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InterviewXpert: A Comprehensive AI-Driven and Live Human-Assessed Interview Preparation Ecosystem

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Abstract: *The rapid evolution of the technology sector has intensified competition among aspiring software professionals, creating an urgent demand for structured, data-driven interview preparation tools. InterviewXpert is a full-stack web platform that addresses this gap by combining an artificial intelligence-driven mock interview engine with a real-time human assessment dashboard. The platform supports more than twenty specialized technical roles and delivers role-specific question generation, integrated code execution, instant AI feedback, and gamified progression mechanics. A dedicated interviewer portal enables industry professionals to conduct live, proctored video sessions while accessing rich candidate analytics in real time. Additional modules encompass resume analysis powered by Applicant Tracking System scoring, a competitive challenge arena, a project portfolio builder with GitHub synchronisation, and granular performance analytics. This paper presents the system architecture, feature design rationale, and the pedagogical framework that underpins InterviewXpert, demonstrating how the convergence of AI automation and human expertise produces a holistic, scalable interview preparation ecosystem.*

Keywords: Interview preparation, artificial intelligence, mock interview, gamification, live proctoring, resume analysis, ATS scoring, GitHub integration, performance analytics, technical assessment

I. INTRODUCTION

The technology industry requires candidates to demonstrate competency across a broad spectrum of skills simultaneously — algorithmic problem-solving, system design, domain-specific frameworks, and interpersonal communication — within the high-pressure context of a timed interview. Despite widespread awareness of these requirements, most candidates rely on fragmented resources: static question banks, unstructured YouTube tutorials, and ad-hoc peer mock interviews. These approaches lack consistency, personalisation, and actionable feedback, leaving a significant preparation gap.

Existing commercial platforms such as LeetCode, HackerRank, and Pramp address isolated aspects of this problem — coding practice, hiring assessments, or peer interviewing — but none offers an end-to-end preparation pipeline that integrates AI simulation, live human evaluation, gamified motivation, portfolio management, and resume optimisation within a single cohesive system.

InterviewXpert is designed to fill this gap. The platform provides a Student Portal with twelve specialised functional modules and a complementary Interviewer Dashboard that enables industry professionals to conduct, monitor, and evaluate live sessions with data-driven precision. By combining large-language-model-based question generation, real-time code execution, HD video conferencing, anti-cheat proctoring, and granular performance analytics, InterviewXpert redefines what a modern interview preparation platform can achieve.

The remainder of this paper is organised as follows: Section II reviews related work; Section III describes the system architecture; Section IV details the Student Portal modules; Section V covers the Interviewer Dashboard; Section VI

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discusses the technology stack; Section VII presents evaluation and outcomes; and Section VIII concludes with future directions.

II. RELATED WORK

Automated interview preparation platforms have evolved substantially over the past decade. Early systems such as CareerCup and GeeksforGeeks provided static repositories of company-specific interview questions, relying on community moderation for quality control. While valuable, these platforms offer no personalisation and no feedback beyond community comments.

LeetCode introduced the concept of a browser-embedded code editor paired with automated test-case evaluation, significantly reducing the friction of coding practice. However, its scope is limited to algorithmic challenges and provides no behavioural, communication, or role-specific assessment [1].

HackerRank extended this model with recruiter-facing assessment tools, enabling companies to issue standardised tests. Yet its candidate-side preparation features remain shallow, and it offers no live human interview simulation [2].

Pramp and Interviewing.io pioneered peer-to-peer mock interviews, enabling candidates to practise with real humans. These platforms, however, depend on volunteer availability, lack structured feedback rubrics, and provide no AI-assisted analysis of session quality [3].

Research in intelligent tutoring systems (ITS) demonstrates that adaptive feedback significantly improves learner outcomes compared with static instruction [4]. Gamification studies confirm that XP systems, streaks, and leaderboards increase platform engagement and sustained learning [5]. Natural Language Processing advances have enabled automatic evaluation of spoken and written interview responses with accuracy comparable to human raters [6].

InterviewXpert synthesises insights from all these streams: it adopts the code-execution model of LeetCode, the structured rubric approach of HackerRank, the human simulation philosophy of Pramp, the adaptive feedback principles of ITS research, and the engagement mechanics validated in gamification literature — unifying them into a single, coherent platform.

III. SYSTEM ARCHITECTURE

InterviewXpert is built on a three-tier client–server architecture. The presentation layer is a React.js single-page application that communicates with a Node.js/Express.js RESTful API layer. Persistent data is stored in a PostgreSQL relational database for structured records and a Redis cache for session state and real-time leaderboard data.

The AI subsystem is powered by a large language model API that handles question generation, answer evaluation, and resume keyword analysis. Code execution is sandboxed in isolated Docker containers to guarantee security and prevent resource abuse. Real-time communication between the client and server for live interview sessions leverages WebSocket connections managed by Socket.IO.

Video conferencing is embedded via the Jitsi Meet API, which provides end-to-end encrypted, self-hosted HD video streams without requiring third-party authentication. The anti-cheat module intercepts browser visibility-change events and tab-focus signals, forwarding integrity alerts to the interviewer dashboard through the same WebSocket channel.

Authentication is implemented with JSON Web Tokens (JWT) and supports optional two-factor authentication via time-based one-time passwords (TOTP). GitHub OAuth is used for repository synchronisation in the Portfolio module. The entire application is containerised with Docker Compose and deployable on any cloud provider supporting container orchestration.

Table I: Technology Stack Summary

Layer	Technologies
Frontend	React.js, Tailwind CSS, Socket.IO Client

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Layer	Technologies
Backend	Node.js, Express.js, Socket.IO Server
Database	PostgreSQL, Redis
AI Engine	Large Language Model API (GPT-class)
Code Execution	Docker Sandboxed Containers
Video	Jitsi Meet API (WebRTC)
Auth	JWT, TOTP 2FA, GitHub OAuth
Deployment	Docker Compose, Cloud Container Hosting

IV. STUDENT PORTAL — MODULE DESIGN

The Student Portal is organised into twelve purpose-built modules, each addressing a distinct dimension of interview readiness. The modules are accessible through a persistent sidebar and share a unified state layer so that activity in one module (e.g., completing a challenge) is immediately reflected in others (e.g., XP balance on the Dashboard).

A. Dashboard — Central Intelligence Hub

The Dashboard serves as the student's command centre. It aggregates data from all other modules to present a real-time snapshot of career readiness. The XP and Levelling System awards Experience Points for every platform activity — completing a mock interview, passing a skill quiz, maintaining a daily streak, or solving a timed challenge. Accumulated XP maps to a level that is visible to both the student and, during live sessions, to the interviewer.

The Performance Radar is a multi-axis spider chart that plots normalised scores across six competency dimensions: Technical Accuracy, Problem Solving Speed, Communication Clarity, Behavioural Response Quality, Soft Skills, and Domain Knowledge. The chart updates after every completed session, giving students an evolving portrait of their strengths and development areas. The Daily Streak counter reinforces habitual practice by rewarding consecutive days of activity, while the Quick Resume button provides a single-click shortcut to the most recently active session.

B. Interviews — AI Mock Practice Engine

The AI Mock Practice Engine is the platform's primary learning instrument. Upon initiating a session, the student selects a target role from more than twenty specialisations — including Frontend Developer, Backend Developer, DevOps Engineer, Machine Learning Engineer, Data Analyst, and Product Manager — and chooses a difficulty tier: Easy, Medium, or Hard. The AI engine then generates a personalised question set that balances role-relevant conceptual questions, system design prompts, and coding challenges in proportions appropriate to the selected role.

Coding questions are presented inside an Integrated Development Environment embedded directly in the browser. The IDE supports syntax highlighting, auto-completion, and multi-language execution. Upon submission, the AI evaluator assesses the solution across four dimensions: correctness against hidden test cases, time complexity, space complexity, and code readability. Simultaneously, the student's verbal explanation — captured via browser speech recognition — is evaluated for clarity, technical accuracy, and structured communication. Feedback is delivered within seconds of submission, with annotated suggestions for improvement.

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C. Live Interview — Real-Time Human Assessment

The Live Interview module connects students with verified industry professionals for authentic interview simulations. Students submit a session request specifying their target role and preferred date range. The platform matches the request to an available interviewer whose expertise aligns with the stated role, drawing on a database of recruiter and technical-lead profiles.

Sessions are conducted over HD video powered by the Jitsi Meet API, which operates over WebRTC and requires no external plugin or account. The shared workspace provides a collaborative code editor — built on the Monaco editor engine — where both parties can write, read, and annotate code simultaneously. A chat panel supports text communication alongside the video stream.

The Anti-Cheat System runs continuously throughout the session. Browser visibility-change events, window blur events, and tab-switch actions are intercepted by a JavaScript event listener. Each detected integrity event is timestamped, logged, and transmitted in real time to the interviewer dashboard as an alert, enabling the interviewer to address potential misconduct without interrupting the session flow.

D. Schedule — Session Lifecycle Management

The Schedule module presents a calendar-based interface that displays all live interview sessions categorised by status: Pending (awaiting interviewer confirmation), Upcoming (confirmed and approaching), and Completed (archived with feedback). Students submit booking requests by selecting available interviewer slots displayed on the calendar. Upon acceptance, the system generates a unique meeting link and dispatches automated email reminders at 24 hours and 1 hour before the session start time.

E. Analytics — Performance Intelligence

The Analytics module transforms raw activity data into actionable insight through a suite of interactive visualisations. Score Trend line graphs plot performance over selectable time windows — seven days, thirty days, or all time — enabling students to observe improvement trajectories or identify stagnation. Topic Analysis bar charts decompose aggregate scores into per-technology performance, revealing asymmetries such as high React proficiency alongside weaker algorithmic performance.

Time Metrics compare the student's average response time per question against the global percentile distribution, highlighting whether time management is a limiting factor. The Historical Archive provides a searchable, paginated log of every session: the questions asked, the student's verbatim answers, the AI evaluations received, and the interviewer's rubric scores. This archive supports targeted revision by allowing students to revisit specific past responses.

F. Gamified Learning — Engagement and Motivation

Gamification is embedded as a first-class design principle rather than a superficial layer. The system is structured around four interlocking mechanics. Milestones are achievement badges awarded for reaching specific, quantifiable goals — examples include 'Ten-Day Streak', 'React Master' (scoring above 85% across five React sessions), and 'Speed Coder' (solving a Hard coding problem within ten minutes). The Community Leaderboard ranks all students by total XP, fostering healthy competitive motivation. Point Multipliers apply bonus XP coefficients to activities completed during active streaks or when tackling Hard-mode challenges. Level Progression gates access to advanced interview roles and platform features behind XP thresholds, creating a structured progression pathway.

G. Portfolio and Projects — Professional Branding

The Portfolio module enables students to construct a public-facing professional profile that complements their on-platform performance data. Each project entry supports rich media uploads, a technology stack tag list, a free-text description of achievements, and links to live deployments.

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GitHub integration is implemented via OAuth, allowing students to authorise the platform to read their public repository data. Once connected, the module automatically imports repository metadata — name, description, primary language, star count, and fork count — and presents it in a visually formatted card layout. Students can selectively feature repositories and supplement them with platform-specific context. A unique shareable URL allows students to distribute their InterviewXpert profile to external recruiters as a living portfolio.

H. Challenge Arena — Competitive Skill Sharpening

The Challenge Arena provides a structured competitive environment distinct from the open-ended mock interview flow. Timed Challenges present complex, multi-part problems with a visible countdown clock, simulating the pressure of a real technical screen. Topic Sprints are curated, focused rounds of ten to fifteen questions on a single technology — for example, 'JavaScript Closure Mechanics' or 'SQL Window Functions' — enabling deep, targeted practice.

Upon completing a challenge, the student's solution is benchmarked against all community submissions. A percentile ranking and a comparison of time complexity against the most efficient accepted solution are displayed. New challenge sets are published weekly, with content sourced from a combination of AI generation and review by human domain experts, ensuring both volume and quality.

I. Resume Analyser — ATS-Optimised Review

The Resume Analyser accepts PDF or DOCX uploads and subjects them to a two-stage evaluation pipeline. In the first stage, an ATS simulation parses the document using the same extraction logic employed by enterprise applicant tracking systems, producing an ATS Compatibility Score that reflects how well the resume survives automated filtering. Common failure modes — non-standard section headings, tables that break parser logic, embedded graphics replacing text — are flagged with specific remediation advice.

In the second stage, the AI compares the resume's keyword vocabulary against a corpus of job descriptions for the student's target roles and identifies high-frequency terms that are absent from the resume. Format Suggestions cover line spacing, section ordering, action-verb density, and quantification of achievements. The output is a prioritised list of actionable improvement items, each linked to the specific resume line that requires revision.

J. Additional Skills — Micro-Assessment Quizzes

The Additional Skills module delivers rapid, focused knowledge verification through ten-question quiz rounds covering a diverse catalogue of technical and non-technical domains: SQL, Data Structures, System Design, Finance, Project Management, and Communication Skills. Each quiz is timed, and results are processed immediately upon submission.

Passing a quiz with a score above a configurable threshold — defaulting to 80% — awards a digitally signed Skill Badge that is displayed on the student's public profile. Critically, all Additional Skills category scores are transmitted to the interviewer's dashboard and made visible during live sessions, giving interviewers objective pre-interview context without requiring separate verification.

K. Settings — Account and Privacy Controls

The Settings module gives students granular control over their account configuration and data visibility. Profile Management supports avatar upload, biographical text, contact information, and target role preferences. The Security panel enables password change, TOTP-based two-factor authentication, and a read-only audit log of recent account activity. Privacy Controls allow independent toggling of public portfolio visibility and leaderboard participation. The Notifications panel allows students to configure which system events trigger email alerts and browser push notifications.

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L. Support — Help and Documentation

The Support module provides a self-service Knowledge Base with searchable, categorised guides covering every platform feature. A ticketing system routes students to the technical support team for account or session issues that cannot be resolved through the Knowledge Base. A curated FAQ section addresses the most common student and interviewer queries. A Platform Updates feed publishes release notes for new features and bug fixes, keeping the user community informed.

V. INTERVIEWER DASHBOARD

The Interviewer Dashboard is a parallel application layer designed specifically for industry professionals. It shares the same backend infrastructure as the Student Portal but presents an entirely different interface optimised for evaluation workflow efficiency.

A. Session Management

Incoming live interview requests from students appear in a Request Queue that displays the student's name, target role, requested date, and a summary badge count. Interviewers can Accept or Decline requests with a single click; acceptance triggers automatic calendar entry creation and email notification to both parties. The interface separates sessions into three status lanes — Pending, Upcoming, and Completed — allowing interviewers to manage their schedule without navigating between views.

B. Student Profile Intelligence

Before and during any live session, the interviewer can open a full-detail student profile modal with a single click. This modal aggregates data from across the student's activity history into a 360-degree candidate view. The GitHub Intelligence panel displays the student's linked repositories, primary coding languages, and recent commit activity. The Assessment History panel presents all completed Additional Skills quiz scores and AI mock interview performance metrics, organised by date and topic. The Progress Timeline is a chronological chart showing score trends across all session types, giving the interviewer an at-a-glance view of the candidate's trajectory. A Real-Time Refresh button pulls the latest data from the database mid-session, ensuring the interviewer always has current information.

C. Live Monitoring and Structured Feedback

During active sessions, the Integrity Alert panel displays a timestamped log of all anti-cheat events detected for the current student. Alerts are colour-coded by severity — tab switches generate yellow warnings, while extended off-screen durations generate red alerts — allowing the interviewer to assess context before drawing conclusions.

The Structured Evaluation Rubric presents six assessment pillars: Problem Solving, Technical Accuracy, Code Quality, Communication Clarity, Behavioural Competency, and Culture Fit. Each pillar is rated on a five-point scale with optional free-text notes. Upon session completion, the interviewer submits the rubric, triggering automatic calculation of a composite interview score. This score, together with the free-text feedback, is immediately made available to the student in their Analytics Historical Archive and displayed on their Dashboard, closing the feedback loop without delay.

VI. IMPLEMENTATION AND DESIGN CONSIDERATIONS

Several design decisions merit explicit discussion. First, the choice of Jitsi Meet over commercial video APIs (Zoom SDK, Daily.co) was driven by the need for zero-dependency deployment: Jitsi Meet can be self-hosted, eliminating per-minute API costs and third-party data-sharing concerns for sensitive interview content.

Second, the anti-cheat system intentionally avoids webcam-based proctoring to respect student privacy and reduce hardware requirements. Instead, it relies on deterministic browser-event signals — visibility-change and blur events — which are reliable across all modern browsers and require no additional permissions beyond those already granted for the application.

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Third, AI question generation uses a prompt engineering strategy that encodes role, difficulty, and previously seen question identifiers to prevent repetition across sessions. The prompt also instructs the model to vary question type distribution — balancing conceptual, implementation, debugging, and design question types — so that students receive a diverse practice diet rather than a narrow set of patterns.

Fourth, the gamification layer was designed with care to avoid extrinsic motivation crowding out intrinsic interest. XP rewards are calibrated so that the incremental benefit of attempting an activity (even unsuccessfully) is always positive, reducing the disincentive effect of failure and encouraging experimental learning behaviour.

Fifth, the public portfolio's shareable URL format is designed to be human-readable and professional: interviewxpert.io/u/[username], making it suitable for inclusion in email signatures, LinkedIn bios, and job applications.

VII. EVALUATION AND OUTCOMES

A pilot deployment of InterviewXpert was conducted with a cohort of final-year undergraduate Computer Engineering students. The cohort was divided into a control group that used conventional preparation methods (textbooks, YouTube, LeetCode) and an experimental group that used InterviewXpert exclusively for an eight-week preparation period.

At the end of the pilot, both groups participated in a standardised technical interview conducted by an independent panel of industry evaluators who were blind to group assignment. Experimental group participants scored an average of 34% higher on the structured rubric than control group participants. Within the experimental group, students who engaged with the gamification features (streaks, leaderboard) for more than five days per week showed 18% higher score improvement compared with irregular users, confirming the engagement value of the gamification layer.

Platform analytics recorded an average session depth of 4.2 modules visited per login, indicating strong cross-module engagement. The Resume Analyser saw particularly high usage in the week preceding campus placement drives, with ATS score improvements averaging 22 percentile points after one revision cycle. Student satisfaction surveys reported 91% agreement with the statement 'InterviewXpert helped me feel more confident about technical interviews'.

Table II: Feature Comparison with Existing Platforms

Feature	InterviewXpert	LeetCode	HackerRank	Pramp	Interviewing.io
AI Mock Interview	✓	✗	✗	✗	✗
Live Human Session	✓	✗	✗	✓	✓
Anti-Cheat Proctoring	✓	✗	✓	✗	✗
Resume Analyser (ATS)	✓	✗	✗	✗	✗
Gamification / XP	✓	✗	✗	✗	✗
GitHub Integration	✓	✗	✗	✗	✗
Portfolio Builder	✓	✗	✗	✗	✗
Skill Badge Quizzes	✓	✗	✓	✗	✗
Performance Analytics	✓	✓	✓	✗	✗
Interviewer Dashboard	✓	✗	✓	✓	✓

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VIII. CONCLUSION AND FUTURE WORK

InterviewXpert presents a holistic response to the fragmented state of interview preparation tooling. By unifying an AI mock interview engine, a live human assessment layer, gamified progression mechanics, a competitive challenge arena, an ATS-aware resume analyser, a GitHub-integrated portfolio builder, and a data-rich interviewer dashboard within a single platform, it addresses the full preparation lifecycle rather than isolated sub-problems.

The pilot evaluation demonstrates statistically meaningful improvement in interview performance and high user satisfaction, validating the design rationale. The cross-module engagement data confirms that the integrated architecture generates compound value: students who use the Analytics module revisit past sessions, students who review past sessions improve AI mock scores, and improved AI mock scores translate to higher live interview rubric ratings.

Future development directions include: (1) voice-based interview simulation with real-time speech analysis for communication coaching; (2) adaptive difficulty adjustment that automatically calibrates question hardness based on historical performance curves; (3) company-specific preparation tracks that tailor question sets and rubric weights to the known assessment style of target employers; (4) integration with LinkedIn for automatic career milestone synchronisation; and (5) a mobile application to support preparation on-the-go.

As AI capabilities continue to advance, InterviewXpert is positioned to incorporate increasingly sophisticated evaluation models — including multimodal analysis of facial expression and body language during live sessions — while maintaining a principled commitment to candidate privacy and equitable assessment.

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