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FormatriX: An AI Form Builder

Neelam More[1], Vedant Swami[2], Vipul Chavan[3], Yashada Funde[4], Yogita Fatangare[5]
[1,2,3,4]*Student,* [5]*Assistant Professor, Department of Information Technology, PES Modern College of Engineering, Pune*

Abstract: ***The creation of an AI-driven form builder was spurred by the growing need for effective, customizable, and user-friendly form-building tools. By incorporating artificial intelligence for prompt-based form development and customization, this project tackles the difficulties encountered by users who lack technical abilities in form creation. Form creation, subscription management, form sharing, and response collection are all simple for users. This survey report discusses the project's benefits, difficulties, and potential developments while outlining its design, procedures, and structure, including comprehensive flow diagrams, architecture, and requirements.***

Keywords: AI-powered form builder, form creation, user-friendly, prompt-based generation, form customization, data collections form sharing*.*

I. INTRODUCTION

The growing digital transformation has made data collection and management integral to almost every sector, including businesses, education, healthcare, and non-profit organizations. Forms are one of the most commonly used tools for collecting structured data, whether for customer feedback, surveys, event registrations, or internal documentation. However, the existing form-building tools often present challenges for users, especially those with limited technical skills. Traditional form builders require users to manually select fields, configure logic, and adjust settings, which can be time-consuming and complicated for non-technical users.

Form Matic: AI Form Builder aims to bridge this gap by introducing artificial intelligence (AI) to automate the form creation process through simple prompts. By leveraging natural language processing (NLP), users can describe their form requirements in plain language, and the AI translates these descriptions into a fully functional and customizable form. This significantly reduces the time and effort required for form creation, making it accessible to users across various technical skill levels.

User-friendly customization is another key aspect of Form Matic. Unlike traditional form builders that offer predefined templates with limited flexibility, this AI-powered tool allows users to easily modify the structure, design, and functionality of forms based on their unique needs. It combines AI's automation with the flexibility of manual customization, offering a hybrid approach that ensures ease of use without sacrificing control. Additionally, Form Matic introduces features like subscription management and form sharing, catering to diverse user needs. With a tiered subscription model, users can access basic or premium features based on their selected plan, making it suitable for individuals, small businesses, or larger enterprises. Forms can be shared effortlessly via a generated link, and responses are collected in real time, enabling users to monitor and analyze the data without delays.

One of the standout features of the system is its integration of real-time response collection and data analysis tools. The platform provides an intuitive dashboard that displays collected data in an organized manner, enabling users to quickly interpret the results. Form creators can also export the response data in various formats for further analysis, reporting, or integration with other tools.

Given the ever-increasing emphasis on data-driven decision making, tools like Form Matic have the potential to play a crucial role in simplifying and enhancing the way data is collected and managed. By harnessing the power of AI, this form builder not only streamlines form creation but also introduces a new era of dynamic, intelligent, and efficient data collection.

Dynamic, intelligent, and efficient data collection.

II. LITERATURE REVIEW

A. The Role of AI in Simplifying Form Creation

As the demand for efficient data collection tools rises, artificial intelligence (AI) has become a key enabler in automating and streamlining processes, including form creation. According to Goktas et al. [1], AI-powered systems can generate interactive forms or chatbots using prompt-based responses, enhancing user engagement and streamlining information gathering. Prompt-based learning, when paired with AI, is shown to improve system efficiency and transparency, especially in contexts demanding rapid responses. However, Goktas et al. also highlight the limited customizable features of current prompt-based systems. They identify the need for AI-powered platforms capable of generating custom forms that dynamically adapt to user inputs and cater to various domains such as education, healthcare, and business [1].

B. Integrating AI with User-Centered Design for Improved Usability

User experience (UX) and user interface (UI) design are pivotal in improving the usability of form builders. Costa et al. [2] discuss the integration of AI in UI/UX design, emphasizing how AI can create a more intuitive and accessible form creation process. AI-driven interfaces can dynamically analyze user interactions and adapt to specific requirements, simplifying the design process and enabling users with minimal technical expertise to build professional forms [2]. However, existing solutions are often under-optimized for form creation. Costa et al. identify opportunities for AI-enabled systems to provide real-time design feedback and automated customizations to better accommodate user needs [2].

C. Enhancing Security in AI-Driven Form Builders

With increased data collection through forms, ensuring security and privacy has become crucial. Sarker et al. [3] underscore the role of AI-driven security in web applications, particularly for systems handling personal or sensitive information. They detail AI-driven cybersecurity measures such as anomaly detection and real-time threat assessments to safeguard data in form-building applications. Measures like multi-factor authentication (MFA) and real-time user activity monitoring can enhance trust and protect user data against breaches [3]. However, further advancements are necessary to address emerging security threats within form builder platforms [3].

D. Automated Data Collection and Analysis for Improved Insights

Organizations seeking actionable insights benefit from automated data collection and analysis capabilities. Smith and Zhang [4] highlight the integration of automated data processing in form builders, which streamlines data analysis, enabling organizations to gain structured insights with minimal resource expenditure. Real-time data management capabilities in form builders allow users to derive meaningful insights directly from responses [4]. The study suggests further enhancements, such as predictive analytics and data visualization features, to bolster the utility of form-building tools [4].

E. Challenges in Real-Time Data Processing for Form Responses

Real-time processing of form responses is vital for applications in education, business, and research. Patel et al. [5] explore technical challenges such as storage, speed, and latency in real-time data processing. Their findings indicate that delays in processing and retrieving responses can frustrate users, ultimately reducing engagement. High-speed, reliable backend systems for storing responses and dynamically rendering insights are recommended [5]. However, many form-building solutions still lack the infrastructure needed for efficient real-time processing of large data volumes [5].

F. Proposed Solution

Based on the reviewed literature, there is a clear need for an AI-driven form builder capable of rapid and user-friendly form creation, secure data management, and efficient response handling. Unlike traditional form builders that lack flexibility and advanced features, the proposed solution leverages AI to generate customized forms from user prompts, securely store responses, and offer real-time data insights. This platform aims to overcome existing limitations by incorporating intuitive UI/UX design, robust security measures, and effective data processing capabilities. As such, it offers a comprehensive tool for diverse data collection needs across sectors.

III. COMPONENTS AND REQUIREMENT ANALYSIS

The Form Matic AI-powered form builder comprises various components that collaboratively ensure a seamless, user-friendly, and customizable experience for form creation, data collection, and response management. The following sections detail these components and their roles within the system.

A. Frontend.

The frontend serves as the interface between the user and the system, providing the user experience for form creation, customization, and response viewing. It is built using **Next.js** and **Shadcn UI**.

1) *Next.js:* A powerful React framework that enables server-side rendering and static site generation, enhancing both performance and SEO. Next.js ensures that the frontend is fast and responsive, critical for maintaining a smooth user experience.
2) *Shadcn UI:* A component library designed for modern, responsive user interfaces. Shadcn UI provides pre-built UI components such as buttons, forms, and tables, making the interface visually appealing while reducing development time. This minimizes the learning curve for users and ensures that form creation is intuitive.

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Features:

- Drag-and-drop interface for manual form customization.
- Prompt-based AI interface where users input form requirements in natural language.
- Real-time updates and previews of forms before publishing.
- Responsive design ensuring compatibility across devices (desktop, tablet, mobile).

B. Backend

The backend is the core engine that processes user requests, manages data, and handles form generation via AI. The backend is built using Drizzle ORM to interact with the PostgreSQL database and handle API requests.

1) *Drizzle ORM:* A type-safe object-relational mapping (ORM) library for TypeScript, which simplifies database interactions. It provides abstractions over SQL queries and ensures that developers can interact with the PostgreSQL database efficiently and securely.
2) *API:* RESTful APIs are employed for handling various operations like form creation, updating, deletion, response collection, and user data management. The backend also interfaces with third-party APIs (such as OpenAI for AI-driven form generation).

Features:
-API endpoints for creating and managing forms, responses, users, and subscription plans.
-Secure processing of requests using authentication and authorization protocols.
-Efficient data management to store and retrieve large volumes of form data.

C. Database

The system uses PostgreSQL as its primary database for storing all necessary information related to users, forms, responses, and subscriptions.
PostgreSQL: A powerful, open-source relational database system known for its scalability, reliability, and performance. PostgreSQL stores all user data, form structures, responses, and payment/subscription information.
Data Models:
-Users: Stores user information such as username, email, hashed passwords, and subscription tier.
-Forms: Stores form metadata, including prompts, fields, structure, and customization options.
-Responses: Stores form submission data, including form ID, respondent ID (if logged in), and individual field values.
-Subscriptions: Manages information about the user's current subscription plan, payment status, and available features.

Features:
-Efficient data retrieval with indexing to ensure fast response times, even for large datasets.
-Backup and restore features to ensure data safety.
-Optimized for handling concurrent requests and large volumes of data (scalability).

D. Authentication & Authorization

The system ensures that only authorized users have access to create, edit, and manage forms. Next-Auth is used to manage secure authentication for both form creators and respondents.
Next-Auth: A secure, open-source authentication library for Next.js applications. It supports multiple authentication providers, such as email and password, OAuth, and third-party integrations like Google or Facebook.
Security Features:

1) Role-based Access Control (RBAC): Ensures that form creators have full control over their forms, while respondents only have access to submission pages.
2) Session Management: Supports both persistent and session-based login options.
3) Token-based Authentication: Uses JSON Web Tokens (JWT) to manage sessions and validate user actions.

Authorization: Ensures that only premium users can access certain advanced features (such as complex form logic, data export, etc.).

E. Subscription Management

The subscription model in Form Matix is powered by Stripe, a robust payment processing platform that handles recurring payments and subscription management.

Stripe Integration: Stripe manages all payment-related processes, including billing, invoicing, and subscription plans. The integration allows users to manage their subscription levels easily.

Subscription Plans:

1) Free Tier: Offers basic form creation and limited responses, with core customization features.
2) Paid Tier(s): Unlocks advanced features such as complex form logic, unlimited form creation, extended data storage, and data export capabilities.

Billing Cycle:

Users can subscribe on a monthly or yearly basis, with automated payment processing and reminders.

Payments are securely processed, with features for managing refunds, cancellations, and upgrades.

F. AI-Powered Form Generation

The heart of Form Matic's innovation lies in its AI-driven form generation, powered by Gemini's API for natural language processing (NLP).

Gemini's API: An advanced NLP model that converts user prompts (in plain language) into structured forms. For example, a user can type "Create a feedback form with name, email, rating, and comments fields," and the AI will generate the appropriate form structure based on this description.

AI Capabilities:

Understands context and intent from user input to generate relevant form fields.

Offers suggestions for additional form elements, improving the form's overall utility.

Continuous learning from user feedback to enhance future form generation accuracy.

Customization:

After AI generates the form, users can manually adjust fields, add conditions (logic), and fine-tune the design for better control.

G. Form Publishing & Sharing

Once the form is created, it can be published and shared with respondents via a unique URL.

Form Publishing:

The user can save their form in the database, where it is assigned a unique ID and URL for sharing.

Sharing Features:

Shareable Links: A unique link is generated for each form, which can be shared via email, social media, or embedded on websites.

Form Access Control: The form creator can control access settings, such as password protection or login requirements for respondents.

H. Response Collection & Data Management

Once the form is shared and responses are submitted, the backend stores the data in the PostgreSQL database, allowing the form creator to analyze responses in real-time.

Response Management:

Responses are stored in a structured format, linked to the form ID and respondent ID (if applicable).

Real-time updates ensure that the form creator can view responses as they are submitted.

Data Export:The system supports exporting responses in multiple formats, including CSV and Excel, for further analysis.

Form creators can filter responses, generate reports, and utilize visual data representations (charts, tables) for better insights.

IV. PROJECT FLOW

The Form Matic AI-powered form builder follows a structured workflow from user sign-up to form response collection and analysis. This flow ensures that both form creators and respondents can interact with the system smoothly, with minimal technical knowledge. The steps in the project flow are described as follows:

A. User Sign-up/Login

Process: Users, both form creators and respondents, begin by signing up or logging in to the platform. Authentication is managed through Next-Auth, which supports multiple login methods, including email/password and OAuth providers like Google.

Explanation: Form Creators must sign up to securely store and manage their forms. Respondents may sign up to save progress or access restricted forms, though this is optional for most forms.

Key Features:

Secure authentication and session management.

Integration with OAuth providers for simplified login.

Support for password resets and login credential updates.

B. Subscription Plan Selection

Process: Form creators are prompted to choose a subscription plan after signing in, ranging from a free tier with basic features to premium plans powered by Stripe.

Explanation: Free-tier users can create forms with limited customization and response options, while premium users unlock advanced features such as conditional logic and detailed data analysis tools.

Subscriptions can be upgraded or downgraded at any time.

Key Features:

Secure payment processing using Stripe.

Differentiation between free and paid features for informed decision-making.

Automated billing with monthly or yearly payment options.

C. Form Creation

Process: Users describe their form in natural language, and the Gemini API processes the input to generate a structured form. This form can be further customized using a drag-and-drop editor in the Next.js frontend.

Explanation: AI-Powered Generation: Users provide simple prompts (e.g., “Create a feedback form with name, email, and rating”), and the AI generates the corresponding form.

Customization: Users can modify fields, add new sections, and configure form logic.

Logic: Premium users can set conditional logic for dynamic forms based on respondents' inputs.

Key Features:

Real-time preview with drag-and-drop editor.

AI-suggested improvements for additional fields.

Predefined templates for faster form setup.

D. Form Publishing & Sharing

Process: Once the form is finalized, it is saved in the database, and a unique URL is generated for sharing. This URL can be distributed through multiple channels such as email or social media.

Explanation: Form creators can configure settings to require respondent login or allow public access.

Additional controls include limiting the number of responses, setting submission deadlines, or enabling password protection.

Key Features:

Form access control (e.g., public/private settings).

Response limits and submission deadlines.

Customizable URLs for branding purposes.

E. Respondent Interaction

Process: Respondents access the form via a link and can fill it out on any device, as the form UI is fully responsive. Depending on form settings, respondents may be required to sign up or log in.

Explanation: The form interface is designed to be intuitive and minimize respondent friction.

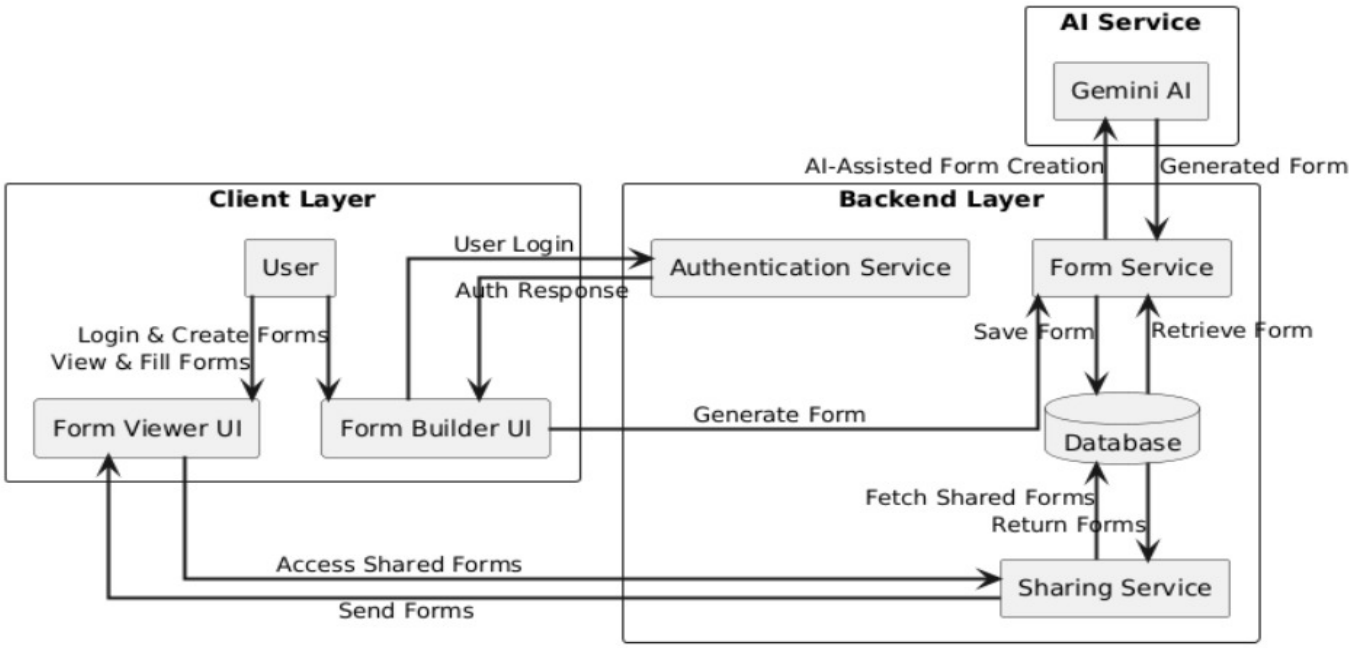
Features like multiple sections and conditional logic ensure smooth navigation for respondents.

Key Features:
Save Progress: Respondents can save progress and return later (if enabled).
Responsive Design: The UI adapts seamlessly to mobile, tablet, and desktop devices.
Auto-Save: Responses are saved automatically during the submission process.

F. Response Collection

Process: Responses are securely transmitted to the backend and stored in the PostgreSQL database. Form creators can view responses in real-time through their dashboard.
Explanation: Real-time updates allow form creators to monitor submissions as they come in.
Response data is stored securely with encryption to ensure privacy.
Premium users have access to advanced data analysis tools for in-depth insights.
Key Features:
Real-Time Monitoring: Form creators can track submissions in real-time.
Instant Notifications: Optional email notifications for new responses.
Auto-Validation: Responses are validated for format accuracy (e.g., email addresses, numeric values).

G. Architecture Diagram



V. METHODOLOGY

The Form Matic project employs a combination of well-established software engineering practices and modern artificial intelligence techniques. The following methodologies were applied throughout the project to ensure efficient development, user-focused design, and the delivery of a scalable, secure, and AI-driven form-building solution.

A. Agile Development Methodology

Agile development was used as the primary approach for managing the project. By dividing the development process into short iterations or sprints, the team was able to deliver incremental improvements and quickly respond to feedback. Agile methodologies ensure flexibility, allowing continuous integration of new features and improvements based on user feedback and testing [1]. Agile promotes adaptive planning and evolutionary development, which fits well with projects that are dynamic and involve emerging technologies like AI [2].

B. User-Centered Design (UCD)

A user-centered design approach was implemented to prioritize user experience and accessibility. This methodology involved conducting user research to identify the target audience's pain points and needs. Iterative design prototypes were developed and refined through usability testing to ensure the system's interface is intuitive and easy to navigate, particularly for non-technical users [3]. Personas were created to represent different user types, and feedback loops were integrated to continuously improve the user interface.

C. AI-Driven Development

The form generation feature of the system is powered by the Gemini API, which uses Natural Language Processing (NLP) techniques to interpret user prompts and generate form structures accordingly. This methodology is based on machine learning models trained on vast datasets to understand and process human language. The AI model's performance was continually optimized through prompt-tuning and periodic retraining, ensuring accuracy and relevance in form generation [4]. The prompt-based AI workflow reduces manual form-building time and allows users to automate much of the process.

D. API-First Development

The project follows an API-first development methodology, where APIs are treated as the core of the system's architecture. This approach allows the frontend and backend to remain decoupled, ensuring scalability and flexibility in integrating additional features or external services [5]. The Gemini API powers AI form generation, while other APIs handle authentication (using Next-Auth) and payment processing (via Stripe). API-first methodologies ensure that future enhancements, such as integrating third-party tools, can be performed without restructuring the core system.

E. Test-Driven Development (TDD)

Test-Driven Development (TDD) was employed to maintain high code quality and reduce the likelihood of defects. In TDD, unit tests are written before actual development, ensuring that the code meets specified requirements. Both unit tests and integration tests were used to verify the functionality of core components such as form creation, response collection, and subscription management [6]. This methodology allowed for faster detection of errors and ensured the robustness of the system.

F. Data Security and Privacy Management

Given the sensitive nature of user data, the project adheres to best practices in data security and privacy management. All data, including form responses and payment details, are encrypted both at rest and in transit. The project complies with industry standards such as GDPR and CCPA for data protection. Role-Based Access Control (RBAC) ensures that users only have access to the features appropriate for their role

VI. CONCLUSION

The Form Matic is a cutting-edge AI-powered form generating tool that automates form development, sharing, and analysis. With the use of modern AI models like the Gemini API and contemporary frontend technologies like Next.js, users with varying levels of technical expertise may effectively construct highly customized forms.

Form-building is now more accessible thanks to the platform's AI-driven natural language processing, which streamlines the laborious and manual process of defining form fields. Furthermore, the user experience is improved by real-time answer gathering, secure authentication, and sophisticated data analytics, which make it a flexible tool for a range of uses in fields including market research, business, and education.

Future developments might concentrate on extending AI's capabilities to encompass more sophisticated contextual comprehension, more thorough integrations with external apps such as analytics and CRM software, and mobile optimization with offline features to increase accessibility. Additional advancements in interactive dashboards, predictive analytics, and data visualization will give users more useful information. Compliance with international data protection laws will be ensured by bolstering security measures, such as putting multi-factor authentication into place and using privacy-preserving AI approaches. Additionally, teams will be able to collaborate easily on form generation with the introduction of collaborative form-building tools.

With these developments, Form Matic is well-positioned to lead the next wave of AI-powered form builders, revolutionizing form management and generation while guaranteeing scalability, security, and an easy-to-use interface.

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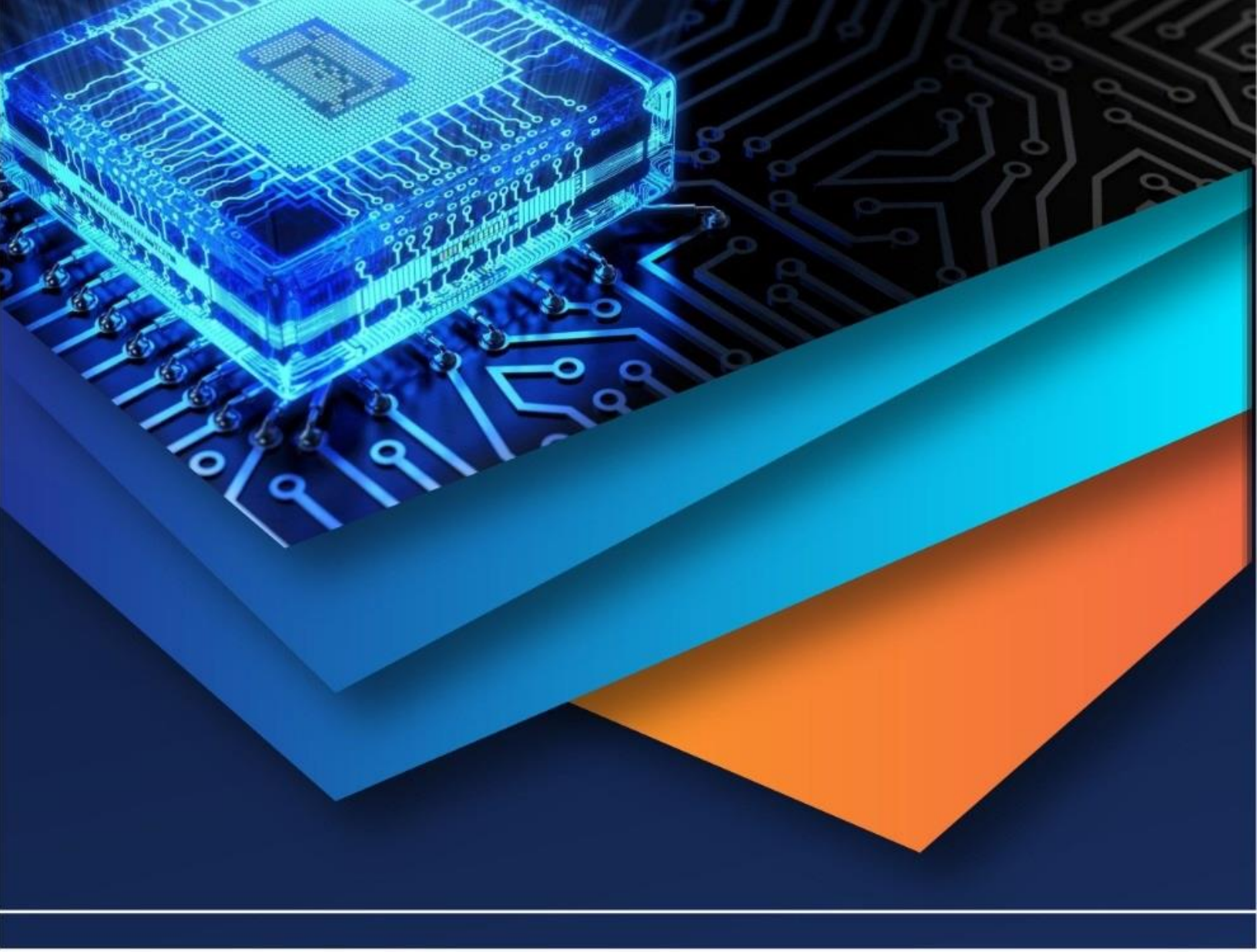

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