iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 14 **Issue:** V **Month of publication:** May 2026

DOI:

www.ijraset.com

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 14 Issue V May 2026- Available at www.ijraset.com

AI-Powered Mock Interview Web Application

Hitesh Aghav[1], Atharva Waykar[2], Atharva Shinde[3], Atharva Shendkar[4], Prof. Zeba Vishwakarma[5]
[1, 2, 3, 4]*K.J.College of Engineering & Management Research, Pune, India*
[5]*Assistant Professor, Department of Computer Engineering*

Abstract—The AI-Powered Mock Interview Web Application is developed to provide an intelligent and personalized platform for interview preparation. Traditional mock interview practices are often limited by cost, accessibility, and lack of customization. The proposed system offers an on-demand web-based solution that simulates realistic interview scenarios tailored to specific job roles, skills, and experience levels. The application utilizes Google Gemini AI to generate dynamic interview questions and deliver automated feedback on user responses. The frontend is built using Next.js and React, while MYSQL manages structured data such as user profiles and interview records. Firebase is integrated for real-time services and cloud support. The system also provides performance analytics to help users track progress and identify areas for improvement. By combining generative AI with modern web technologies, the platform enhances interview readiness and provides a scalable solution suitable for educational and career development environments.

Keywords - AI-powered mock interview, personalized platform, role-specific interviews, Google Gemini AI, realistic questions, authentication

I. INTRODUCTION

Traditional preparation methods such as reading interview questions, watching tutorials, or participating in occasional mock sessions lack personalization and real-time feedback [1], [2]. Additionally, professional mock interview services can be costly and inaccessible to many individuals.

With advancements in Artificial Intelligence and Generative AI, it is now possible to simulate intelligent and interactive systems capable of mimicking real-world interview scenarios. AI-driven platforms can dynamically generate domain-specific questions, evaluate responses, and provide structured feedback, offering scalable and intelligent solutions compared to conven-tional preparation techniques [3], [4].

The proposed AI-Powered Mock Interview Web Application aims to address these limitations by providing an on-demand, personalized, and interactive interview preparation platform. The system generates role-specific interview questions based on user-defined parameters such as job role, technical skills, and experience level. It further analyzes user responses and provides automated feedback to help candidates identify strengths and areas requiring improvement.

The application is developed using modern web technolo-gies to ensure scalability and accessibility. The frontend is built using Next.js and React to provide a responsive and

seamless user experience. MYSQL is used for structured data storage, including user profiles, interview records, and performance analytics. Firebase is integrated to support real-time services and cloud-based functionalities. Google Gemini AI serves as the core intelligence engine for generating inter-view questions and feedback.

By combining generative artificial intelligence with hy-brid database architecture and scalable web technologies, the system creates a realistic mock interview environment that enhances user confidence and preparation efficiency. The platform is designed to be adaptable for integration into edu-cational institutions, placement cells, and career development platforms, making it suitable for large-scale deployment.

The remainder of this paper presents related work in AI-based interview systems, details of the proposed system architecture and methodology, implementation aspects, and performance evaluation results

II. LITERATURE REVIEW

Yashaswini Nag M. N., Lokesh Chowdary K., Shashank L., and Gokul D. [1] have written a paper titled “AI-Driven Mock Interview: A New Era in Candidate Preparation.” The authors proposed an AI-based mock interview platform that evaluates candidates across emotions, confidence, and knowledge. The system uses Convolutional Neural Networks (CNN) for facial expression analysis and Natural Language Processing (NLP) for speech and semantic evaluation.

The platform provides real-time personalized feedback to reduce interview anxiety and improve preparedness. However, the study mainly focuses on behavioral and emotional assessment rather than scalable web deployment architecture.

Akshada Katakar, Namrata Kadam, Sakshi Jagtap, and Pratik Hole [2] presented a review on a mock interview system using AI that analyzes non-verbal cues such as eye movement, smiling, and head motion to assess personality traits. The system integrates deep learning techniques, speech recogni-tion, and NLP to simulate realistic interview environments. It emphasizes behavioral analytics and performance comparison between interview and non-interview scenarios. While effec-tive in non-verbal analysis, the system does not extensively discuss hybrid database integration or cloud scalability.

B. Anitha, G. Bhavani, B. Divya, and M. Jyoshna [3] proposed an AI-Based Mock Interview Evaluator that auto-mates candidate assessment using facial recognition, speech analysis, and sentiment detection. The system utilizes CNN and LSTM models for emotion and confidence classification. It aims to reduce bias and enhance hiring precision through data-driven evaluation. Although the system improves fairness and automation, it primarily targets recruitment evaluation rather than personalized candidate self-preparation.

Rubi Mandal, Pranav Lohar, Dhiraj Patil, Apurva Patil, and Suvarna Wagh [4] developed an emotion and confidence classifier model for AI-based mock interviews. Their research explores machine learning approaches for detecting non-verbal cues and speech-based emotional patterns. The system integrates personality assessment techniques and behavioral analysis using human-computer interaction frameworks. The study highlights the importance of emotional intelligence in interviews but does not focus on dynamic AI-based question generation.

Nirgide Shubhangi Vishal, Sayyed Arsh Aktharali, Patil Paresh Narendra, Raktate Shriraj Vikas, and Pathan Md Fazal Mushtaque [5] introduced an AI-Based Interview Critique System that incorporates deep learning models for speech emotion recognition and behavioral analysis. The system pro-vides personalized feedback based on verbal and non-verbal performance metrics. It emphasizes confidence estimation and real-time evaluation techniques. However, the architecture lacks detailed discussion on scalable web frameworks and structured relational data management.

Aditi S. More, Samiksha S. Mobarkar, Siddhita S. Salunke, and Reshma R. Chaudhari [6] proposed a Smart Interview system using AI to evaluate personality traits through speech and facial emotion recognition. The system applies CNN and TensorFlow-based models to analyze emotional states during interviews. It aims to create an unbiased and efficient evaluation process. While the model enhances recruitment automation, it does not integrate generative AI models for adaptive, role-specific question creation.

Rahul Sharma and Neha Gupta [7] have written a paper on an Intelligent Virtual Interview System using Natural Language Processing and Machine Learning techniques. The proposed system focuses on generating interview questions based on predefined job domains and evaluating candidate responses using semantic similarity and keyword matching algorithms. The authors emphasize the importance of auto-mated scoring mechanisms to reduce human bias and improve evaluation efficiency. However, the platform relies on static question banks and rule-based evaluation methods, which limit adaptability and contextual understanding compared to modern generative AI-based systems.

III. METHODOLOGY

The proposed AI-Powered Mock Interview Web Application follows a modular and scalable architecture that integrates generative AI, hybrid database systems, and modern web technologies to simulate realistic interview environments.

A. System Overview

The system is designed as a web-based application where users can register, select interview parameters, participate in mock interviews, and receive automated feedback. The overall workflow consists of user authentication, interview configura-tion, AI-based question generation, response evaluation, and performance analytics storage.

B. User Authentication and Profile Management

User authentication and session management are handled using secure authentication mechanisms integrated through Firebase services. Upon successful login, user data such as profile information, selected job roles, and interview history are managed and stored securely. This ensures data integrity and controlled access to the system.

C. Interview Configuration Module

Before starting a mock interview, users provide input param-eters including job role, technical skills, and experience level.

These parameters are processed and structured into prompts that are sent to the Google Gemini AI model for dynamic ques-tion generation. This allows the system to generate customized and role-specific interview questions instead of relying on static question banks.

D. AI-Based Question Generation and Evaluation

Google Gemini AI serves as the core intelligence engine of the system. It performs two major functions:
1. Dynamic Question Generation – The model generates context-aware technical and HR interview questions based on user inputs.
2. Automated Feedback Generation – After the user submits responses, the AI analyzes the content for relevance, clarity, technical accuracy, and completeness. Struc-tured feedback is generated to highlight strengths and areas of improvement. This generative approach enables adaptive and realistic interview simulation compared to rule-based systems.

E. Data Storage and Hybrid Architecture

The system adopts a hybrid data management approach:
MYSQL is used for structured data storage, includ-ing user profiles, interview records, scores, and performance analytics. • Firebase supports real-time services and cloud-based functionalities required for seamless user interaction. This hybrid architecture ensures both structured relational data management and scalable cloud support.

F. Performance Analytics Module

After each mock interview session, performance metrics are computed and stored. The analytics module tracks user progress over time, allowing candidates to monitor improve-ment trends and identify weak areas. The dashboard visualizes interview history and feedback summaries in an organized format.

G. Frontend Implementation

The frontend of the application is developed using Next.js and React to provide a responsive and interactive user inter-face. Tailwind-CSS is used to design a clean and user-friendlylayout. The system follows a component-based architecture to ensure maintainability and scalability.

IV. SYSTEM ARCHITECTURE

The AI-Powered Mock Interview Web Application is designed with layers and modules to facilitate scalability, maintainability, security, and the seamless integration of gen-erative artificial intelligence services. There are five primary layers in the system architecture: the Presentation Layer, the Authentication and Session Management Layer, the Applica-tion Layer (Backend Services), the AI Processing Layer, and the Data Layer (Hybrid Architecture).

A. Presentation Layer

The presentation layer is the system's user interface. Users can access the platform through a web browser because its frontend is developed using React and Next.js to provide a versatile and engaging single-page application (SPA). Tailwind CSS is used to build a straightforward and understandable user interface that offers consistent styling and functionality on all devices.
This layer collects user input, including job title, technical abilities, experience level, and interview answers. It also provides interview questions generated by artificial intelli-gence, organized feedback, and performance analytics through a dashboard interface. The frontend communicates with the backend via secure API calls. Significantly, it improves system security by maintaining architectural separation and avoiding direct interaction with the database or AI services.

B. Layer for Authentication and Session Management

The Authentication and Session Management Layer ensure secure access control inside the system. User verification is done via Clerk Authentication services, which provide secure registration, login, logout, and profile management capabil-ities. After a successful authentication, session tokens are generated in order to verify and maintain live user sessions.
This layer guarantees that only permitted users have access to interview tools and personal performance data. By sepa-rating authentication methods from core business logic, the system protects user data and prevents unauthorized access. Data privacy is protected, and the system's overall security is improved by this structured approach to access control.

C. *Application Layer (Backend Services)*

The main coordinating center of the system is the ap-plication layer. Using Next.js API routes, it serves as the intermediary between the data storage components, the AI processing layer, and the frontend.

This layer contains a lot of vital components, including:

The Interview Session Manager is responsible for managing interview sessions, managing the logical flow of questions, and maintaining session metadata.

AI Request Handler: Sends structured prompts based on user input to the Google Gemini AI model. In addition, it processes AI-generated outputs before sending them back to the frontend.

Response Evaluation Controller: Determines performance measures, extracts structured feedback, and sends user re-sponses to the AI engine for analysis.

The layer's modular architecture facilitates task division. It simplifies troubleshooting, enables future growth, and facili-tates efficient request administration. This layer acts as a man-aged interface between the front-end and back-end services, increasing the system's reliability and maintainability.

D. AI Processing and Intelligent Layer

The primary intelligence engine of the system is the Google Gemini AI, which is integrated into the AI Processing Layer. The purpose of this layer is to transform structured inputs into useful interview simulations and evaluative information.

Its primary responsibilities are:

Dynamic Question Production: The AI model generates context-aware HR and technical interview questions based on the user's selected professional route, technical skills, and degree of competence. Quick engineering techniques are used to ensure relevance and adaptability.

Automated Response Evaluation: The AI analyzes user responses to see if they are clear, technically correct, com-prehensive, and relevant. It offers structured feedback that highlights areas where improvement is needed and areas of strength.

This generative AI-based approach offers realistic and flex-ible interview simulations, unlike traditional interview prepa-ration methods that rely on static question banks or rule-based evaluation. The AI layer improves personalization and sets a higher standard for user input quality.

E. The Data Layer (Hybrid Architecture)

The Data Layer uses a hybrid architecture that combines relational database storage with cloud-based services in order to achieve a balance between regulated data management and scalability.

MYSQL: Maintains structured data like user profiles, interview history, performance ratings, and analytics data. The relational database ensures transactional integrity, reliability, and data consistency.

Firebase: Delivers real-time services and cloud-based assis-tance to enhance scalability and responsiveness. It facilitates real-time data processing and lightweight cloud operations.

This hybrid approach ensures efficient storage by combining scalable and cloud-supported capabilities with efficient structured storage.

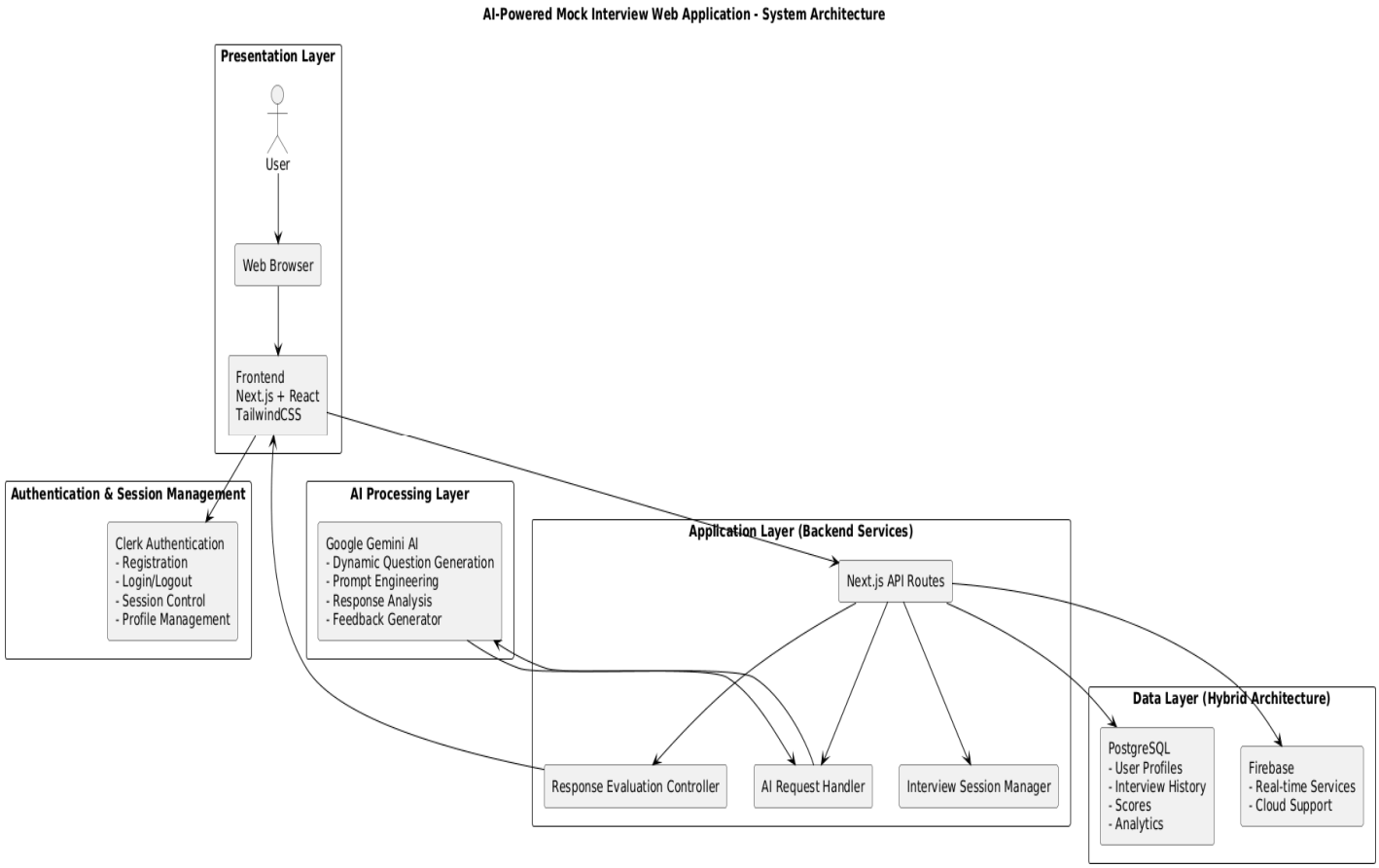

Fig. 1. System Architecture of the AI-Powered Mock Interview Web Application

V. RESULTS AND DISCUSSION

The AI-Powered Mock Interview Web Application was implemented and evaluated to assess its effectiveness in deliv-ering personalized interview preparation, automated response evaluation, and scalable web performance. The system was tested across multiple functional and performance parameters including dynamic question generation, feedback quality, re-sponse time, and data management efficiency.

A. Functional Evaluation

The system successfully generated dynamic interview ques-tions based on user-defined parameters such as job role, technical skills, and experience level. During testing, different technical domains including software development and data analysis were selected. The integrated generative AI model produced context-aware technical and HR questions tailored to the selected role.

Unlike conventional mock interview systems that rely on static question banks [1], [2], the proposed system generated adaptive and non-repetitive questions for each session. This confirms the effectiveness of generative AI integration in en-hancing personalization and realism in interview simulations. The Interview Session Manager ensured consistent question flow and maintained structured session control.

B. Response Evaluation Performance

The automated evaluation mechanism analyzed user re-sponses based on clarity, relevance, completeness, and techni-cal correctness. Structured feedback was generated, highlight-ing strengths and improvement areas. Previous research has shown that AI-based evaluation can reduce bias and improve feedback consistency [3], [4]. In the implemented system, responses of varying quality levels were tested. Strong answers received constructive reinforcement, while incomplete responses triggered detailed suggestions for improvement.

The evaluation process demonstrated consistent behavior across multiple test cases, validating the reliability of the AI-driven feedback model. Compared to rule-based scoring systems [5], the generative AI-based evaluation provided deeper contextual analysis rather than keyword matching alone.

C. System Performance and Responsiveness

The application was deployed in a web environment and tested under moderate user load conditions. The integration of Next.js API routes ensured efficient backend processing, while MYSQL maintained reliable data storage.

Cloud-based architectures are widely adopted to enhance scalability and remote accessibility [6]. In the proposed sys-tem, Firebase services supported real-time functionality with-out introducing significant latency. API response times for question generation and evaluation remained within acceptable limits, ensuring smooth user experience.

The layered architecture enabled concurrent session han-dling without system instability, demonstrating scalability and modularity.

D. Data Management and Analytics

User profiles, interview history, performance scores, and analytics records were successfully stored in MYSQL. The analytics dashboard displayed historical performance trends, enabling users to track improvement across sessions.

Hybrid data architectures combining relational databases and cloud services are recommended for scalable web applica-tions [7]. The implemented system demonstrated stable data handling and consistent retrieval of historical records. Data integrity was maintained through structured relational storage, while cloud integration supported responsive operations.

E. Discussion

The experimental results indicate that integrating generative AI significantly enhances the adaptability and personalization of mock interview platforms. Traditional systems often depend on predefined question sets [1], which limit contextual adapt-ability. The proposed architecture overcomes this limitation by leveraging AI-driven dynamic generation and structured evaluation. While the system demonstrates strong functional perfor-mance, AI-based evaluation may occasionally introduce vari-ability due to the probabilistic nature of generative models. Future enhancements may include hybrid evaluation mecha-nisms combining AI analysis with predefined scoring rubrics to improve consistency.

Overall, the results confirm that the proposed system ef-fectively delivers intelligent interview simulation, automated feedback, secure data management, and scalable deployment.

VI. CONCLUSION

This paper presented the design and implementation of an AI-Powered Mock Interview Web Application that integrates generative AI with modern web technologies to enhance interview preparation. The system provides dynamic, role-specific question generation and automated response evalua-tion, enabling personalized and adaptive interview simulation. The layered architecture ensures secure authentication, ef-ficient backend coordination, scalable AI integration, and reliable data management through a hybrid database approach. Experimental evaluation demonstrated that the system delivers relevant questions, structured feedback, and stable performance under web deployment conditions. Overall, the proposed solution offers an intelligent, scalable, and practical platform for interview training. The architecture supports future enhancements such as voice-based interaction, advanced analytics, and expanded AI capabilities, making it suitable for academic and professional deployment.

VII. FUTURE SCOPE

Although the proposed AI-Powered Mock Interview Web Application demonstrates effective personalization and auto-mated evaluation, several enhancements can further improve its capabilities and practical impact.

Future development can include integration of voice-based interviews using speech recognition and natural language processing techniques. This would enable real-time spoken interaction, making the mock interview experience more re-alistic.

Additionally, facial expression analysis and confidence detection using computer vision models can be incorporated to evaluate non-verbal communication skills.The system can also be extended to support resume analysis and job description matching. By analyzing uploaded resumes, the AI model can generate more targeted interview questions aligned with specific job requirements. Multi-language sup-port can further expand accessibility for users from diverse backgrounds.

Another area of enhancement involves implementing hybrid evaluation mechanisms that combine AI-generated feedback with predefined scoring rubrics to improve consistency and reliability.

From a deployment perspective, the platform can be scaled using microservices architecture and containerization tech-niques to support large-scale institutional usage.

Overall, the system provides a strong foundation for in-telligent interview preparation, and future enhancements can transform it into a comprehensive AI-driven career develop-ment platform.

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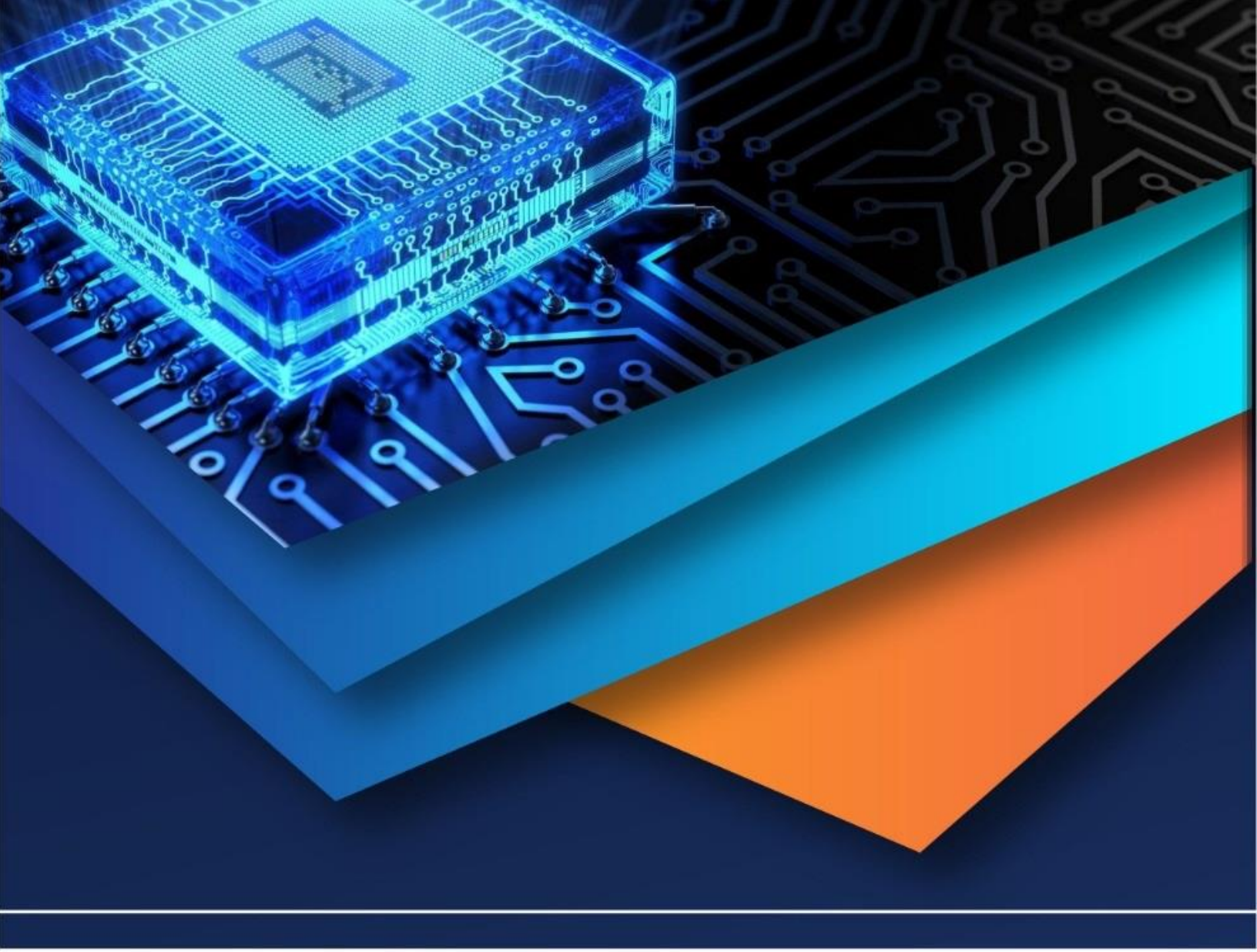

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