



Mobile Application  
Development Laboratory

# GROOVE.flac Music Player

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# Abstract

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- Groove.FLAC is a modern, offline-first local music player for Android that blends powerful functionality with aesthetic appeal, following Material You design principles. Built using Kotlin and Android Studio, the app offers users a customizable and immersive audio experience with features typically found only in premium apps. Unlike traditional players, Groove.FLAC focuses on user freedom, allowing renaming of tracks, changing cover art, and adjusting playback speed, all while delivering smooth performance even on low-end devices.

# Need for the Proposed System

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The need for the proposed system, Groove.FLAC, arises from the growing demand for a privacy-focused, offline-capable, and lightweight music player that caters to users who prefer managing their local music library without relying on cloud-based or data-intensive streaming apps. While many modern music players prioritize online functionality, Groove.FLAC fills the gap by offering essential features like song renaming, custom cover art, playback speed control, sleep timer, inbuilt equalizer, and shuffle—all wrapped in a sleek Material You design. Additionally, with increasing concerns about data privacy and app bloat, Groove.FLAC provides a simple yet powerful alternative that ensures smooth performance, user control, and an enjoyable listening experience even without internet connectivity.

# Advantages of the Proposed System

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**Offline Functionality:** Users can enjoy their music collection without requiring internet access, ensuring privacy and zero data usage.

**Lightweight and Efficient:** The app is optimized for low resource consumption, ensuring smooth performance even on older devices.

**Material You Design:** A modern, customizable, and visually appealing UI that adapts to user preferences for a better user experience.

**Advanced Playback Features:** Includes options like playback speed control, sleep timer, shuffle, and an inbuilt equalizer for a tailored listening experience.

**No Ads or Data Tracking:** Focused on user privacy, the app does not serve ads or track user activity, unlike many commercial alternatives.

# Literature Survey

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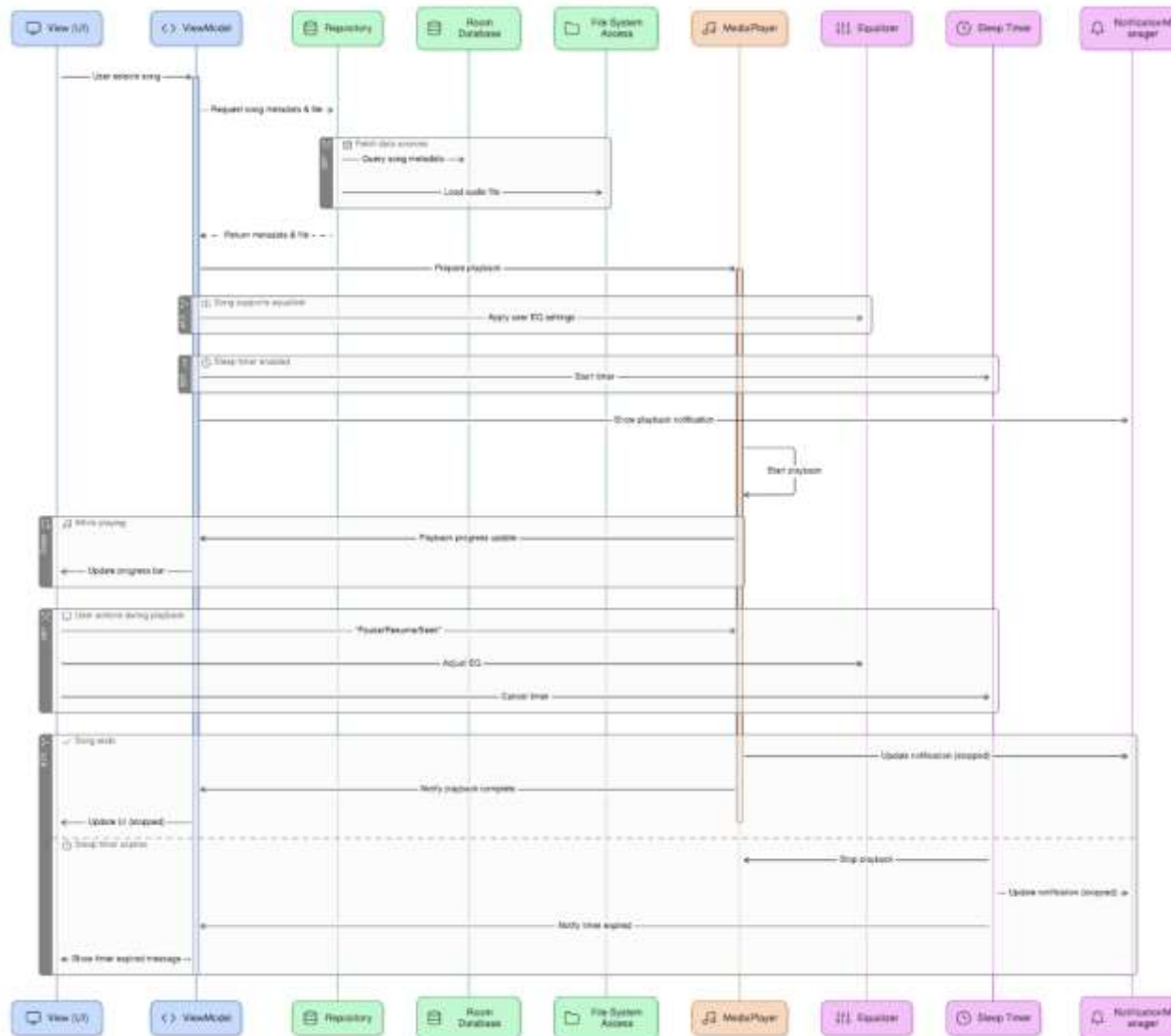
- **“Design and Implementation of a Simple Android Music Player”**  
*(International Journal of Mobile Applications, 2021)*
- Advantages:- Simple and easy to implement
  - Lightweight for mobile devices
- Disadvantages:- Lacks personalization features
  - No support for album art or metadata editing
- **“A Study on Multimedia Streaming and Playback on Android”**  
*(International Journal of Software Engineering, 2022)*
- Advantages:- Provides good playback performance
  - Includes playlist functionality
- Disadvantages: - UI is outdated

# Main Objective

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- The main objective of the Groove.FLAC project is to develop a lightweight, offline-capable local music player application for Android that prioritizes user privacy, delivers a retro yet modern Material You interface, and offers core features such as playback controls, song renaming, custom cover art, playback speed adjustment, a sleep timer, an inbuilt equalizer, and shuffle functionality—without relying on online streaming or cloud services.

# Architecture



# System Requirements

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## Hardware Requirements:

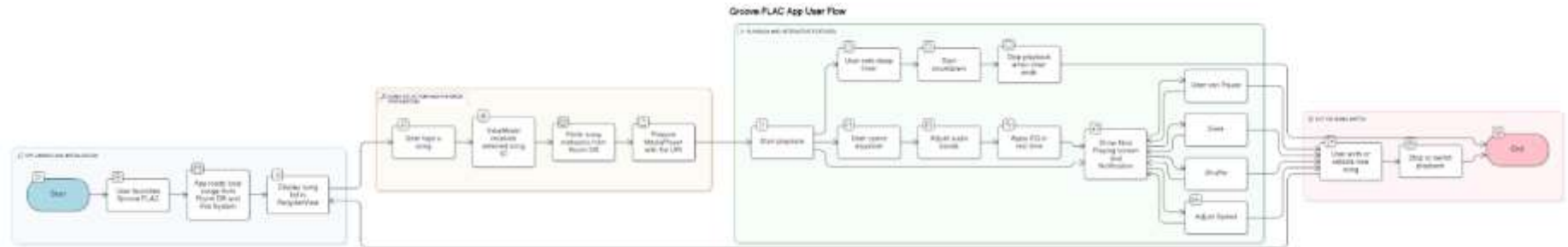
- Processor: Minimum 1.8 GHz quad-core
- RAM: Minimum 4 GB
- Storage: Minimum 100 MB free space for app and media
- Display: Minimum 5.0" screen, 720p resolution
- Audio: Support for media playback, speaker or headphones

## Software Requirements:

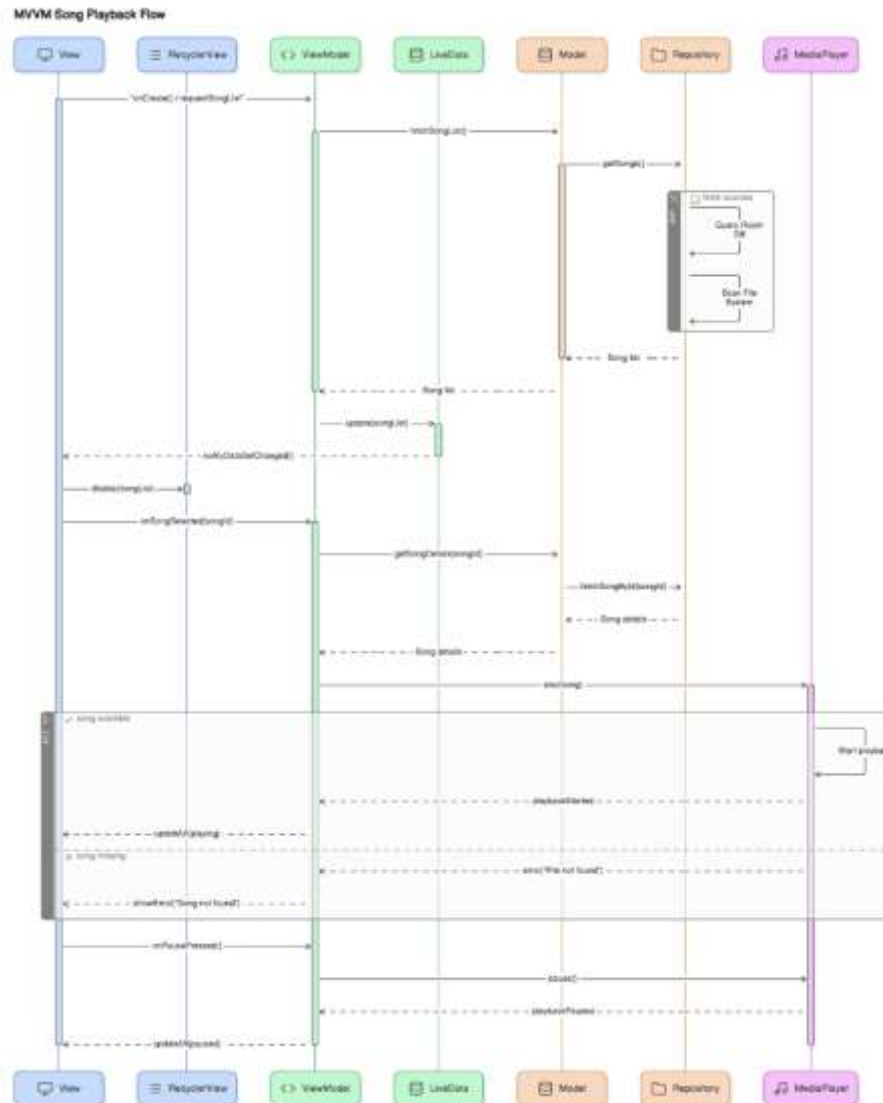
- Operating System: Android 8.0 (Oreo) and above
- Development Environment: Android Studio Electric Eel or newer
- Programming Language: Kotlin
- Database: Room Persistence Library
- Build System: Gradle
- UI Framework: Material You Design Components
- Emulator/Device: Android Emulator or Physical Device



# Functional Description



# Table Design

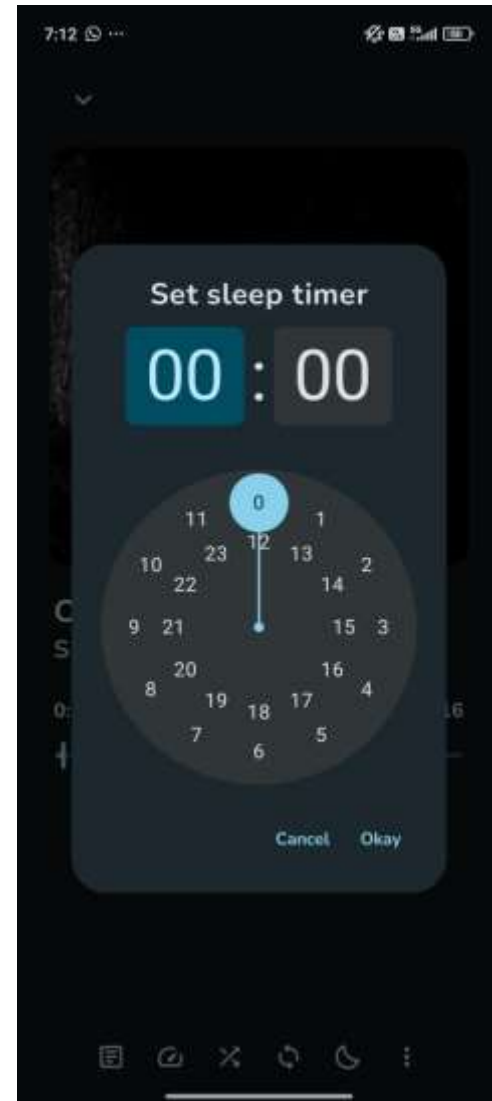


# Process Design

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- User Onboarding (Initial Setup)
- Main Screen (Home)
- Music Library
- Now Playing Screen
- Settings Screen
- Spotify Integration (Future)
- Playback Flow
- Error Handling
- Background Operations
- Testing & Debugging

# Implementation



# Testing

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- Unit Testing
- UI Testing
- Integration Testing
- Performance Testing
- Error Handling Testing
- Usability Testing
- Beta Testing

# Conclusions

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**Groove.FLAC** provides a strong foundation for a feature-rich, offline-first music player designed to offer users a customizable and immersive audio experience. While the current version already delivers key functionalities such as audio playback, song renaming, and personalized audio settings, there is ample room for growth and enhancement.

The app's modular architecture, based on MVVM, ensures that it is both maintainable and scalable, allowing future upgrades—such as cloud sync, streaming support, and advanced audio features—to be seamlessly integrated. The app's offline capability, privacy-focused design, and focus on user customization make it an excellent choice for users who want complete control over their music library.

# Future Enhancement

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- Cloud Sync
- Personalized Recommendations
- UI Enhancements
- Cross-Platform Support
- Voice Control Integration
- Social Sharing Features
- Advanced Equalizer Settings

# IEEE Paper

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## 1. **"Design and Implementation of Media Player Based on Android"**

This paper discusses the development of a media player on the Android platform, covering aspects like user interface design, system architecture, and performance optimization.

## 2. **"Quality Improvement of MP3 Encoded Audio Reproduction using Fluency Locally Supported Sampling Function for Use in Cell Phones"**

This study presents methods to enhance the quality of MP3 audio playback on mobile devices, which could be beneficial for FLAC file handling in your app.

## 3. **"Development and Research of Music Player Application Based on Android"**

This paper explores the design and research of a music player application on the Android platform, focusing on system structure and application framework.



# References

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1. A. Phillips and M. Hardy, *Kotlin for Android Developers*, 1st ed. Birmingham, UK: Packt Publishing, 2019.
2. Google Developers, “SQLite database,” Android Developers, [Online]. Available: <https://developer.android.com/training/data-storage/sqlite>. [Accessed: May 6, 2025].
3. M. Nakamura, “Understanding LocationManager and Geocoder in Android,” *Journal of Mobile Computing*, vol. 10, no. 3, pp. 56–62, 2020.
4. B. Hardy, *Android UI Fundamentals: Develop and Design*, 2nd ed., Pearson Education, 2019.
5. A. Meier, “Using RecyclerView in Android Applications,” *International Journal of Android Programming*, vol. 5, no. 1, pp. 22–29, 2021.

Thank You...!