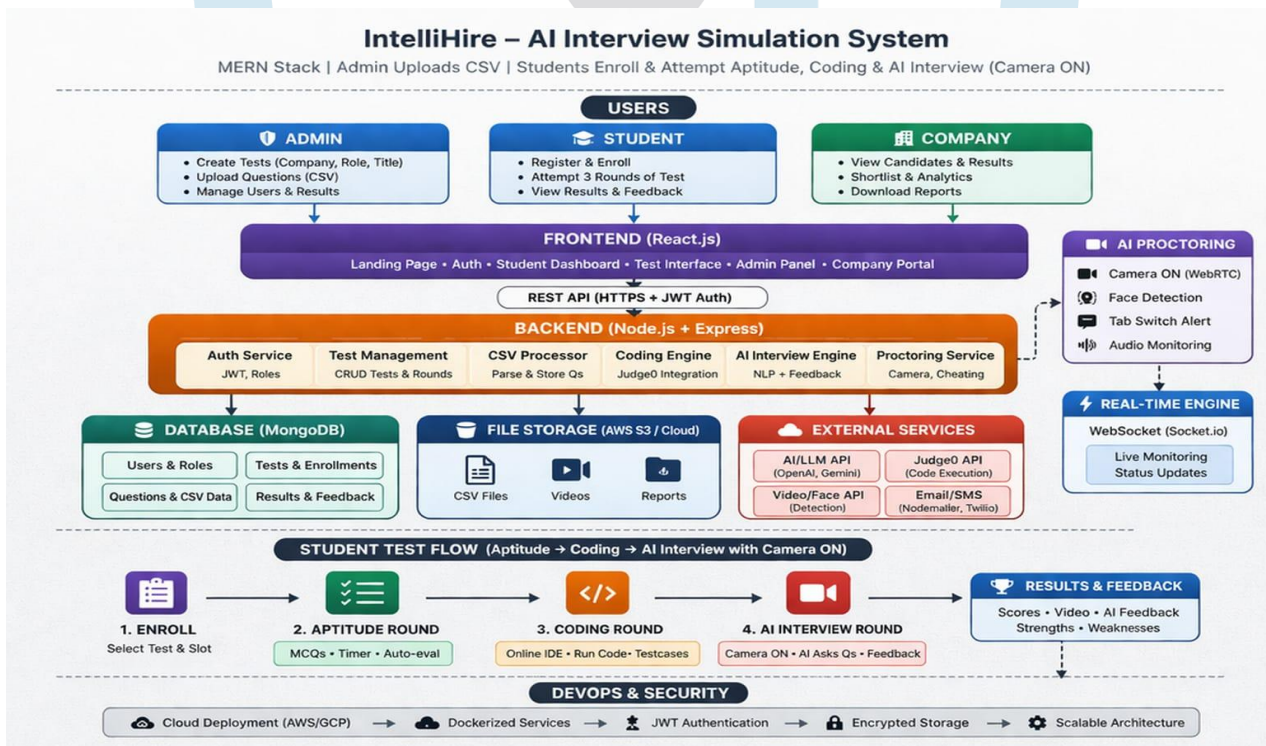


Figure 1: IntelliHire – Architecture Design

###### Database & Storage:

- **MongoDB** stores all structured and semi-structured data including users, tests, questions, and results.
- **AWS S3 / Cloud Storage** manages large files such as CSV question sets, interview video recordings, and detailed feedback reports.

###### External APIs & Real-Time Engine:

- **OpenAI / Gemini API** generates AI-based interview questions and evaluates responses.
- **Judge0 API** executes coding challenges and validates test cases.
- **Video/Face Detection API** monitors test integrity.
- **WebSocket (Socket.io)** ensures real-time updates and live proctoring.

###### Deployment & Security:

- **Dockerized services** ensure scalable deployment.
- **Cloud Hosting (AWS/GCP)** provides high availability.
- **Encrypted storage and JWT authentication** protect sensitive user and test data.

This architecture ensures maintainability, scalability, and secure end-to-end interview preparation.

**B. Technologies and Tools Used**

S. No	Technology / Tool	Purpose / Description
1	React.js	Frontend framework for building responsive dashboards and interfaces
2	Node.js + Express	Backend framework for handling REST APIs, authentication, and test management
3	MongoDB	NoSQL database for storing users, tests, questions, and results
4	AWS S3 / Cloud Storage	Storage of CSV files, AI interview videos, and reports
5	Judge0 API	Execute and evaluate coding challenges in real-time
6	OpenAI / Gemini API	AI question generation and feedback on interview responses
7	WebSocket (Socket.io)	Real-time monitoring and status updates during tests
8	JWT Authentication	Secure user login and role-based access control
9	Docker	Containerized deployment for scalability and maintainability
10	Visual Studio Code / GitHub	IDE and version control for development workflow

**C. System Workflow and Functionality**

IntelliHire system is designed to provide an end-to-end AI-driven interview preparation platform that simulates real-world hiring scenarios. The workflow ensures seamless integration between students, admins, companies, and the backend AI and database services. The system functions in a multi-stage assessment process and provides real-time feedback to enhance candidate preparation.

**1. Student Enrollment and Profile Creation**

Students register, create profiles, and select target companies and job roles. Based on this, the system generates personalized study plans including technical subjects, aptitude modules, HR topics, and revision schedules.

**2. Aptitude Assessment Round**

Students attempt multiple-choice questions (MCQs) evaluated in real-time. Scores and performance metrics are stored in MongoDB, enabling progress tracking and personalized insights.

**3. Coding Assessment Round**

Students solve programming problems in an online IDE. Code execution and validation are handled via Judge0 API, which provides detailed feedback on correctness, efficiency, and execution time.

**4. AI-Powered Interview Round**

Role-specific questions are generated by OpenAI / Gemini APIs, simulating real interviews. Responses are evaluated for accuracy, clarity, problem-solving, and communication skills, helping students gain confidence.

**5. AI Proctoring and Monitoring**

The system monitors students during tests using camera, face recognition, tab-switch alerts, and audio analysis to ensure assessment integrity. Suspicious activity is logged and flagged for admin review.

**6. Admin and Company Functionality**

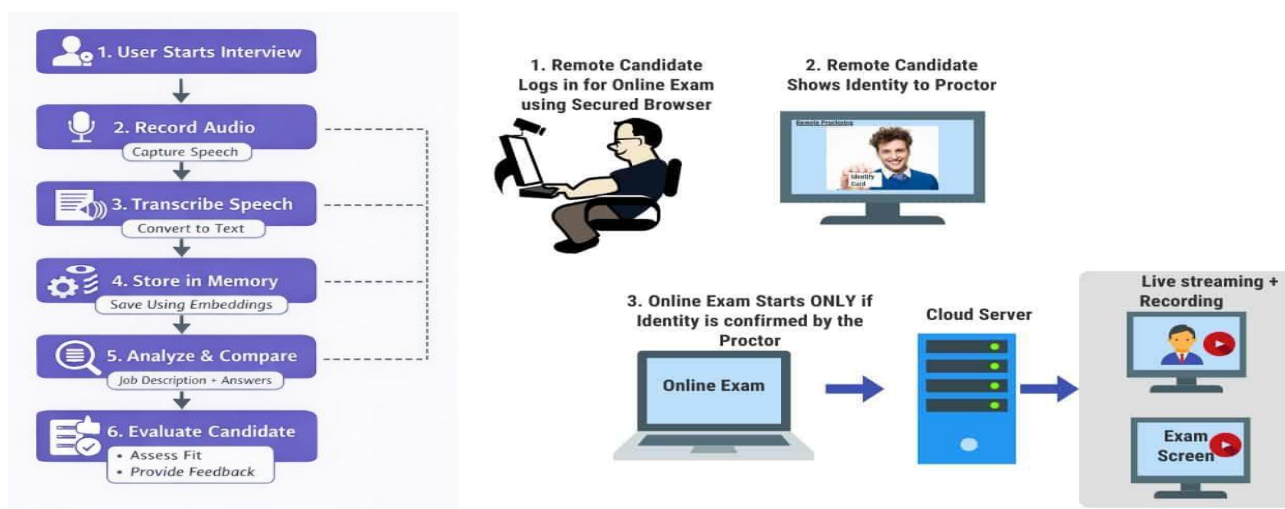
Admins manage tests, approve questions, and monitor performance. Companies can view analytics, shortlist candidates, and download detailed reports.

**7. Real-Time Database Integration**

MongoDB and cloud storage (AWS S3) store all data, while WebSocket (Socket.io) ensures real-time updates, feedback, and notifications.

**8. Future Enhancements**

The workflow allows addition of AI-based recommendations, mobile apps, recruiter chat, and advanced analytics, making the platform scalable and adaptable.



**Figure 2:** IntelliHire – System Workflow

### D. Evaluation of System Performance

Testing and analysis demonstrate that IntelliHire delivers high performance, security, and scalability:

- **Functional Performance:** Accurate evaluation of aptitude, coding, and AI interview responses.
- **Scalability:** Cloud-based, containerized architecture supports multiple concurrent users without performance degradation.
- **Real-Time Monitoring:** WebSocket ensures live feedback and AI proctoring.
- **Security:** Encrypted storage and JWT-based authentication protect sensitive user and test data.
- **Usability:** Intuitive dashboards provide seamless navigation and immediate access to results and feedback.
- **AI Effectiveness:** AI mock interviews improve candidate readiness by generating company- and role-specific questions with detailed evaluation.

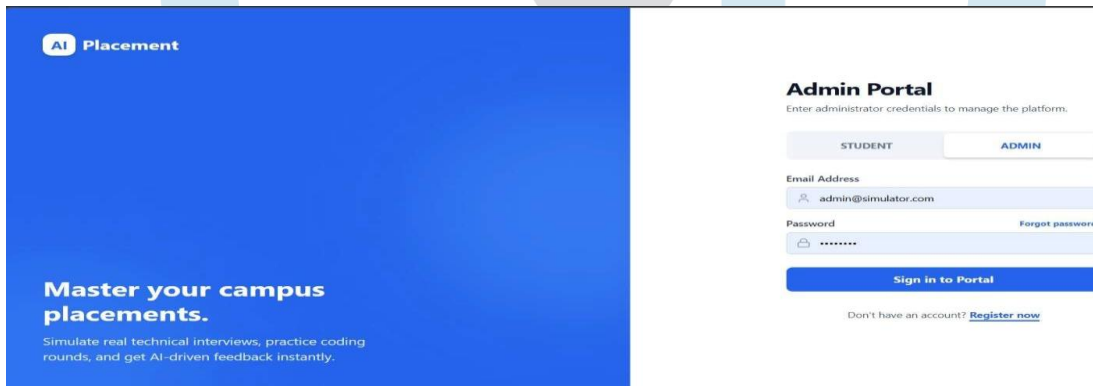
Overall, the modeling and evaluation of IntelliHire confirm its robust functionality, real-time capabilities, scalable architecture, and potential for future enhancements, making it an effective platform for interview preparation.

### V. RESULTS AND DISCUSSION

The Interview Simulator was successfully developed and tested. The system provides a complete platform for students to experience real-time interview simulations, including aptitude, coding, and SQL-based assessments. The application ensures smooth interaction between frontend and backend, accurate evaluation, and real-time result generation.

#### A. Administrator Login Interface

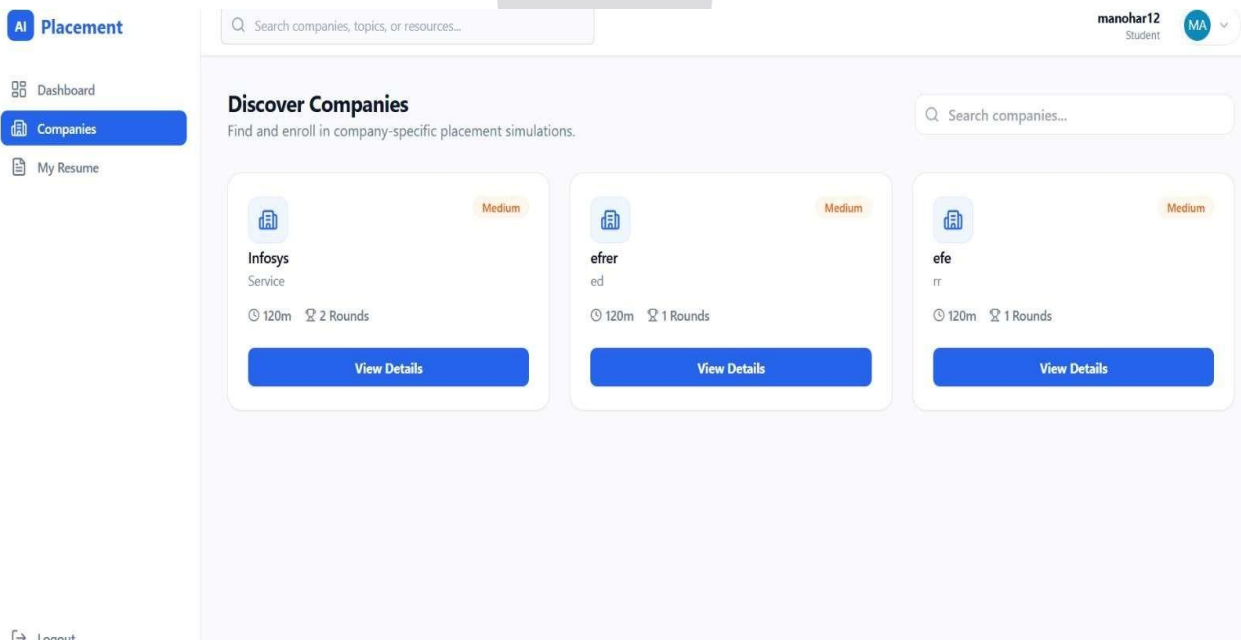
The administrator login interface is shown in **Fig. 3**, where authorized users enter their email address and password to access the admin portal. The page also includes an option to switch between student and administrator roles, ensuring secure and role-based system access.



**Figure 3:** Admin Portal Authentication Page

#### B. Company Simulation Selection Dashboard

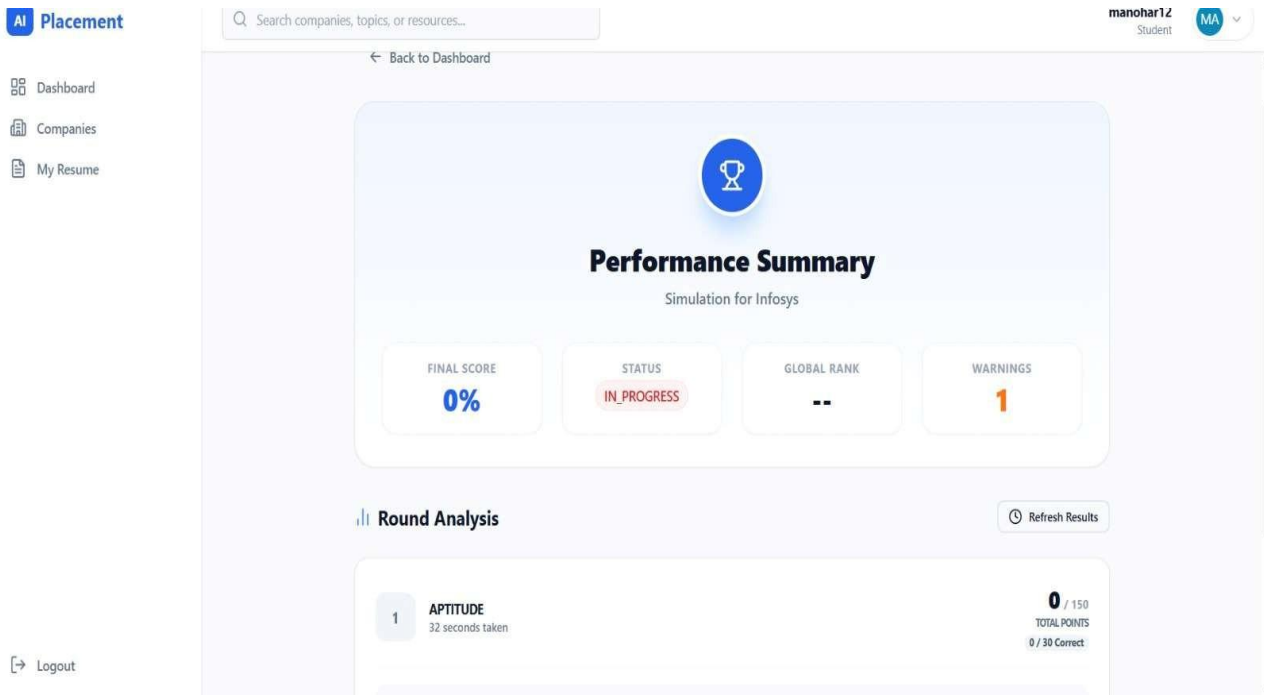
The company simulation selection dashboard is illustrated in **Fig. 4**, enabling students to browse and enroll in company-specific placement simulations. Each company card displays key details such as difficulty level, duration, and number of rounds, helping users choose appropriate simulations.



**Figure 4:** Discover Companies Module

**C. Student Performance Summary Interface**

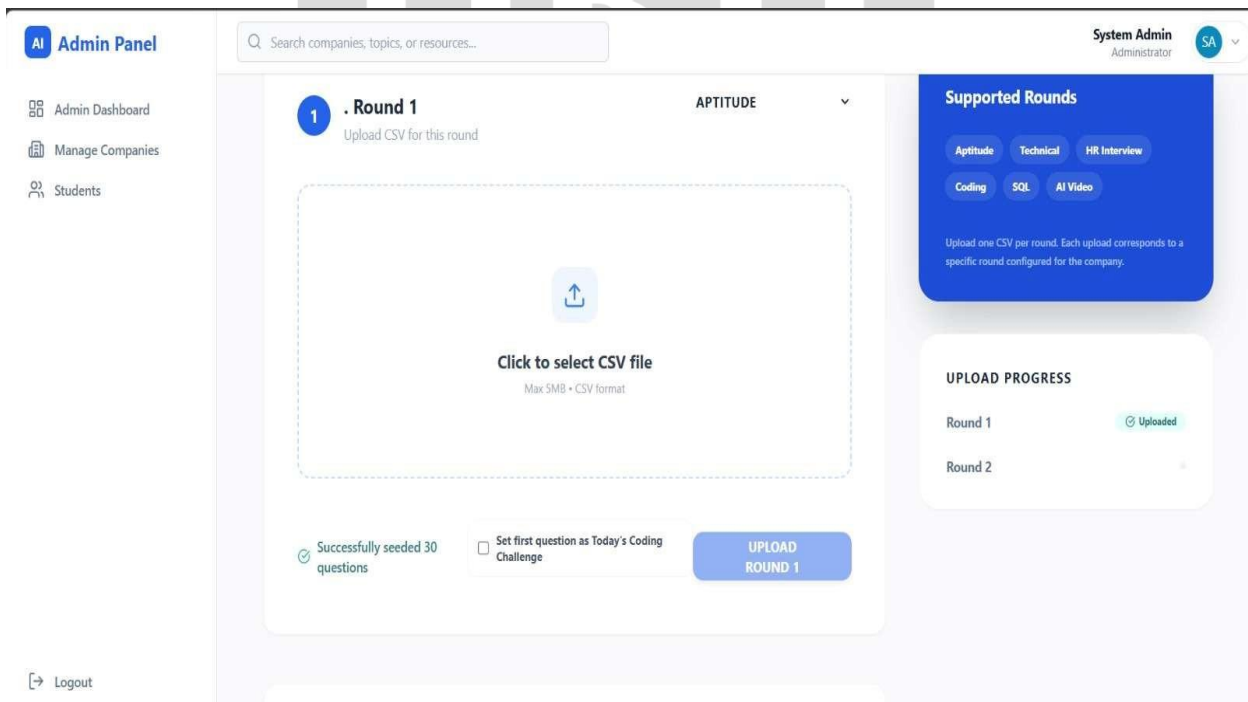
The student performance summary for a selected simulation is depicted in **Fig. 5**, where the system presents metrics such as final score, current status, global rank, and warning notifications. The dashboard also includes round-wise analysis to provide detailed insight into user performance.



**Figure 5: Simulation Performance Overview**

**D. Admin Round Configuration and Question Upload Panel**

The administrative interface used for configuring interview rounds and uploading question datasets is presented in **Fig. 6**. This module allows administrators to upload CSV files, define round types such as aptitude, coding, and HR interviews, and monitor the upload progress for each round.



**Figure 6: CSV Upload and Round Setup Interface**

**E. Uploaded Questions (Admin)**

The uploaded questions interface allows the administrator to view and manage all the questions added to the system. Each question is categorized based on difficulty level and type, such as aptitude. The admin can also delete unwanted questions, ensuring proper maintenance of the question bank. The interface is shown in **Fig. 7**.

The screenshot displays the 'Uploaded Questions' interface in the Admin Panel. It features a search bar at the top and a list of five questions, each with a 'Delete' button. The questions are as follows:

- Q1: What is 25% of 240? (Medium, APTITUDE)
- Q2: If all Bloops are Razzies and all Razzies are Lurgs,...
- Q3: A train travels 300km in 4 hours. What is its speed?
- Q4: Choose the synonym for 'Diligent'.
- Q5: Find the missing number in the series: 2, 4, 8, 16, ?

Figure 7: Uploaded Questions Interface

### F. Admin Dashboard Overview

The admin dashboard provides a comprehensive overview of the system, including total companies, active students, and active simulations. It also displays company blueprints with details such as difficulty level, number of rounds, and duration. This helps the administrator monitor and manage the system effectively. The dashboard is shown in **Fig. 8**.

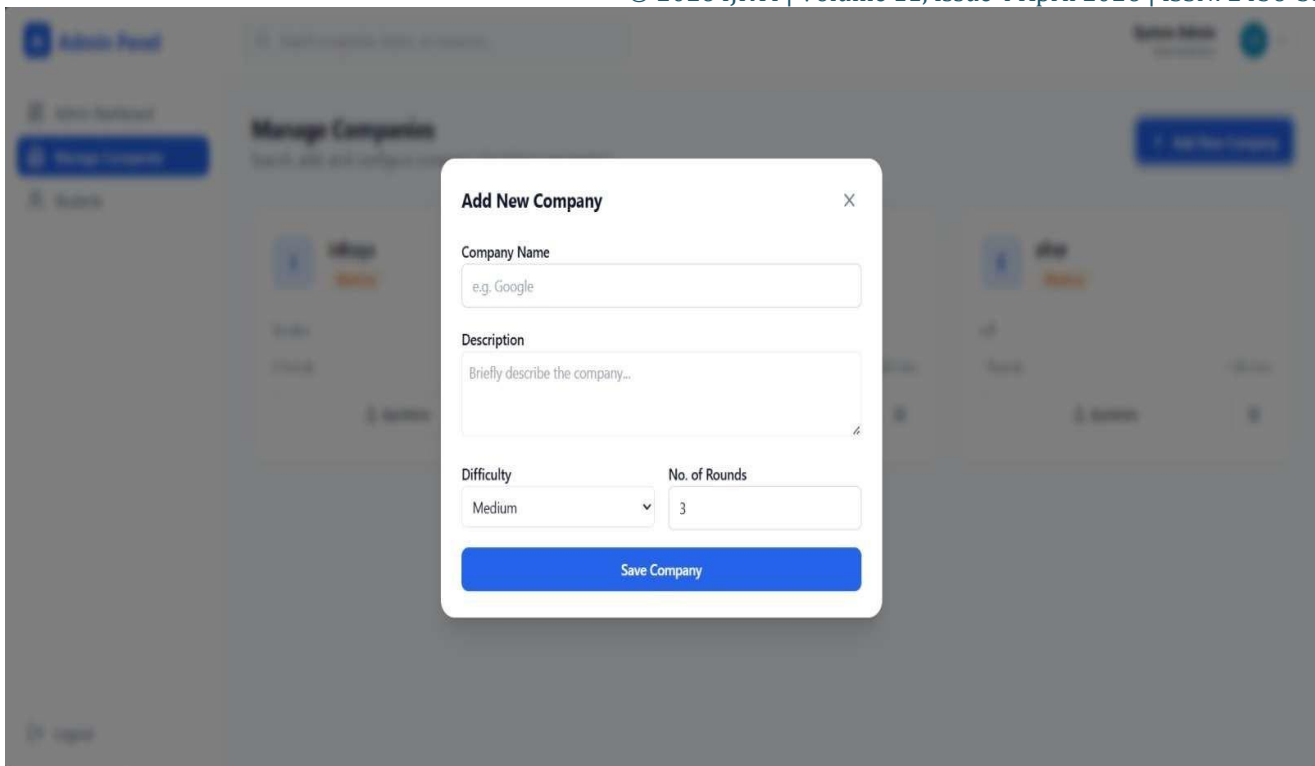
The screenshot displays the 'Admin Dashboard Overview' in the Admin Panel. It features a search bar at the top and a 'Welcome, System Admin!' message. The dashboard includes three summary cards: 'TOTAL COMPANIES' (4), 'ACTIVE STUDENTS' (4), and 'ACTIVE SIMULATIONS' (1). Below these is a 'Company Blueprints' table with the following data:

Company	Difficulty	Rounds	Duration	Action
I Infosys	Medium	2 Rounds	120 mins	Edit Blueprint
A as	Medium	1 Rounds	120 mins	Edit Blueprint
E efe	Medium	1 Rounds	120 mins	Edit Blueprint

Figure 8: Admin Dashboard Overview

### G. Add New Company

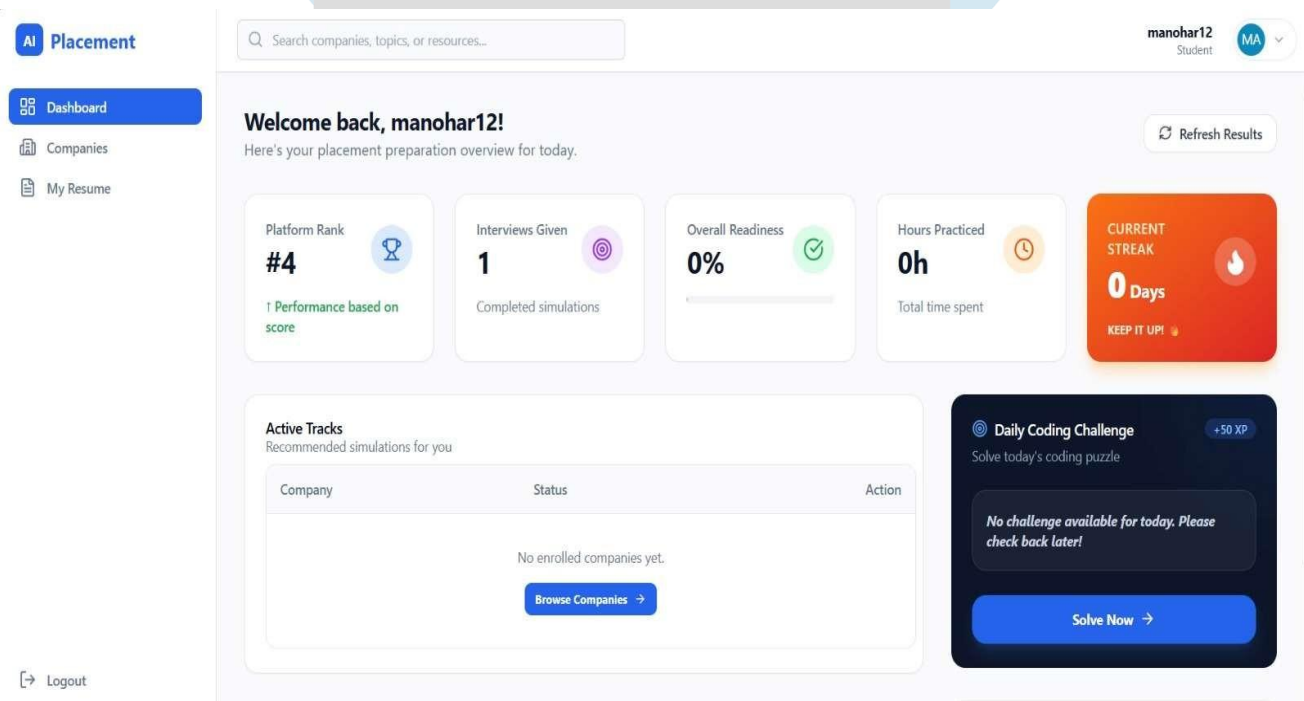
The add new company module enables the administrator to create a new company profile by entering details such as company name, description, difficulty level, and number of interview rounds. This feature allows customization of interview simulations based on company requirements. The interface is shown in **Fig. 9**.



**Figure 9:** Add New Company Interface

## H. Student Dashboard (Placement Portal)

The student dashboard provides an overview of the user's placement preparation status, including platform rank, number of interviews attended, overall readiness, and practice hours. It also displays active tracks and coding challenges to enhance learning and performance. The interface is shown in **Fig. 10**.



**Figure 10:** Student Dashboard (Placement Portal)

## I. Discussion

The IntelliHire system provides an effective solution for interview preparation by offering personalized and structured guidance based on the user's target company and job role. It helps users prepare through day-wise plans, technical topics, aptitude practice, and HR questions, making the preparation process more organized and focused. The AI Mock Interview module adds value by simulating real interview scenarios and giving feedback on user performance, which helps in improving confidence and communication skills. The system is easy to use and supports continuous learning through progress tracking and personalized insights. However, the system may have limitations in fully understanding complex human responses and emotions during interviews. In the future, more advanced AI features can be added to improve accuracy and interaction. Overall, IntelliHire is a useful platform that enhances interview readiness and skill development.

## VI. CONCLUSION

The IntelliHire system successfully provides a smart, efficient, and user-friendly platform for interview preparation by offering personalized guidance based on the user's target company and job role. It helps users build a strong foundation in technical subjects, improve aptitude skills, and enhance their overall interview performance through structured study plans and company-specific question generation. By replacing traditional and generic preparation methods, the system delivers a more focused, organized, and effective learning experience.

One of the major strengths of the system is the AI Mock Interview module, which simulates real-time interview scenarios and provides meaningful feedback on user responses. This feature helps users improve their confidence, communication skills, clarity of thought, and problem-solving abilities. The inclusion of coding, SQL, and aptitude modules ensures that both technical and analytical skills are developed in a balanced manner.

Additionally, features such as progress tracking, user dashboards, and session history enable continuous learning and self-evaluation. Users can monitor their performance over time, identify weak areas, and work on improving them systematically. The system also supports better time management and preparation strategies, which are essential for success in competitive placement processes.

The overall design of the system is simple, interactive, and accessible, making it suitable for students and job seekers from different backgrounds. By combining automation, intelligent analysis, and personalization, IntelliHire creates a complete and reliable platform for interview preparation. With further advancements and integration of more intelligent features, the system has the potential to become even more effective and closely aligned with real-world interview environments, thereby helping users achieve better career opportunities.

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