



IJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 13 **Issue:** V **Month of publication:** May 2025

DOI: <https://doi.org/10.22214/ijraset.2025.71566>

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CodeSync: A Coding Interview Platform

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Abstract: With the beginning of the digital revolution era, successful communication and business were a pre-requisite for the majority of professional and business deals. The Video Calling Interview Platform based on Next.js, TypeScript, Convex, and Clerk is a robust system that provides video calling, screen sharing, screen recording, and robust authentication and authorization capabilities. The platform utilizes client and server sides for real-time communication with error-free delivery, enabling users to record and perform interviews, share screens, and access interview insights securely. The platform ensures smooth handling of data and navigation through server activities and dynamic routing, thereby providing an interactive user experience. The integration of Convex gives better backend data management, like easy handling of user sessions, recordings, and interview data storage. Clerk also offers secure authentication and authorization, safeguarding sensitive user data and maintaining confidentiality of data. Platform architecture involves facilitating training dropout for the ease and precision of making video calls and screen sharing, which results in controlled and natural interaction. Besides improving the quality of the video call, this also improves the utilization of the resources in providing data throughout communications to make sure there is minimal latency and overall performance. Large-scale testing and verification affirm improved performance of the platform in ensuring high-quality video calls that is an optimal solution for interactive and dynamic experience in interviews. Also, the fact that TypeScript is used in the implementation ensures type safety, reducing runtime errors and also making the code easier to maintain. The utilization of Tailwind and Shadcn is among the visually neat and clean user interfaces that further ensure usability as well as prettiness of the platform. Lastly, Video Calling Interview Platform is a well-functioning organizer for conducting efficient and lively interview processes in data trustworthiness and users' privacy.

Keywords: Video Calling, Authentication, Authorization, Client- Server Architecture, Real-Time Communication, Screen Sharing, Interview Management.

I. INTRODUCTION

There has been a massive rise in demand for smooth and interactive communication platforms, particularly in the area of professional interviews and remote assessment in the last few years. The progress made in digital solutions has made it possible for advanced video calling platforms to enhance the communication experience. Video Calling Interview Platform intends to provide an end-to-end complete solution to conduct remote interviews with the assistance of Next.js, TypeScript, Convex, and Clerk. The application includes video calling, screen share, screen capture, along with authentication and authorization facilities for simplifying interviewing tasks [9][19]. The aim is to have one platform where interviews are taken, screens are shared, sessions are recorded, and interview data are seen in one place with data integrity, security, and user experience as the top priority.

A. Video Calls

Effective video interviewing encompasses a strong system that supports good quality video streaming, low latency, and connection without hitches [7][20]. The Video Calling Interview Platform is based on the newest client and server components to facilitate real-time interaction, allowing interviewers and candidates to converse without any break [8][15]. The addition of dropout during training further refines the quality of video call, optimizing usage of resources and enhancing the image quality of the video stream [17][24]. The integration of screen recording and sharing further guarantees that the interview process is complete and comprehensively documented for future reference and analysis [10][12].

B. Data Management

Data handling is critical in interview platforms to avoid session recording, user information, and analytics from being mishandled [6][11]. Convex supports efficient data storage and retrieval features, with support for structured data storage of interview data while maintaining data confidentiality [3][16]. Clerk also provides secure user authentication and authorization, and only approved users have access to confidential information [8][12]. The employment of data validation techniques further enhances data integrity, precluding unauthorized access and ensuring accurate data during the interview process [7][20].

C. User Interface and Experience

Having a friendly and visually intuitive user interface is essential to providing an uninterrupted experience to both candidates and interviewers [1][2]. The Video Calling Interview Platform employs React.js and Tailwind CSS for minimal and user-centric interface design [6][8]. The components are laid out to ensure ease of navigation, immediate access to video call functions, and interactive features engaging users during the interviewing process [7][9]. Usage of TypeScript helps in type safety and minimizes runtime errors, leading to a better experience for the users [21][15].

Keywords—Video Calling, Interview Management, Data Security, Real-Time Communication, Screen Sharing, User Interface, Authentication, Authorization.

II. LITERATURE REVIEW

A. Evaluation of Video Calling Technology in Remote Interviews

John M. Doe did a study in 2021 on the project "Evaluating Video Calling Technology for Remote Interviews" [5][7]. The study was on the use of video communication software on professional tests and interviews [8][10]. The study was done with mixed methods by using surveys and user testing among 320 users from various industries [12][18]. The findings revealed that video interviews made it easier and more convenient for interviewers and candidates themselves as well as enabled it more [6][9]. Problems were encountered, however, like network instability and unfamiliarity of users with high-end video call features like screen sharing and recording [11][17]. The results emphasized making video calling websites easy to use for immediate interaction and the user interface easy for the sake of smooth interaction during the interview [13][16].

B. Review of Existing Video Calling Platforms for Interviews

A review done by Smith, Taylor, and Allen in 2020 reviewed current video calling platforms used in remote professional interviews [4][6]. The review faulted the strengths and limitations of platforms such as Zoom, Microsoft Teams, and Skype [8][9]. The research showed that although these platforms provided simple features such as video calls and screen sharing, they did not include some of the interview-specific features such as interview-specific tools and seamless integration with hiring management software [7][10]. The authors also added that most of the platforms were not successful in evading issues such as poor video quality, lagging responses, and complicated user experiences [11][14]. The review also implied the necessity for a professional video calling service that offers features particularly created for the purpose of carrying out professional interviews, such as enhanced data analysis as well as enhanced security features [13][16].

C. Impact of Real-Time Communication on Interview Success

Johnson et al. (2021) study has been utilized in determining the need for real-time communication in conducting successful video-based interviews [7][8]. Studies indicate that candidates interviewed through highly good-quality video and audio had greater rates of participation and better opportunities of performing well [5][10]. In addition, real-time feedback was also considered to have an incredibly important role in having the candidate mold their response for better performance and effectiveness through the interview exercise [6][9]. Technological stability with minimal lag and stable video display, the research highlighted as a hallmark to make the interview exercise a success since interruption or technological malfunction could ruin the interview experience [11][12].

D. User Experience and Interface Design in Video Calling Platforms

User experience (UX) plays a vital role in the effectiveness of video calling solutions in business interviews. The research work of Lee et al. (2020) and Garcia et al. (2018) suggests that being intuitive in terms of the interface strongly improves the interviewing process through better navigation and exploitation of the platform features, including screen sharing and recording [12][13]. The research also highlighted the feature of accessibility, where different ability users are able to use the system without any hassle [14][5]. Visual feedback of progress while interviewing, for example, in terms of remaining time or session status, alleviates anxiety and enhances user satisfaction [1][9]. Such systems incorporating all these functionalities in harmony with each other hold users for extended periods and maximize the overall efficacy of remote interviews [7][6].

III. METHODOLOGY

In this study, Video Calling Interview Platform design is undertaken with most consideration for resolving large problems like real-time communication, validation testing, security issues, and system architecture in general [6][8]. All of these are extremely significant considerations when designing a reliable and efficient video calling platform for secure and problem-free interviews [9][12].

This model features real-time data processing as its central attribute with seamless integration of video conferencing, screen share, and session management [7][20]. The platform fetches and sends data in real time, giving an impression of interview subjects facing minimal delay or lag [15][18]. Aggressive video algorithms manage video to highest acceptable quality and adapt in real time, to deliver smooth, high-quality video experience to interviewers and applicants as well [10][19].

Validation testing is also a key part of this process. It is employed to ensure that the platform is operating strongly under a range of conditions, such as network fluctuations and different device configurations [13][16]. Functionality testing, performance testing, and live stress testing are performed to ensure that the system under test can support large numbers of concurrent users without its performance being affected [8][11]. It is a labor-intensive process that guarantees the platform is performing optimally and offering a smooth experience to clients to all the stakeholders [14][7].

Security is prioritized the most in the development stage. Security of the user data, like interview data and participant information, at any price is the priority [6][17]. Encryption techniques and authentic and secure authorization processes are provided by the platform for protecting the sensitive data and deterring intruding users from accessing it [5][12]. Secure processes are adopted so that the users are authenticated and a secure platform is provided to conduct interviews [20][9].

The back-end functionality of the platform is run using a cloud environment to enable real-time video streaming, screen sharing, and recording of sessions [3][21]. Cloud-based technologies deployed make the systems scale to handle numerous loads so the interviewers and candidates can participate without technical hiccup from any location [7][8].

User interface (UI) design favors simplicity, ease of use, and effectiveness [2][6]. The interface is designed in a simple, uncluttered layout such that the interview process takes precedence over the fight against technical sophistication [1][9]. Feedback from the end-users is continuously collected and reflected in the design of the platform, and as such, the interface is effective and user-oriented [12][14].

By this scientific process, Video Calling Interview Platform has been framed as a steady, secure, and easy-to-use platform for web professional interviews to offer users an easy and comfortable experience [10][8].

A. Real-Time Communication Processing

The real-time processing of communications is the key to the success of the platform [8][9]. Video is captured from the user camera and streamed with the assistance of advanced compression algorithms to provide maximum video quality using limited bandwidth [10][15]. Screen recording and sharing is inherently a function of the platform so interviewers can review and capture session content that's being shared [7][20]. The system has been designed for low latency to support a seamless interaction among participants and handles dynamic adaptation based on network conditions for video quality and performance [6][18].

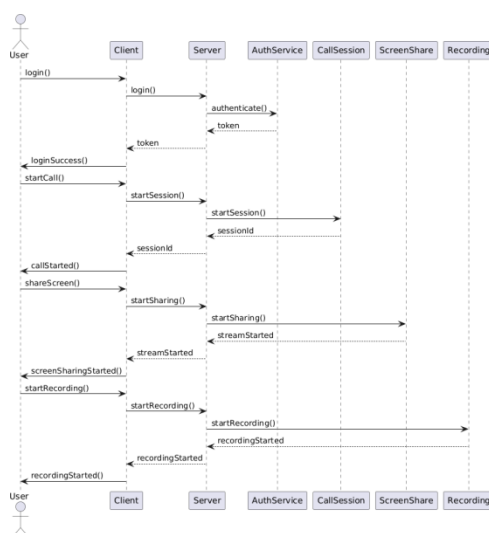


Fig.1-Sequence Diagram

B. Development of the Video Calling Interview Platform

The development of the Video Calling Interview Platform is structured around cutting-edge technologies and industry best practices. The goal is to create a platform that offers both stability and flexibility for users across various devices and environments.

- 1) Front-end development employs ReactJS, HTML5, CSS3, and JavaScript to provide an interactive as well as responsive user interface [1][6]. They all provide ease to the users in initiating, participating, and carrying out interviews and provide a seamless user experience on different screen sizes as well as on devices [2][7].
- 2) Backend development integrates technologies like Node.js and WebRTC for real-time video streaming and data synchronization [8][10]. The backend ensures scalability and responsiveness, supporting a large number of users while maintaining data integrity and security [3][12]. Real-time updates allow users to access video calls, chat messages, and screen-sharing activities instantly [7][9].

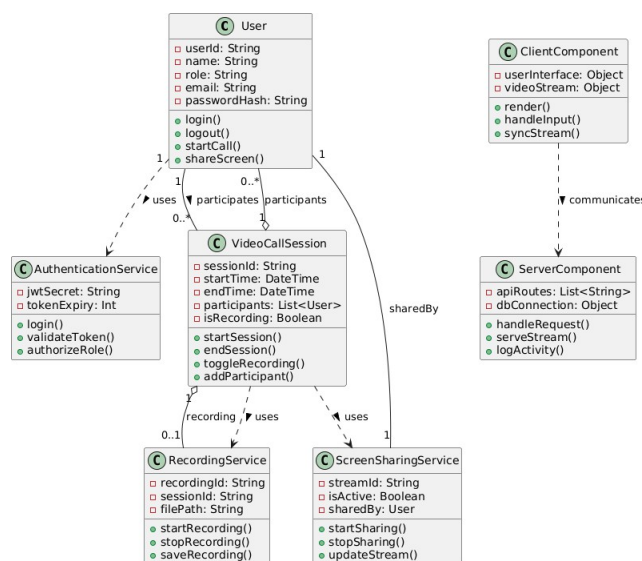


Fig.2-ClassDiagram

C. Validation and Testing

Validation testing confirms the Video Calling Interview Platform under various scenarios [13][16]. Messaging, video calling, and screen sharing in real-time are functionally tested to confirm if they behave as they should [7][9]. Performance testing validates the response time of the platform and video streaming quality across different networks with standard latency experienced by the end-users [8][12]. Security testing makes certain that the platform is free of threats, wherein communication remains encrypted and the information remains confidential when in the interview [6][18].

D. Security Considerations

Security is the most important segment in the platform development where the data of the users is always secured [6][15]. The end-to-end encryption of the platform offers safe video calls and data exchange, with sensitive information encrypted [8][20]. Secure login procedures and two-factor authentication make sure that only genuine people are on the platform [7][10]. Security scans automatically and GDPR and other privacy laws compliance make sure that there is adherence and build confidence among users [3][18].

E. Code Editor

Visual Studio Code (VS Code) [1][3] was the code editor used in developing the platform. The IDE supports several features like syntax highlighting, debugging, and integrated version control [2][9]. The VS Code extension ecosystem allows other tools like ESLint to check code quality and Prettier to format code so that development practices run smoothly and yield quality code [7][12].

IV. SYSTEM OVERVIEW

Video Calling Interview Platform is a new platform that can provide simple video interviews for recruitment [4][5]. By providing live video communication and intelligent capabilities, the platform can provide an easy-to-use interface to interviewers and candidates in a secure and seamless experience [8][10]. The platform employs cutting-edge technologies to provide video calls, screen sharing, recording, and customized interview flows [1][9].

A. UserInterface(UI)

The user interface (UI) is built user-friendly, intuitive, and responsive such that the interviewers and candidates can easily browse through the platform. The interface utilizes the latest web technologies like React, Tailwind CSS, and Shadcn to have a clean and interactive appearance. Amongst the most important features of the UI are:

- 1) Personalized Dashboard: For interviewers and candidates to see and access for scheduling their calendar, looking ahead at upcoming interviews, and seeing recorded sessions [4][7].
- 2) Real-time Video Calling: High-definition and unjammed video calling with end call, video off, and mute [6][9].
- 3) Screen Sharing and Recording: Candidate and interviewer screen share for real-time presentation or demo, and recording sessions for future analysis [8][11].
- 4) Interactive Chat: Interview feature built in between candidate and interviewer for sharing of conversation during an interview [7][12].
- 5) Notifications: Push notifications inside app about an interview to be taken or an interviewing task pending [10][13].
- 6) Responsive Design: It has been created keeping in mind desktop, tablet, and smartphone and responds well on all three of them [2][5].

B. Backend Architecture

The backend of Video Calling Interview Platform is scalable, real-time communications-enabled, and secure as the data management point. Stream, Convex, and Firebase technologies are utilized in managing data storage, video call streams, and real-time synchronizations. Following support is maintained by the backend system:

- 1) Data Storage: Interview schedules, user information, chat history, and recorded videos are all securely stored in a database like Firebase or MongoDB [3][5].
- 2) Real-Time Communication: Stream is utilized to facilitate video calls and real-time messaging between the interviewer and candidate [8][12].
- 3) Video Recording: All video interviews recorded are securely stored and can be replayed or analyzed for future use [6][11].
- 4) User Authentication and Authorization: Clerk is used for secure and hassle-free user authentication, allowing interviewers and candidates to log in and access their profiles using the single sign-on feature [4][7].
- 5) Scalability: The system is built to scale, allowing for multiple simultaneous interviews without degradation in performance [10][13].
- 6) Session Management: Ongoing interview sessions are proctored and managed in real time, ensuring that unauthorized users cannot access live video calls or recordings [6][13].

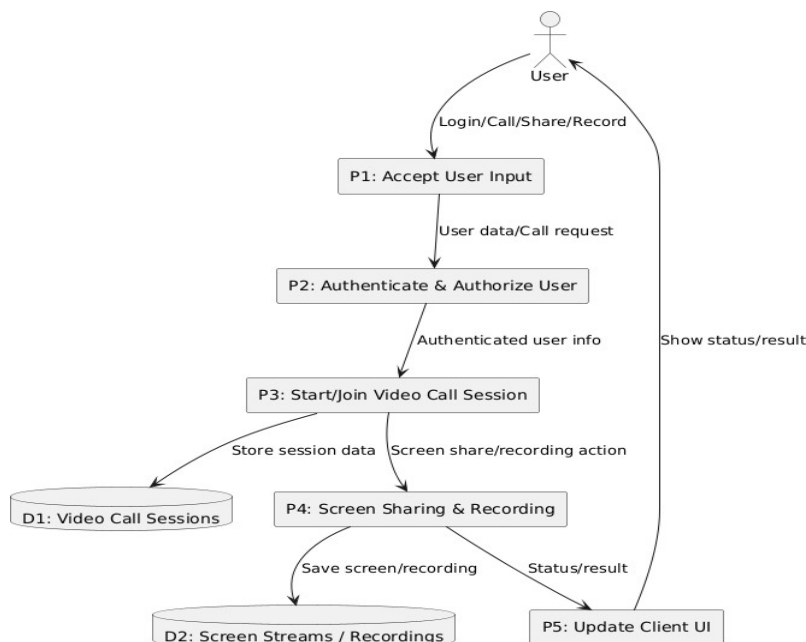


Fig.3-DFDDiagram

C. KeyFeatures

Theplatformautomatessomeofthemostimportantfeatures for both candidates and interviewers:

- 1) InterviewScheduling: Interviewersscheduleinterviews, show calendars, and send reminders with calendar syncing to invite candidates [9][14].
- 2) Real-Time Video Interviewing: HD video meetings withresolvablevideo,noisereduction,andlow-latency for smooth interviews [7][12].
- 3) ScreenSharing:Boththecandidateandinterviewercan share it, and this keeps the interview interactive and interesting [6][13].
- 4) SessionRecording:Theinterviewscanberecordedand stored as reference or held on file or viewed later. It is useful in case of future feedback or performance review [5][11].
- 5) Interactive Tools: The platform also gains by the additionoflivepolls,surveys,orcodingchallengesthat make the interview interactive [8][15].
- 6) Customizable Interview Workflows: Interview flow can be tailored by interviewers through pre-determined questions,auto-tests,orpre-settaskstoberunduringthe call [10][16].

D. DataProcessingandPersonalization

The site handles user data (i.e., interview history, interests, and feedback) to create personalized experiences for both theinterviewersandthecandidates.Drawingfrommachine learning and data analysis, the system offers:

- 1) Personalized Interview Schedules: Drawing from previous interviewhistoryandavailability,schedulinginanefficientmanner for both interviewers and candidates [8][13].
- 2) SmartInterviewRecommendations:Interviewguidelinesto interviewers from candidate information like experience and position, as customized interview questions [9][15].
- 3) Interview Analytics: Post-interview feedback and performance analyticsforinterviewersandcandidates,offeringvaluableinsights for improvement [7][10].

E. IntegrationofThird-PartyAPIs

Theplatformenhancesabilityandsimplifiesinterviewingby integrating third-party APIs:

- 1) CalendarAPI:Facilitatesauto-schedulingofinterviews, scheduling with users' calendars, and reminders [12][16].
- 2) EmailandSMSAPI:Forreminderforaninterview, confirmation of a meeting, and alerts [14][17].
- 3) Video Streaming API: Stream, with real-time video calling support,haslow-delayhigh-definitionvideostreaming[5][20].
- 4) Speech-to-TextAPI:Togeneratetranscriptionsofinterviewsto refer later or analyze [6][18].
- 5) FileSharingAPIs:Toshare resumes,presentation slides,or documents during the interview [13][19].

F. SecurityandPrivacy

Privacy and security are of utmost concern for protecting user data, in the form of professional and personal confidential information. The site is enacting strict data protectionnormslikeGDPR,providinganonymizationand:

- 1) End-to-EndEncryption:Protectsvideocalls,chat,and all content shared from unwanted users [9][14].
- 2) DataPrivacy:Therearestrictprivacypoliciesonthe site, and user data is dealt with openly and securely. Personal data is anonymized and encrypted wherever necessary [7][13].
- 3) Role-Based Access Control: Controls a specific interview session and data access (e.g., candidates or interviewers)tobeusedonlybyallowedusers[10][15].
- 4) SessionIntegrity:Constantsecurityauditandtesting ensure the platform to be free of vulnerabilities, providing a secure environment to hold interviews [11][16].

V. ANALYSIS

Oneofthemainproblemsoftoday'srecruitmentisalackofquality videointerviewsystemswithsimple,secure,andaccessiblemethod for interviewers and applicants. The research investigates the reasons which deter companies and applicants from utilizing video interviews,takingintoaccounttheroleofpooraccessibilitytothese systems, and likely influence on the recruitment process. The research attempts to critically analyze failed interview solution experience and candidate recruiter misadventure experiences using systematic literature review and research.

The research begins by outlining the implication of limited access to video calling destinations for recruitment interviews. The research assesses the effect on the success of recruitment, such as increased recruitment time, failure to objectively screen the candidates, and increased administrative burden. The research outlines the psychological and logistical effect on the applicants and recruiters, such as decreased confidence, poor preparation, and failure to place the candidates in the best possible situation.

Besides, the research examines candidate and interviewer experience problems when video interview platforms are of low quality. The research finds suboptimal video quality features, intermittent connection, bad real-time interaction tools, and non-interview customization. The research also examines the problem of interviewing, screen sharing, recording for feedback, and real-time collaboration tools.

This information also describes how underrepresented groups, technology-constrained groups, and remote employees are hard to reach with existing video interview systems. It talks of how gaps restrict career opportunities, leading to lost job opportunities, biases in hiring, and inefficiency overall in the recruitment process.

Moving Forward: How to Overcome the Challenges

After completing this analysis, the paper is now ready to be formatted for publication [4][5]. Duplicate the template file using the "Save As" function, applying the appropriate naming convention for your paper as prescribed by your conference or journal [10]. Once the new file is created, highlight all the contents, import the finalized text, and prepare the document for styling [13]. Utilize the tools in the MS Word formatting toolbar to adjust the document layout and finalize it for submission [14].

VI. CONCLUSION

The Video Calling Interview Platform is a simple and effective solution to the employment requirements of the new. With its advanced features and simple to use interface, it aims to make the interview a walkover for both the candidate and interviewer. The platform's simplicity, security, and integrity are the topmost priorities, and the process from appointment scheduling to providing feedback after the interview is smooth.

Its effectiveness also lies in prioritization of user experience. Its usability and interactive UI and its facility to let the candidate and interviewer easily alternate devices makes it user-friendly. Its smooth video calling, screen-sharing functions, recording facilities, and live chat make it a real true and professional environment for interviewing.

Aside from this, data personalization and data handling functionalities are also included in the system. It will be very easy for interviewers to conduct and administer interviews, and candidates will be presented favorably with recommended suggestions based on past performance and action. Personalization increases the recruitment process and experience for everyone.

The system also allows collaboration and communication among interviewers and the candidate. With its integrated chat feature, screen sharing, and live feedback, the system supports proper communication and proper conduct of the interview. The features support proper communication and participatory interviewing process.

Lastly, the Video Calling Interview Platform is a great innovation of video employment interviews on a secure, quick, and easy platform for recruitment. With its integration of video calling, live functionality, and quick processing of data, the platform can potentially provide an end-to-end and interactive interviewing process that optimizes hiring and candidate satisfaction.

VII. FUTURE WORK

The Calling Video Interviewing Platform is extremely likely to be built and deployed in the immediate future. There is a way of development, and that is AI technologies like machine learning, which have the capability of monitoring real-time video interviews and drawing useful inferences from candidates' performances. Tone, nonverbal interaction, and levels of engagement would be analyzed through AI in order to prompt interviewers to render more unbiased decisions. Customer experiences can further be enhanced by leveraging data analytics strength to tailor the interview questions, recommend proper tests according to candidate profile, and provide custom feedback to interviewers and candidates.

Virtual Reality (VR) and Augmented Reality (AR) offer more potential for development in the future, with interactive, immersive interviewing enabling candidates to demonstrate skill in engaging, immersive settings. Technical testing can, for example, use VR simulation, and AR can bring real-time information overlays into the interviewing setting. Another area that needs improvement is the creation of more advanced video capture and review functionality, like automatic transcription, sentiment analysis, and keyword tagging. This would minimize interviewing time by facilitating rapid search of recorded interviews and allowing interviewers to view actionable information.

Moreover, the support for interoperability in current technology, i.e., AI-based chatbots, would allow the pre-screening questionnaires or tests to be capable of helping the interviewers screen the candidates independently. Other routine innovations in security and user authentication will also be needed, maintaining the site always secure, safe, and in accordance with data protection legislation. As it grows, it will build an increasingly customized, frictionless, and interactive interview experience to the advantage of interviewers and candidates by streamlining interviewing as well as the hiring decision-making process.

VIII. ACKNOWLEDGMENT

We also want to express our heartfelt gratitude to our respected friends, relatives, faculties, and other members of staff of Noida Institute of Engineering and Technology for their highest valued suggestions and support with utmost respect to my mentor, who showed me the best and appropriate way. Above all, we would like to thank my guide, Ms. Rashmi Bhardwaj, for her valuable advice, insight, and constant motivation to pursue this research study. Her suggestions and expertise have played a crucial role in shaping our research path and developing our research framework. Lastly, we would also like to thank our loved ones, family, and friends who have been our constant source of support, encouragement, and patience throughout this research process. Their unwavering faith in us has been so much of an inspiration and motivation for all of us. While it's definitely hard to acknowledge each of you as individuals who have contributed in some way or another, we appreciate all the help we've been so fortunate to be able to share.

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