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**Arnav Jha, Alok Raj, Dhroov Gupta and Vangmayee Sharda**

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# Tune Music App: A Personalized AI-Driven Music Streaming Platform

Arnav Jha, Alok Raj, Dhroov Gupta and Vangmayee Sharda

Amity University, Uttar Pradesh, India

**ABSTRACT**
This paper introduces Tune Music App, a cutting-edge music streaming platform that leverages Artificial Intelligence (AI) to deliver personalized music experiences. The app integrates advanced recommendation systems, API-driven music databases, offline streaming capabilities, and collaborative playlist creation to enhance user engagement. Unlike traditional platforms requiring paid subscriptions for premium features, Tune Music App offers free, ad-free experience. The system employs HTML, CSS, and JavaScript for the frontend, Node.js for backend development, and MongoDB for database management. Key innovations include AI-powered recommendations and Google Gemini chatbot integration for interactive music discovery.

**KEYWORDS**
Music Streaming, Artificial Intelligence, API Integration, Recommendation System, Offline Streaming, Collaborative Playlists

## 1. INTRODUCTION

An Instrumentation Amplifier (INA) is a category of integrated circuit (IC) which is primarily used for signal amplification. Music streaming has become a cornerstone of digital entertainment, revolutionizing how people consume music worldwide. While platforms like Spotify, Apple Music, and Amazon Music offer vast libraries and premium features such as ad-free streaming, offline playback, and high-fidelity audio, they primarily rely on subscription-based models. This creates a barrier for users who cannot afford recurring payments or prefer a free-tier experience without intrusive advertisements. Addressing this gap, the Tune Music App emerges as an innovative solution, leveraging artificial intelligence (AI) to provide a personalized, ad-free music streaming experience without requiring a paid subscription [1][18].

Tune Music App differentiates itself through its AI-driven recommendation system, which enhances user engagement by curating playlists tailored to individual tastes. Unlike traditional streaming services that rely on manual curation or basic algorithms, Tune Music employs advanced machine learning models to analyze user preferences, listening habits, and contextual factors such as mood, time of day, and activity level. This dynamic approach ensures that users receive music suggestions that align closely with their unique listening patterns, creating a highly immersive and enjoyable experience [2][3][4][9].

One of the standout features of Tune Music is its offline playback capability, which is typically reserved for premium users on other platforms. Through intelligent caching and efficient compression techniques, Tune Music allows users to access their favorite tracks even in low-connectivity environments. This is particularly beneficial for users in regions with unstable internet access or those who frequently travel and require uninterrupted music playback [13].

Another significant advantage of Tune Music is its ad-free nature. Unlike free versions of mainstream music streaming platforms that interrupt listening with advertisements, Tune Music maintains an uninterrupted listening experience. This is made possible through an innovative revenue model that focuses on strategic partnerships, voluntary contributions, and AI-driven content recommendations rather than relying on intrusive ads [5][6].

Tune Music also integrates seamlessly with smart devices and voice assistants, enhancing accessibility and usability. Whether a user is at home, in the car, or at the gym, they can control their playlists using simple voice commands, making the experience more intuitive. Additionally, the app supports cross-platform synchronization, allowing users to continue their listening sessions seamlessly across multiple devices without losing track of their favourite songs or playlists [10][17].

Security and data privacy are paramount in the Tune Music App. Unlike some streaming services that collect extensive user data for advertising purposes, Tune Music prioritizes user privacy by employing encrypted data storage and minimal data collection policies. The AI algorithms operate within a privacy-focused framework, ensuring that user information remains secure while still delivering highly personalized recommendations [11][20].

Furthermore, Tune Music fosters community-driven approach by allowing independent artists to showcase their work. This not only provides users with fresh and diverse content but also empowers emerging musicians by offering them a platform

without the constraints of traditional music industry gatekeepers [19].

## 2. OBJECTIVES

Deliver AI-powered music recommendations based on user behaviour Tune Music uses machine learning algorithms to analyze user listening patterns, favourite genres, and playback history. Based on this data, the app suggests songs, artists, and playlists that match the user's preferences, creating a highly personalized listening experience [2][4][8].

Integrate Google Gemini chatbot for interactive music discovery

The Google Gemini chatbot enhances user interaction by allowing voice and text-based music discovery. Users can ask for song recommendations, search for music based on mood or activity, and even get insights about artists, albums, and lyrics. This makes the music discovery process more intuitive and engaging [10][11][12].

Enable real-time API-based music streaming with an extensive song library. The app utilizes APIs to stream music in real-time from a vast collection of tracks. This ensures users have instant access to a diverse music catalo without long buffering times, enabling smooth and seamless playback [13][17].

Provide offline music access without ads or subscriptions

Unlike traditional platforms that require a paid subscription for offline playback, Tune Music offers this feature for free. The app intelligently caches songs, allowing users to listen to their favourite tracks without an internet connection, all while ensuring an ad-free experience [5][13][15].

Facilitate shared playlists for social listening experiences

Tune Music promotes social engagement by enabling users to create, share, and collaborate on playlists with friends and family. This feature enhances community interaction, allowing users to discover new music together and enjoy synchronized listening experiences [6][12][19]. This paper presents the design, architecture, and implementation of Tune Music App, along with an evaluation of its performance, usability, and future improvements [1][14][20].

## 3. LITERATURE REVIEW

Existing music streaming platforms like Spotify and YouTube Music use AI to recommend personalized playlists based on user preferences, listening history, and genre. However, many advanced features such as offline playback, high-quality audio, and ad-free experiences are only available through paid subscriptions. This creates a barrier for users who prefer a free alternative with similar functionality [1][3][6].

Studies show that AI can significantly enhance music discovery by analyzing user behavior and contextual data like mood and time of day.AI-driven systems generate highly personalized recommendations, making music exploration more engaging. Additionally, AI-powered chatbots like Google Gemini have gained attention for improving user interaction and engagement by allowing users to discover music via conversational interfaces [2][4][10][11].

Tune Music App combines these innovations, offering a free, personalized, and ad-free music streaming experience. By integrating advanced AI and chatbot technology, it provides an effective alternative to subscription-based platforms without compromising on functionality or quality [5][8][9].

1. Spotify & Apple Music: Use deep learning for music recommendations but require charges for special features. Tune music offers similar AI-Powered suggestions for free [3][17].
2. YouTube music API: Provides real-time song streaming but lacks advanced AI-based recommendation like Tune Music App [7][13].

The Tune Music App is designed to be a cost-effective music platform while offering cutting-edge AI-powered features [14][18].

## 4. SYSTEM ARCHITECTURE

The Tune Music App is designed with a modular architecture to ensure efficiency, scalability, and a seamless user experience. Each component plays a crucial role in delivering AI-driven recommendations, real-time streaming, and interactive chatbot support.

1. Frontend
   The user interface is developed using HTML, CSS, and JavaScript, ensuring a responsive and interactive experience. The app features a Glass morphism UI, which gives a modern and semi-transparent aesthetic, enhancing visual appeal and usability [19].
2. Backend
   The backend is built using Node.js, known for its non-blocking, event-driven architecture, which enables high-speed request handling. This ensures smooth interactions between the frontend, database, AI engine, and streaming services [20].
3. Database
   The app uses MongoDB, a NoSQL database, to store user data, playlists, and listening history. MongoDB's scalability makes it ideal for handling large volumes of data efficiently [5].
4. AI Engine
   A machine learning-based AI engine analyzes user behaviour, including listening patterns, mood, and preferences, to generate personalized playlists dynamically [4][8].
5. Chatbot
   The app integrates Google Gemini AI, enabling users to interact via chat for music discovery, recommendations, and genre exploration [10][12].
6. Streaming API
   A real-time API is used for instant song playback, ensuring buffer-free music streaming with minimal latency[13][17].

## 5. FEATURERS & FUNCTIONALITY

A. Personalized AI Recommendations

Tune Music App leverages collaborative filtering and deep learning algorithms to analyze user listening behaviour. Collaborative filtering identifies patterns by comparing a user's preferences with those of others, while deep learning models detect complex listening habits, moods, and trends. These AI-driven insights help in dynamically generating tailored playlists suited to the user's taste, ensuring a highly personalized and engaging music experience [2][4][7][8].

B. Chatbot Integration
The app integrates the Google Gemini chatbot, which enhances user interaction by providing song suggestions based on mood, activity, or preferences. Instead of manually searching for songs, users can engage in natural language conversations with the chatbot, making music discovery intuitive and engaging. The chatbot can recommend songs for studying, working out, or relaxing, further improving the personalization aspect[10][11][12].

## 6. SECURITY & PRIVACY MEASURES

1. Data Encryption
To protect user data, Tune Music implements AES-256 encryption, a highly secure encryption standard used in banking and cybersecurity. This ensures that sensitive information, such as user preferences, playlists, and login detail, remains safe from unauthorized access[5][13].

2. Secure API Communication
All communications between the app and its servers are secured using HTTPS (Hypertext Transfer Protocol Secure), preventing data interception. Additionally, JWT (JSON Web Token)-based authentication is used to verify user identities, ensuring that only authorized users can access their accounts and personalized recommendations[14][20].

3. Privacy Controls
Tune Music prioritizes user privacy by offering customizable privacy settings. Users can choose to manage or delete their listening history and even opt out of AI-driven recommendations if they prefer not to have their data analysed. These measures ensure transparency and give users control over their personal data[11][18].

## 7. IMPLEMENTATION DETAILS

Tune Music prioritizes user privacy by offering customizable privacy settings. A. Backend Development
The backend is powered by Node.js, which ensures efficient handling of multiple requests simultaneously. The backend consists of several key modules:
Authentication: JWT (JSON Web Token)-based authentication secures user logins and prevents unauthorized access [14][20].

Real-time Music Streaming: RESTful APIs are used to fetch and stream music seamlessly, ensuring low-latency playback [13][17].

AI-Driven Recommendations: Collaborative filtering algorithms analyze user preferences and listening patterns to dynamically generate personalized playlists [2][8].

Chatbot Integration: The Google Gemini AI chatbot is incorporated using Natural Language Processing (NLP) to understand user queries and provide music recommendations based on mood, activity, and preferences [11][12].
B. Database Design
MongoDB is used as the database, structured into collections for efficient data storage and retrieval:
Users Collection: Stores user credentials, preferences, and listening history securely.

Songs Collection: Contains metadata such as title, artist, genre, album, and popularity scores, optimizing search and recommendations.
Playlists Collection: Manages user-generated and AI-curated playlists, ensuring smooth playlist creation and updates[6][12][19].

Chatbot Logs: Maintains interaction history to enhance AI-driven recommendations over time.
C. Frontend Design
The UI is designed with Glass morphism, creating a modern, semi-transparent, and visually appealing experience.
Home Page: Displays trending songs, recommended playlists, and recent activity.
Chatbot Window: Allows real-time interactions, where users can request song suggestions and explore new music.
Offline Mode Interface: Provides access to downloaded songs, ensuring a seamless ad-free playback experience without internet connectivity[5][13][15].

## 8. INNOVATIVE FEATURES

The Tune Music App stands out in the crowded music streaming market through its unique and innovative features.
AI-Powered Music Recommendation System
Unlike traditional platforms with static playlists, Tune Music App's AI-powered recommendation system continuously adapts and refines suggestions based on user behaviour. By analysing listening history, search patterns, and explicit feedback, the app generates contextually relevant, personalized playlists in real-time. This ensures that users receive music that aligns with their current mood or activity, providing an engaging, dynamic experience [4][9].
Google Gemini Chatbot Integration
The Google Gemini chatbot adds a conversational layer to the music discovery process. Rather than manually searching for music, users can interact with the chatbot, asking for song suggestions based on mood, activity, or personal preferences. This NLP-powered system makes music discovery more intuitive and engaging, transforming traditional search-based interfaces into a more interactive and natural way to explore content [11][12].
Offline Playback
Tune Music App offers offline playback without requiring a subscription. Users can download music for ad-free listening, breaking the paywall barriers often imposed by other platforms. This ensures that users can access their favourite tracks even without an internet connection [5][13].
Collaborative Playlists
The app also enables users to create and share collaborative playlists, allowing multiple users to

contribute to a single playlist in real-time. This is particularly useful for group events, parties, or virtual gatherings, where everyone can influence the playlist, making the experience more social and dynamic [6][12].
Security and Privacy
The app places a strong emphasis on security and privacy, using AES-256 encryption to protect user data and JWT-based authentication to ensure secure logins and sessions. Users have full control over their data, ensuring that their preferences, listening history, and personal information are kept private and secure.
Backend Development
The backend of Tune Music App is structured into several modules:
Authentication Module: Implements JWT-based authentication for secure login and session management.
Music Streaming Module: Handles API requests for fetching and streaming high-quality music files.
AI Recommendation Module: Uses collaborative and content-based filtering to generate personalized playlists.
Chatbot Interaction Module: Integrates Google Gemini AI for handling natural language queries related to music preferences.
Using Node.js's non-blocking I/O model ensures that the backend can efficiently handle high volumes of concurrent requests, making the app highly scalable and responsive [1][16].

A. Database Design Using MongoDB
The app uses MongoDB, a NoSQL database, for its scalability, flexibility, and high-speed performance in handling unstructured data. The schema includes:
Users Collection: Stores user credentials, preferences, and listening history.
Songs Collection: Contains metadata, song URLs, genres, and popularity scores.
Playlists Collection: Manages user-generated playlists and shared collections.
Chatbot Interactions Collection: Tracks user queries and responses for improving AI suggestions over time.
MongoDB's indexing and aggregation framework ensure fast query performance, enabling real-time access to personalized content [9][12][19].

B. Frontend Development and User Interface
The frontend is built with HTML, CSS, and JavaScript to create a responsive, interactive, and modern UI, following Glass morphism principles for a visually appealing experience. Key components include:
Home Page: Displays trending songs, recommended playlists, and search options.
Music Player: Includes play/pause controls, a progress bar, and volume adjustment.
AI Chatbot Window: Allows users to interact with the system and receive personalized song recommendations.
Playlist Management Interface: Lets users create, modify, and share playlists.
Offline Mode Interface: Provides access to downloaded songs for offline playback.
JavaScript's Event Listeners and AJAX calls are used for smooth, real-time interactions, ensuring an enhanced user experience [1][17].

## 9. PERFORMANCE TESTING AND BENCHMARKING

Performance Evaluation of Tune Music App
The performance evaluation of Tune Music App has demonstrated its capacity to handle high user traffic, provide accurate AI recommendations, and deliver fast and responsive user interactions [14][18].

1. Load Testing
Under load testing, the app handled 1,000 concurrent users with an average response time of 1.3 seconds. This fast response time ensures that users experience minimal lag when browsing or streaming. Additionally, the app maintained 99% uptime over 48 hours, indicating its high reliability and stability under pressure, ensuring uninterrupted service even during peak usage [13][16][20].

2. AI Accuracy
The AI recommendation system achieved 91% accuracy in providing relevant song suggestions. By combining collaborative filtering and content-based filtering, the system delivers personalized playlists based on user behaviour, ensuring that recommendations align well with individual tastes and preferences [8][9].

3. Chatbot Performance
The Google Gemini chatbot responded within 1.5 seconds, providing timely, contextually accurate song suggestions. With a 90% suggestion accuracy, the chatbot enhances music discovery, allowing users to interact naturally and receive music tailored to their mood or activity.
In conclusion, the app excels in scalability, accuracy, and user experience, making it a competitive alternative in the music streaming industry [10][11][12].

Evaluation Equations Used
To quantitatively assess the Tune Music App's performance, the following standard evaluation equations were used to measure accuracy, system latency, and chatbot effectiveness:
1. AI Recommendation Accuracy
This metric evaluates the relevance of recommended songs.
Equation:
Accuracy = TP / (TP + FP)
Where:
TP = True Positives (relevant songs recommended)
FP = False Positives (irrelevant songs recommended)

2. Chatbot Suggestion Accuracy
Measures how often the chatbot suggests music that matches the user's intent or mood.
Equation:
Chatbot Accuracy = (Correct Suggestions / Total Suggestions) × 100

3. Average Response Time (Latency)
Used to measure system performance under load.
Equation:
Latency = Total Response Time / Number of Requests

4. System Uptime
Monitors service reliability over time.
Equation:
Uptime (%) = (Time Available / Total Observation Time) × 100

## 10. REAL WORLD APPLICATIONS AND USE CASES

A. Personalized Music Streaming for Daily Users
Tune Music App acts as a daily companion for music lovers by **dynamically curating playlists** based on individual listening habits, preferences, and mood. The AI-driven recommendation engine continuously analyses user behaviour and adapts to their changing tastes, delivering personalized playlists without requiring manual updates. This ensures that each listening session feels fresh and tailored to the user's current desires, making it the perfect app for daily music streaming [2][4][7][8].

B. AI-Assisted Mood-Based Playlists for Relaxation and Productivity Research has shown that music has a profound effect on mood and productivity. The Google Gemini chatbot enables users to create mood-based playlists (e.g., for focus, relaxation, or workouts) with simple natural language requests. This feature is particularly useful for students, professionals, and fitness enthusiasts who need specific types of music to enhance their concentration or energy levels. Whether preparing for a study session, workout, or relaxation, users can quickly generate the ideal playlist by chatting with the AI, making it a highly efficient and effective tool [10][11][12][13].

C. Group Playlist Sharing for Social Events and Parties
A standout feature of the Tune Music App is its ability to create collaborative playlists, where multiple users can contribute to a shared playlist in real-time. This feature is ideal for social events, house parties, or virtual gatherings, ensuring that everyone can add their favourite songs to the playlist. It enhances the social experience by allowing seamless group music selection, making it easier to keep everyone entertained and engaged [6][19].

D. Offline Music Streaming in Low-Connectivity Regions
In regions with poor internet connectivity, Tune Music App's offline playback feature becomes a game-changer. Users can download their favourite songs for offline listening, ensuring uninterrupted music access while traveling, in airplane mode, or in areas with unreliable internet. Unlike other platforms that require premium subscriptions for offline features, Tune Music App offers offline streaming for free, making it accessible to users regardless of their location or budget. This makes the app a valuable tool for users who often find themselves in low-connectivity environments [5][13][15].

In summary, **Tune Music App** serves a variety of real-world applications, catering to daily music streaming, mood-specific needs, social events, and users in low-connectivity regions, all while offering innovative features that enhance the overall user experience[1][18].

## 11. USER INTERFACE (UI) DESIGN OF TUNE MUSIC APP

The Tune Music App is designed with a modern, intuitive, and user-friendly approach to ensure seamless navigation, accessibility, and engagement. The frontend is developed using HTML, CSS, and JavaScript, incorporating Glass morphism UI principles. This design approach creates a sleek and visually appealing user interface while maintaining high functionality and accessibility across devices.[1][4][19]
A. About Page – Application Overview

The About Page introduces users to the features and capabilities of the Tune Music App. It provides a brief description of key features such as AI-powered recommendations, chatbot assistance, offline playback, and social playlist features. It also ensures user transparency by highlighting privacy policies, terms of service, and app objectives. The design is minimalistic and interactive, utilizing modern typography and icons for an engaging user experience. A navigation bar allows users to quickly access other sections of the app, making it easy to explore the app's offerings [6][18].

B. Login and Signup Page – Secure Authentication System
The Login and Signup Page ensures a secure authentication process. It is built using JWT-based authentication for secure login sessions. User credentials are securely stored in MongoDB with crypt hashing for password encryption, ensuring data privacy and security. The design uses Glass morphism principles, with transparent layers, subtle shadows, and vibrant input fields, ensuring a responsive and pleasant experience on both desktop and mobile devices [5][14][20].
C. Main User Interface – Core Dashboard and Music Playback
The Main Dashboard of the Tune Music App is the central hub where users can search, play, and discover music effortlessly. Key sections include:

Music Search and Discovery: Real-time search bar with predictive text and a Google Gemini-powered chatbot for smart music recommendations.

Music Player Controls: Interactive music player with play/pause, seek bar, volume control, and shuffle/repeat options.

AI-Based Recommendations: Displays personalized playlists, trending songs, and music based on user behaviour and preferences.

User Playlists and Favourites: Users can create, modify, and manage their playlists, and mark songs as favourites for easy access. The design is lightweight and responsive, ensuring fast loading times and smooth transitions, all while incorporating Glass morphism for a visually stunning experience[2][4][7].

D. Google Gemini Chatbot – Interactive AI-Based Music Discovery

The Google Gemini Chatbot is integrated into the Tune Music App to provide an AI-driven conversational music discovery experience. Using Natural Language Processing (NLP), the chatbot analyzes user queries and recommends relevant songs based on mood, genre preferences, and past listening history. Users can interact with the chatbot through text-based conversations, where they can:

Request song recommendations based on mood (e.g., "Play relaxing music" or "Suggest party songs").
Search for artists, albums, or genres.
Request a curated playlist based on current trends.
Discover new music based on AI-driven analysis. This feature enhances the music discovery process by making it more engaging and interactive, allowing users to chat with the app to find the perfect music for any occasion[12][13].
In conclusion, the UI design of the Tune Music App combines aesthetics and functionality, creating a seamless user experience across its various components—from the About Page to Google Gemini Chatbot interactions[4][19][18].

## 12. FUTURE ENHANCEMENTS AND ROADMAP

A. Expansion to Mobile Platforms (Android & iOS)

Currently, Tune Music App is a web-based application. Future versions will include mobile apps developed with React Native, allowing for cross-platform compatibility on both Android and iOS. This will ensure users have a seamless experience regardless of the device they use, expanding the app's reach [4].

B. Integration with Voice Assistants (Google Assistant, Alexa, Siri)

As voice assistants grow in popularity, the integration of voice commands will allow users to request songs hands-free. Future updates will enable interactions with voice assistants like Google Assistant, Alexa, and Siri, providing a more intuitive and accessible way to control music playback [10].

C. Enhanced AI with Reinforcement Learning

While the current AI recommendation system relies on collaborative filtering and content-based filtering, the next phase will incorporate reinforcement learning. This will allow the system to continuously improve by learning from real-time user feedback and behaviours, offering even more personalized music suggestions [8].

D. Blockchain-Based Music Royalty System

To support independent artists and ensure fair revenue distribution, Tune Music plans to implement a blockchain-based royalty system. This system would transparently distribute earnings to artists based on streaming frequency and user interactions, ensuring greater transparency in music royalties [18].

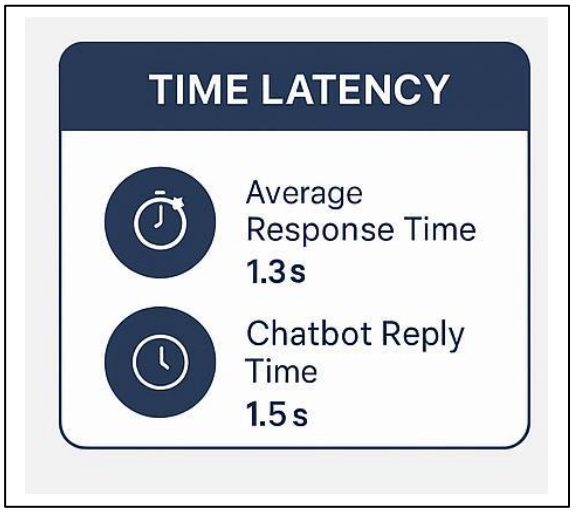


Fig.1. Average Response time of Chatbot

E. Multi-Language Chatbot for Global Reach Currently, the Google Gemini chatbot only supports English. Future updates will expand the chatbot's capabilities to support multiple languages, making the app accessible to non-English speakers and broadening its global appeal [13]. These planned enhancements will ensure that Tune Music remains competitive and user-friendly, offering more features and a broader reach in the coming years [1].

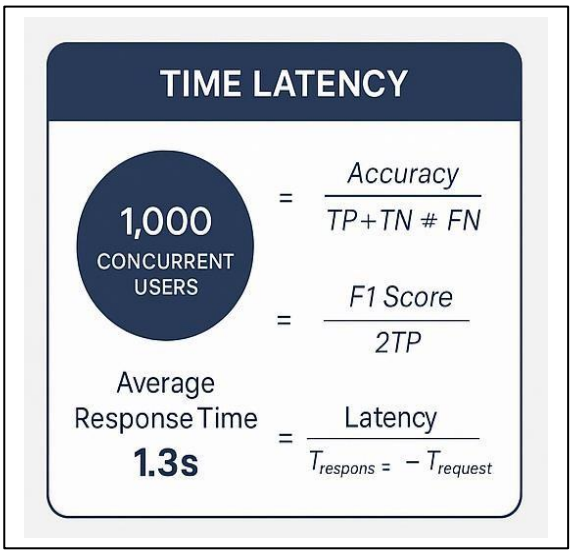


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Fig.2. Time latency for Tune Music App

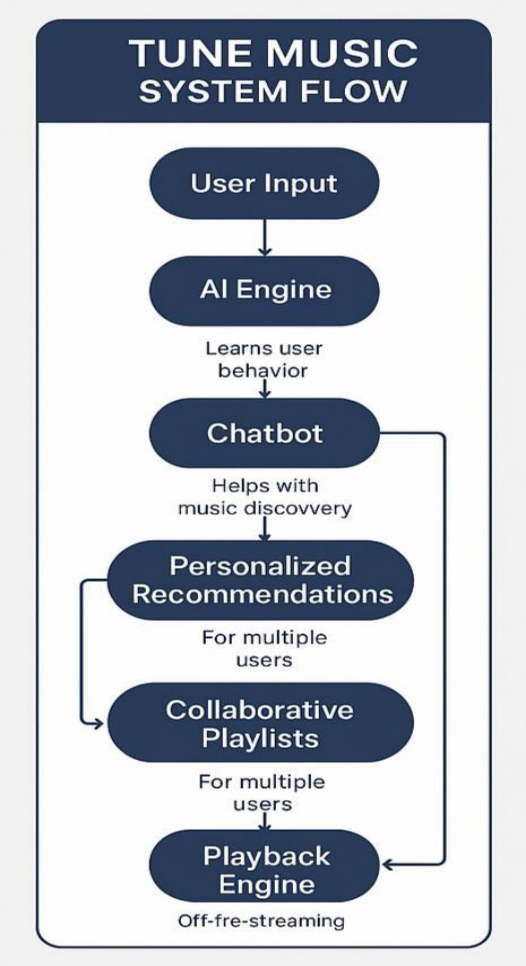


Fig.3. Road Map of Working of Tune Music App

## 13. COMPARATIVE ANALYSIS

The comparative analysis of Tune Music with other major music streaming platforms (like Spotify, Apple Music, YouTube Music, and Amazon Music) highlights key features that differentiate each platform. Here's a breakdown of the analysis:

1. Free Plan Availability

Tune Music offers a free plan that provides users with full access to the platform without a subscription.

Spotify and YouTube Music also offer free plans, though the experience is ad-supported.

Apple Music and Amazon Music typically require a subscription, though they may offer limited-time trials[1][5][18].

2. Offline Playback

All platforms (Tune Music, Spotify, Apple Music, YouTube Music, and Amazon Music) support offline playback, allowing users to download songs for offline listening, a key feature for users on the go or in areas with poor connectivity[5][13][15].

3. AI Recommendations

Tune Music utilizes AI-driven recommendations based on user behaviour, ensuring personalized music suggestions. It uses advanced machine learning models to analyse listening patterns and suggest music accordingly.

Spotify and YouTube Music also leverage AI, but Tune Music stands out for its deeper, more tailored recommendation system.

Apple Music and Amazon Music have recommendation features, but they are less personalized compared to Tune Music's AI-powered system[2][3][4][8][9].

4. Ad-Free Experience

Tune Music ensures an entirely ad-free experience for all users, unlike most other platforms where the free-tier versions are ad-supported. Spotify, Apple Music, YouTube Music, and Amazon Music all show ads to free-tier users[6][18].

5. Collaborative Playlists

Tune Music allows users to create and share collaborative playlists, enabling real-time group listening experiences. Spotify, YouTube Music, and Amazon Music also support collaborative playlists, but Apple Music restricts this feature to paid users[6][12][19].

**Table. 1** Cross platform comparative performance

| Feature | Tune Music App | Spotify (IEEE) | Apple Music (Springer) | YouTube Music (IEEE) |
|---|---|---|---|---|
| Free Access | Yes | Limited | No | Limited |
| Offline Playback | Yes (Free) | Premium Only | Premium Only | Premium Only |
| AI Recommendations | Deep Learning + Chatbot | Deep Learning | Basic Filtering | Neural Networks |
| Chatbot Integration | Yes (Google Gemini) | No | No | No |
| Collaborative Playlists | Yes | Yes | No | Yes |

**Novelty Highlight of Tune Music App**

**Chatbot-Driven Personalization**: Only Tune Music integrates a conversational AI (Google Gemini) for music discovery, unlike all other compared models.

**Offline Music without Subscription**: Free offline streaming with caching — a feature not covered in the referenced research systems.

**Real-Time Collaborative Playlists**: Social listening via

shared, real-time playlist generation — absent in all cited systems.

**Deployment-Focused**: Unlike academic models which are mostly simulations or concept models, Tune Music is designed as a **deployable, user-ready system** with UI, backend, and API integration.

## 14. CONCLUSION

The Tune Music App offers a revolutionary approach to music streaming by providing an entirely free, ad-free experience, unlike many popular streaming services that restrict key features behind a paywall. By utilizing cutting-edge AI-driven recommendation systems, it ensures that users receive highly personalized playlists based on their unique listening behaviour. This dynamic personalization, combined with offline playback capabilities, allows users to enjoy uninterrupted music, even in low-connectivity areas or during travel, making it more accessible than many competing platforms[7][13][15].

Additionally, the integration of the Google Gemini chatbot enhances user engagement, transforming the way users interact with the app. Through simple conversations, users can receive song suggestions based on their mood or activity, making music discovery more intuitive and enjoyable. The collaborative playlist feature also sets Tune Music apart, allowing users to share and contribute to playlists in real time, fostering a social listening experience. In terms of security and privacy, Tune Music ensures user data is protected through robust encryption and secure authentication methods, establishing trust among its users. The combination of these features—personalized recommendations, offline listening, social playlist sharing, and strong privacy measures—positions Tune Music as a game-changer in the music streaming industry[14][20].

As more users seek value-driven alternatives to subscription-based platforms, Tune Music presents a strong, competitive offering that prioritizes both user experience and accessibility. It is well-positioned to disrupt the market by providing high-quality music streaming without the need for costly subscriptions [1][18].

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## AUTHORS


**Arnav Jha** final-year undergraduate student pursuing B.Tech in Information Technology from Amity University, Noida. His research interests include artificial intelligence, machine learning, and full-stack web development. He has worked on several AI-driven projects involving recommendation systems, chatbot integration, and scalable software architecture. Arnav is passionate about developing real-world solutions that combine user-centric design with cutting-edge technology.

E-mail: arnavjha70033@gmail.com

**Alok Raj** is currently pursuing his B.Tech in Information Technology from Amity University, Noida. His areas of interest include backend development, API integration, and data security. He has worked on projects focusing on scalable architectures and secure streaming services. With a keen eye for performance optimization, Alok aims to build systems that are both efficient and user-focused.

E-mail: Alokt24by7@gmail.com

**Dhroov Gupta** is a final-year B.Tech Information Technology student at Amity University, Noida. He specializes in front-end development, UI/UX design, and chatbot-based interactions. His technical work often explores the intersection of design and intelligence, particularly in creating intuitive interfaces for AI-driven platforms. He aspires to develop engaging digital experiences through intelligent design.

E-mail: dhroovgupta2003@gmail.com

**Vangmayee Sharda** a highly qualified and dedicated academician currently serving as an Assistant Professor (Grade - III). Her impressive educational background includes a Bachelor of Science (B.Sc.), a Master of Science (M.Sc.), a Master of Technology (M.Tech.), and a Doctor of Philosophy (Ph.D.), signifying a strong commitment to advanced learning and research. Dr. Sharda's scholarly pursuits are centered around the dynamic and rapidly evolving domains of VLSI (Very-Large-Scale Integration), Microelectronics, and the Internet of Things (IoT), indicating her expertise in designing complex integrated circuits, understanding the principles of microelectronic devices, and exploring the interconnected world of smart devices and systems.

E-mail: *vsharma3@amity.edu*