iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 13 **Issue:** XII **Month of publication:** December 2025

DOI: https://doi.org/10.22214/ijraset.2025.76026

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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 13 Issue XII Dec 2025- Available at www.ijraset.com

Rhythm-Edge: Music Streaming Platform

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Abstract: ***In Today's fast-paced world, individuals often grapple with emotional stress, social isolation, and the lack of creative outlets. Music has long been recognized as a universal language that transcends barriers, offering emotional relief and cognitive stimulation. Rhythm-Edge is a modern, responsive, and scalable music streaming platform designed to bring personalized music experiences to users. Inspired by platforms like Spotify and JioSaavn, it delivers seamless real-time streaming, intelligent recommendations, and an engaging listening environment. The platform not only serves as a source of entertainment but also promotes mental wellness and a sense of community through music discovery and shared musical journeys.***
Keywords: Music Streaming, Web-based Application, Audio Streaming, Playlist Management, Responsive Design.

I. INTRODUCTION

In recent years, the role of music in our daily lives has become more significant than ever. With rising cases of mental health challenges, stress, and digital fatigue, people are increasingly turning to music as a therapeutic escape. Music offers a unique way to connect with emotions, manage mood, and create a sense of belonging. It has the power to uplift, motivate, and heal, making it a vital part of daily routines, especially for students, working professionals, and individuals coping with isolation or anxiety. As a result, digital music platforms have become essential in delivering these emotional experiences directly to users in an accessible format.

While major music streaming platforms have made music more available than ever, they often fall short when it comes to personalization, affordability, and inclusivity—especially for independent artists and regional content creators. Many creators struggle to reach a broader audience due to platform restrictions, algorithm biases, or a lack of promotion tools. Moreover, not every user finds mainstream content relatable, and there's a growing need for platforms that support diverse genres and niche communities. The digital divide between content creators with technical or industry connections and those without is still significant.

Rhythm-Edge addresses these gaps by offering a fully-fledged web-based music streaming solution that focuses on both user experience and creator empowerment. The platform allows listeners to explore a wide range of music genres, build custom playlists, and enjoy smart song recommendations that evolve with their tastes. For artists, especially those without a strong technical or production background, Rhythm-Edge acts as a bridge — helping them upload, share, and promote their work effortlessly. By providing intuitive interfaces and community-driven discovery, the platform amplifies the voices of underrated talent.

What truly sets Rhythm-Edge apart is its vision to foster not just entertainment but emotional and creative well-being. It is designed to be a platform where users don't just consume music but feel seen, heard, and connected. Whether it's a student using lo-fi beats to focus, a commuter seeking motivation through energetic tracks, or an independent musician trying to break through without formal industry support — Rhythm-Edge is built to serve diverse needs with inclusivity, performance, and simplicity at its core. As the digital music landscape continues to grow, platforms like Rhythm-Edge can redefine how music heals, connects, and empowers individuals globally.

II. LITERATURE SURVEY

[1] This paper examines how streaming platforms influence song popularity, particularly through playlist placements and discovery algorithms. Aguiar and Waldfogel (2018) found playlist inclusion boosts streams and revenue, while Datta et al. (2017) highlighted platforms' role in music discovery. Social factors like familiarity and influence also impact user behavior (Salganik et al., 2006; Pereira et al., 2011).

[2] Music streaming services have transformed the music industry by shifting revenue from physical sales to digital platforms. The study by Barata and Coelho [1] identifies key drivers like habit, performance expectancy, and price value influencing users to adopt paid versions of streaming services. Their extended UTAUT2-based model, validated through SEM, also highlights the importance of personalization and perceived freemium-premium fit in shaping consumer behavior.

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[3] Singh et al. (2023) examine blockchain's potential to revolutionize Spotify by enhancing royalty transparency and decentralized ownership. Zhang et al. (2021) highlight blockchain's role in ensuring fair and timely artist compensation by reducing intermediaries. Challenges such as scalability and regulatory compliance are discussed by Singh and Rani (2023). These developments are grounded in Nakamoto's (2008) foundational blockchain concepts. Together, these studies underscore blockchain's transformative impact on music streaming platforms.

[4] Paper presented by Li (2023) highlights Spotify's challenges with its single revenue model and reliance on licensed content, suggesting that upgrading its recommendation algorithms, creating an in-house record label, and developing proprietary hardware could drive future growth. The study emphasizes Spotify's strong personalization features but points out the financial strain from high royalty payments. These insights suggest strategic diversification is essential for Spotify's sustainable success in the competitive music streaming market.

[5] This paper presents the development of a music streaming website that offers users access to a vast music library with personalized recommendations through advanced filtering and deep learning techniques. It highlights the convenience, cost-effectiveness, and social sharing features that enhance user experience. The study also emphasizes secure customer account management and seamless playback across devices. Overall, the project aims to create an innovative and user-friendly platform leveraging modern web technologies like Node.js.

[6] This paper presents a data-driven analysis of customer satisfaction determinants in music streaming services by mining online app reviews. It identifies key factors such as usage environment, pricing plans, and content quality that significantly impact user satisfaction. The study highlights differences in satisfaction across various streaming platforms, emphasizing the need for tailored service improvements. This research complements the technical focus of music streaming platforms by providing valuable insights into user preferences and market demands.

[7] Handoyo and Kristianto (2022) proposed a platform to automate the exchange of content and data between discographers and internet streaming services using standardized Electronic Data Interchange (EDI). Their work highlights the importance of rationalizing business processes and improving efficiency in digital music distribution. The study also emphasizes the role of e-business and business intelligence in modernizing the music industry. This provides a foundational understanding of backend systems that complement user-facing music streaming platforms like Spotify.

[8] This paper proposes the Music Streaming Sessions Dataset (MSSD) to address the lack of publicly available user interaction data in music streaming research. While previous datasets in web search and advertising enabled progress through click logs, recommender system research has been limited by the absence of such rich interaction data. Existing music datasets (e.g., last.fm, KKBOX) only record what songs were played, without user interaction details. MSSD fills this gap by providing approximately 150 million sessions with skip behavior, timestamps, and contextual metadata for about 3.7 million tracks.

III. METHODOLOGY

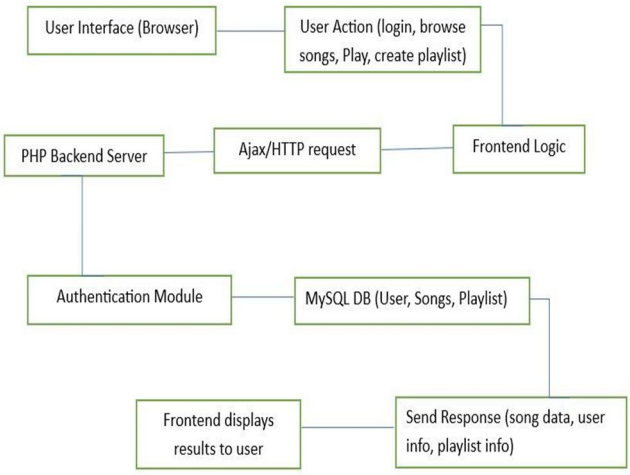


Fig 1: System Architecture

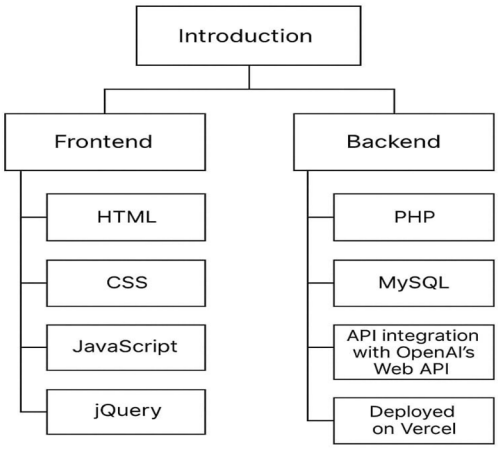


Fig 2. Work-Flow

The music streaming website follows a client-server architecture. The frontend is responsible for user interaction and UI rendering, while the backend handles business logic, user management, media streaming, and database communication. Communication between frontend and backend occurs through RESTful APIs.

A. Frontend Architecture

The frontend follows a modular architecture, with separate components for user interaction, AJAX request handling, audio playback, and dynamic DOM manipulation. The application is rendered in the browser and communicates asynchronously with the backend to fetch or update data.

User interactions such as login, browsing songs, playing music, and managing playlists are handled on the client side using event-driven programming via JavaScript and jQuery.

B. Framework and Scripting:

The frontend is built using:

HTML5 for semantic markup and structural layout, CSS3 for styling and responsive design, JavaScript and jQuery for DOM manipulation, form validation, and AJAX calls. jQuery simplifies cross-browser scripting and enables dynamic updates without requiring full page reloads.

C. Styling and Responsiveness

The application uses CSS3 along with media queries for a responsive design that adapts to various screen sizes. Key styling features include:

Grid and flexbox layouts. Custom styling for audio controls.

Visual feedback on interactions such as hover and active states.

D. State Management

As the project does not use advanced frontend frameworks like React or Vue, state management is handled manually through: JavaScript variables for user session tracking.

DOM manipulation for updating playlists and playback status.

Local storage/session storage for retaining user preferences during the session.

E. UI Components

Several reusable UI components are implemented including:
Login and registration forms.
Search bar and song listings
Audio playback controls (play, pause, seek).
Playlist creation and management panel.
Each component dynamically interacts with the backend through jQuery-based AJAX calls.

F. Backend Architecture

The backend is developed using PHP, following a modular script-based structure. It handles:
Authentication using PHP sessions and form validation.
Business logic for playlist and song management.
Database interaction with MySQL using SQL queries for user, song, and playlist data.

G. Core Functionalities Flow

This section describes the core functionalities that make the system engaging and informative for users.

1) Landing Page

Visually appealing hero section with call-to-action buttons (e.g., "Listen Now", "Sign Up").
Showcase trending songs or top artists.
Highlights of features like playlists, ad-free streaming, or artist profiles.
Login/Signup options.
Smooth navigation to other pages (Menu: Home, Browse, Library, About Us, etc.).

2) User Authentication

User Registration and Login (via email or social logins).
Session Management to keep users logged in securely.
Forgot Password / Reset Flow.

3) Home Page (after login).

Personalized recommendations ("Top Picks for You").
Recently played songs.
Trending songs and new releases.
Genres and mood-based sections (Pop, Chill, Workout, etc.).

4) Music Player Interface

Controls: Play, Pause, Seek, Next, Previous.
Display: Song title, artist name, album art, duration.
Volume control and mute toggle.
Auto-play next song feature.
Mini-player and full-screen player views.

5) Search Functionality

Instant search with song, album, artist name.
Search suggestions as you type.
Filter by category
Library / My Music
User-created Playlists.
Liked Songs.
Recently played history.
Option to download.

6) Song & Artist Detail Pages

Song Page:
Play button.
Add to playlist / like / share)

Artist Page:
Biography.
List of albums/songs
Follow button

Playlist Management
Create, edit, delete playlists.
Add/remove songs from playlists.
Public/private playlist settings.

IV. SCOPE OF RESEARCH

This research involves the design, development, and evaluation of a web-based music streaming platform focused on delivering real-time audio playback and interactive user experiences. The system is developed as a desktop-oriented prototype accessible through modern web browsers and aims to simulate the core functionalities of commercial platforms such as Spotify.

Core Features Within Scope:

1) User Authentication and Session Management: Secure login and account handling for registered users.
2) Song Catalog Browsing and Selection: Dynamic retrieval and display of songs from a backend database.
3) Real-Time Audio Playback Controls: Functionalities including play, pause, next, and previous for seamless listening.
4) Playlist Management: Ability for authenticated users to create, edit, and manage personalized playlists.

V. FUTURE SCOPE

1) AI-Powered Music Recommendation System: Implement personalized song suggestions using collaborative filtering, content-based filtering, or deep learning to analyze user behavior, listening history, and song attributes.
2) Real-Time Lyrics Synchronization: Integrate synchronized lyrics display during playback, enhancing user engagement and accessibility.
3) Offline Playback Support: Allow users to download and listen to music offline, improving usability in low-connectivity areas.
4) Voice Assistant Integration: Support voice commands for searching, playing, and managing music (e.g., “Play my workout playlist”).
5) Social Features and Sharing: Enable users to follow friends, share playlists, and see what others are listening to, fostering community interaction.
6) Cloud-Based User Data Syncing: Ensure playlist, preferences, and playback history sync across multiple devices through cloud services.
7) Multi-Language and Regional Content Support: Cater to global audiences with localized content, language-specific interfaces, and regional music recommendations.
8) Live Streaming and Artist Interaction: Add features for live virtual concerts or artist sessions, boosting user engagement and exclusivity.

VI. RESULTS

The music streaming website was successfully developed and tested, delivering a smooth, user-friendly, and functional experience. The following results were achieved:

A. Functional Music Player

Implemented a responsive and dynamic player interface.
Core features like Play, Pause, Seek, Next, Previous, and Volume control worked seamlessly.
Song information such as title, artist name, album art, and duration displayed correctly.

Enabled auto-play of the next song after the current track ends.
Both mini-player and full-screen player views functioned effectively across devices.

B. Real-Time Search Feature

Users can perform instant searches by song title, artist, or album.
Implemented search suggestions that appear dynamically as the user types.
Returned accurate and relevant results based on user queries.

C. User Experience and Navigation

Navigation between sections such as Home, Browse, Library, and Playlist was smooth and intuitive.
Fast loading times and low latency in audio streaming due to optimized backend logic and caching.
The website remained fully responsive across different screen sizes and devices.

D. Playlist and Library Management

Users could like songs, create custom playlists, and manage their music library.
Changes reflected in real-time, improving interactivity and personalization.

E. Database Integration

Song data, user preferences, and playlists were stored and retrieved efficiently using SQLite/MySQL.
Backend successfully handled operations like storing likes/dislikes, managing sessions, and fetching user-specific content.

F. Security and Performance

Secure login and session handling ensured user data safety.
Implemented caching using Redis to reduce server load and enhance performance.

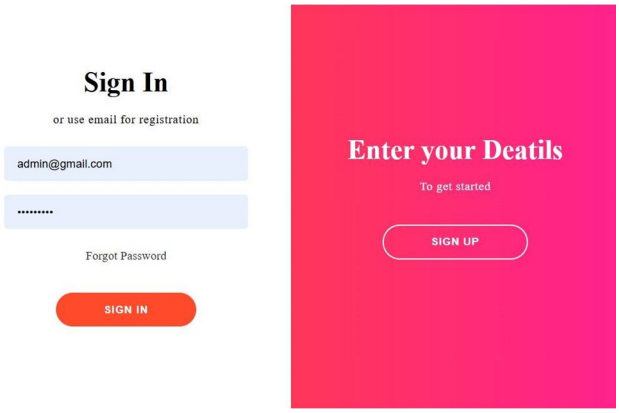


Fig 3. Login/Sign up page

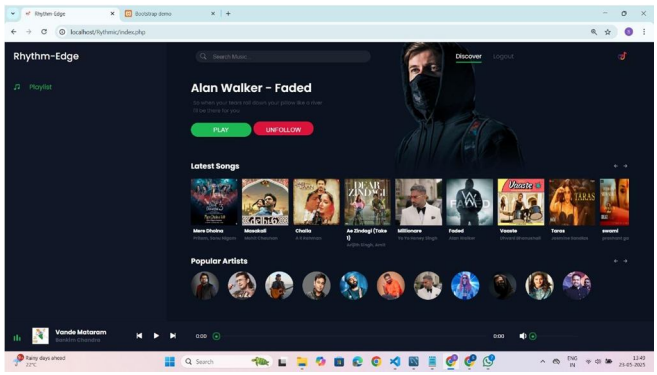


Fig 4. Home Page

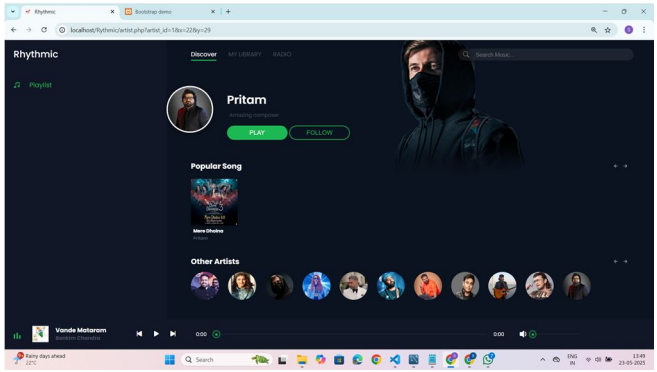


Fig 5. Artist Album Page

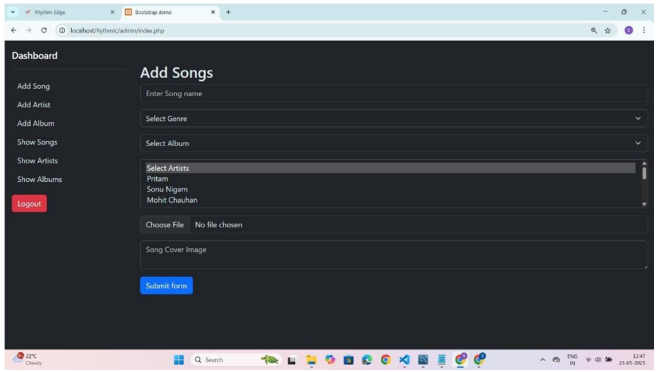


Fig 6 Admin Page

VII. CONCLUSION

This project successfully demonstrates the development of a functional prototype of a web-based music streaming platform that replicates core features found in leading services like Spotify. By integrating user authentication, dynamic song browsing, real-time playback controls, and playlist management, the system offers a streamlined and interactive user experience tailored for desktop web environments.

The use of HTML5, CSS, JavaScript, jQuery, PHP, and MySQL ensures a responsive frontend and a reliable backend capable of handling essential data operations. Through usability testing and performance evaluations, the platform's effectiveness in delivering consistent streaming, cross-browser compatibility, and user-friendly navigation was validated.

While the current implementation lays the foundation for a full-scale music streaming service, future enhancements such as AI-driven recommendations, mobile app development, real-time lyrics, and social features hold significant potential for expanding functionality and user engagement.

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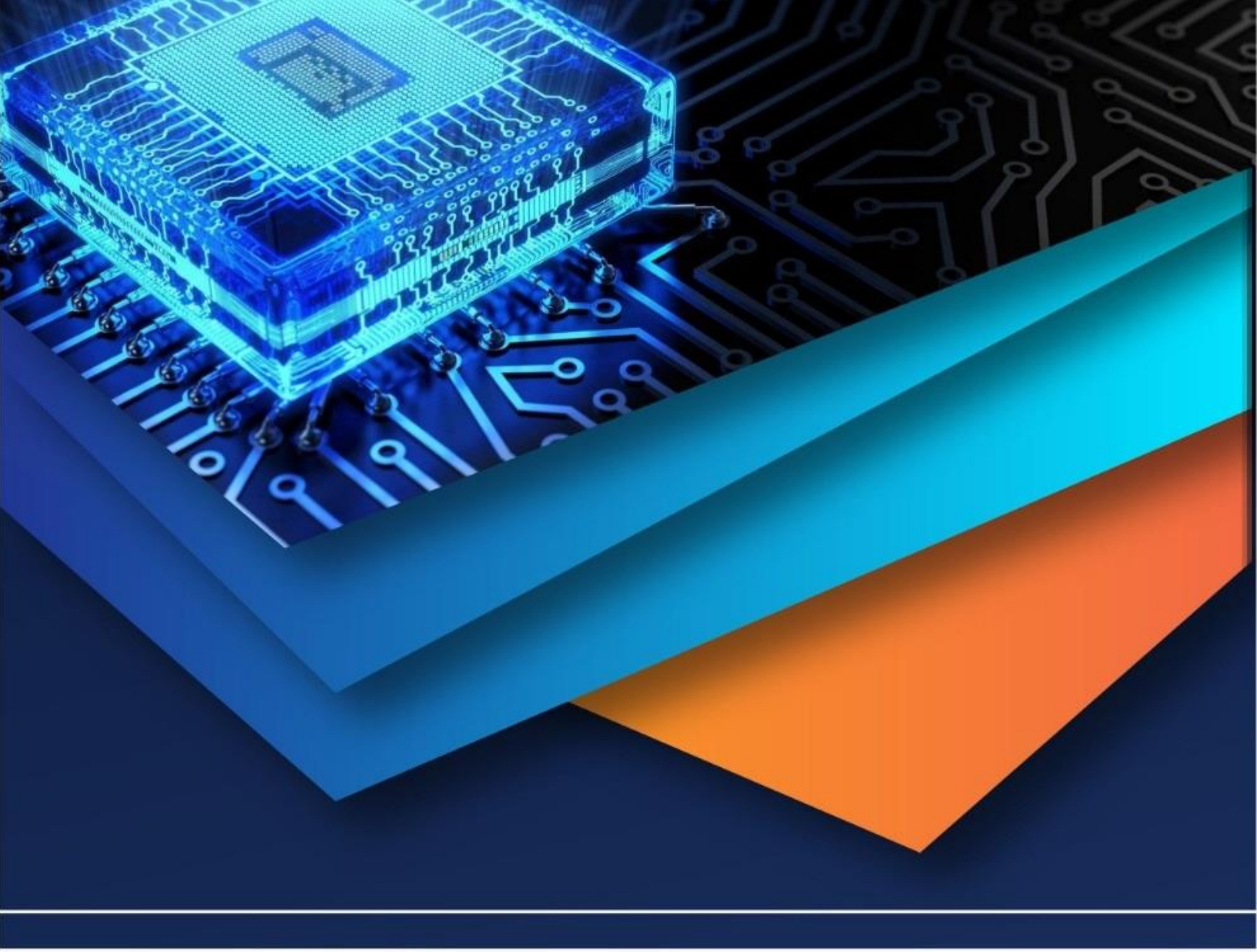
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