

QR Code Based Bus Pass Authentication System

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Abstract: Public transport remains the backbone of urban mobility in India, yet routine ticketing and pass verification are still dominated by paper-based processes. Paper passes are easy to lose, hard to verify at scale, and vulnerable to misuse, while manual checks slow down boarding and reduce operational transparency. This project presents a QR Code Based Bus Pass Management System, an Android application developed in Java (Android Studio, Gradle Groovy) that digitises the entire pass lifecycle. The solution supports three roles—Admin, Passenger, and Conductor—within a single app. Passengers purchase and store digital passes locally and present them as QR codes; Conductors validate these QR codes using CameraX and Google ML Kit (Barcode Scanning); Admins manage users and pass products. Data is persisted offline using Room (SQLite), while SharedPreferences supports role-aware session management. The interface follows Material Design 3, providing a clean, accessible, and responsive user experience suitable for devices commonly used in Indian cities.

The system is designed to work reliably even when data connectivity is poor, a practical requirement on many Indian routes. Room Database tables—users, passes, and shift_logs—enable consistent local operations: passengers can view active passes and history, conductors can scan and log validations during shifts, and admins can oversee user administration and pass definitions from the same APK. The design also includes placeholders for future enhancements such as password hashing, key rotation, and optional server synchronisation, ensuring a pathway to production hardening without compromising today's usability.

Keywords: missing person identification, deep learning, face recognition, data augmentation, Flask, MySQL, real-time video analytics, geolocation alerts

