



NEIGHBR: Smart Residence Management System with Residential Management Efficiency Through AI-Driven Facility and Data Analysis

Abstract

This project introduces **NEIGHBR**, a smart management system designed to modernize residential community operations. Traditional methods like manual logbooks and guesswork for budgeting are inefficient. NEIGHBR solves this by moving from reactive logging to proactive, data-driven planning.

PREDICTIVE FACILITY ANALYTICS

An on-device AI engine that analyzes booking history to forecast future maintenance budgets, replacing manual guesswork.

DYNAMIC VISITOR SECURITY

Generates time-sensitive, encrypted QR codes that expire automatically after use, eliminating unauthorized re-entry.

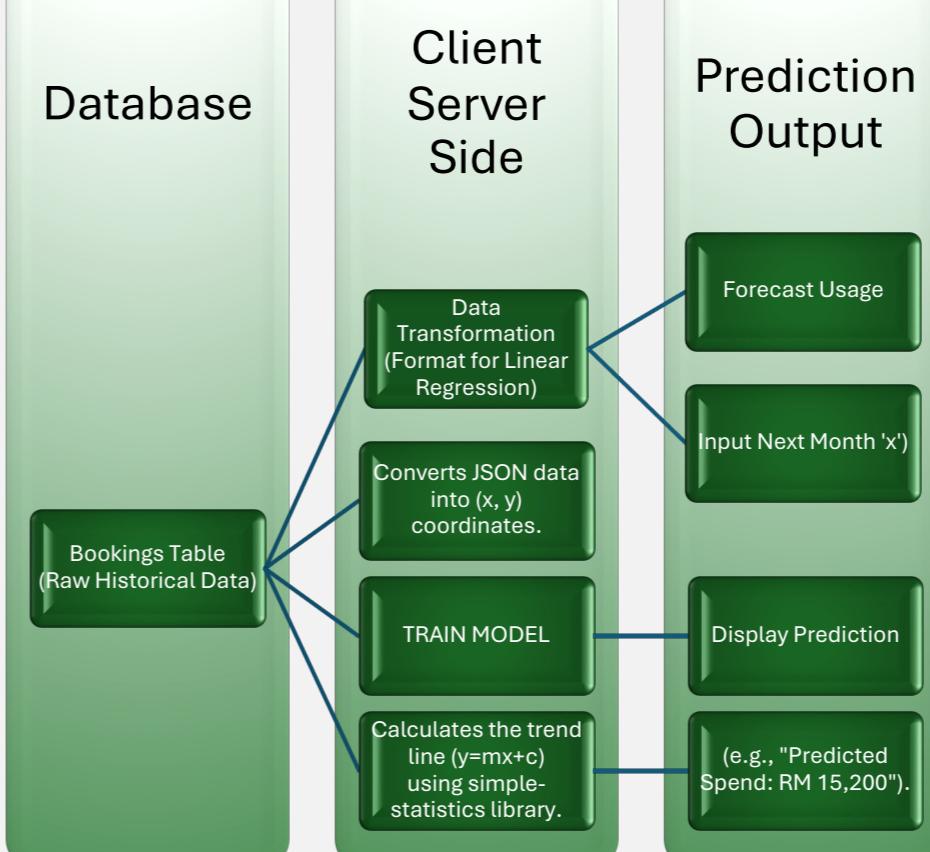
CENTRALIZED OPERATIONS HUB

A unified management platform that guarantees 100% user authenticity through a verified "Offline Onboarding" protocol.

Methodology

Database

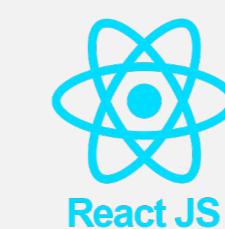
Client Server Side



Hardware



Software



TypeScript



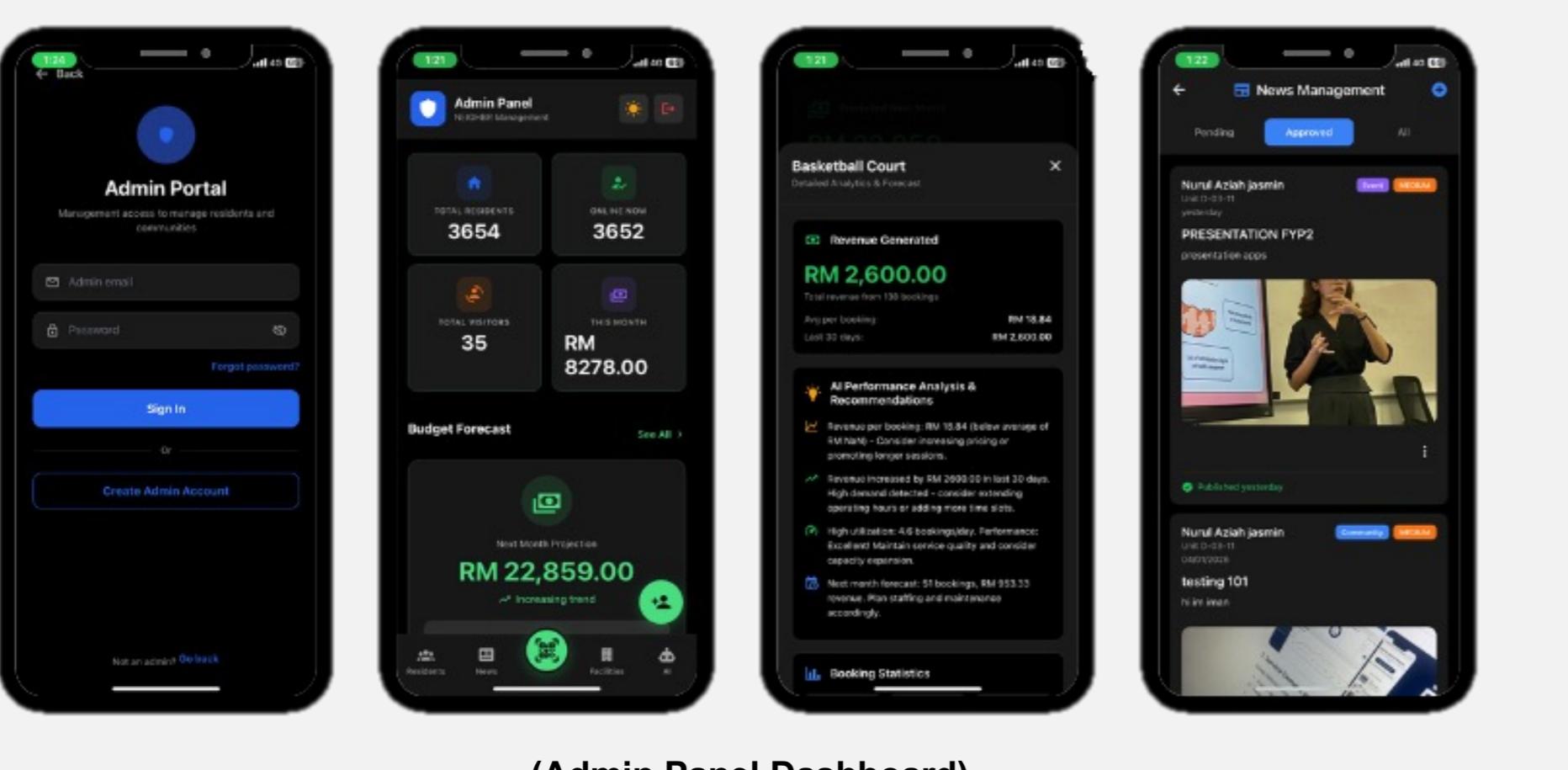
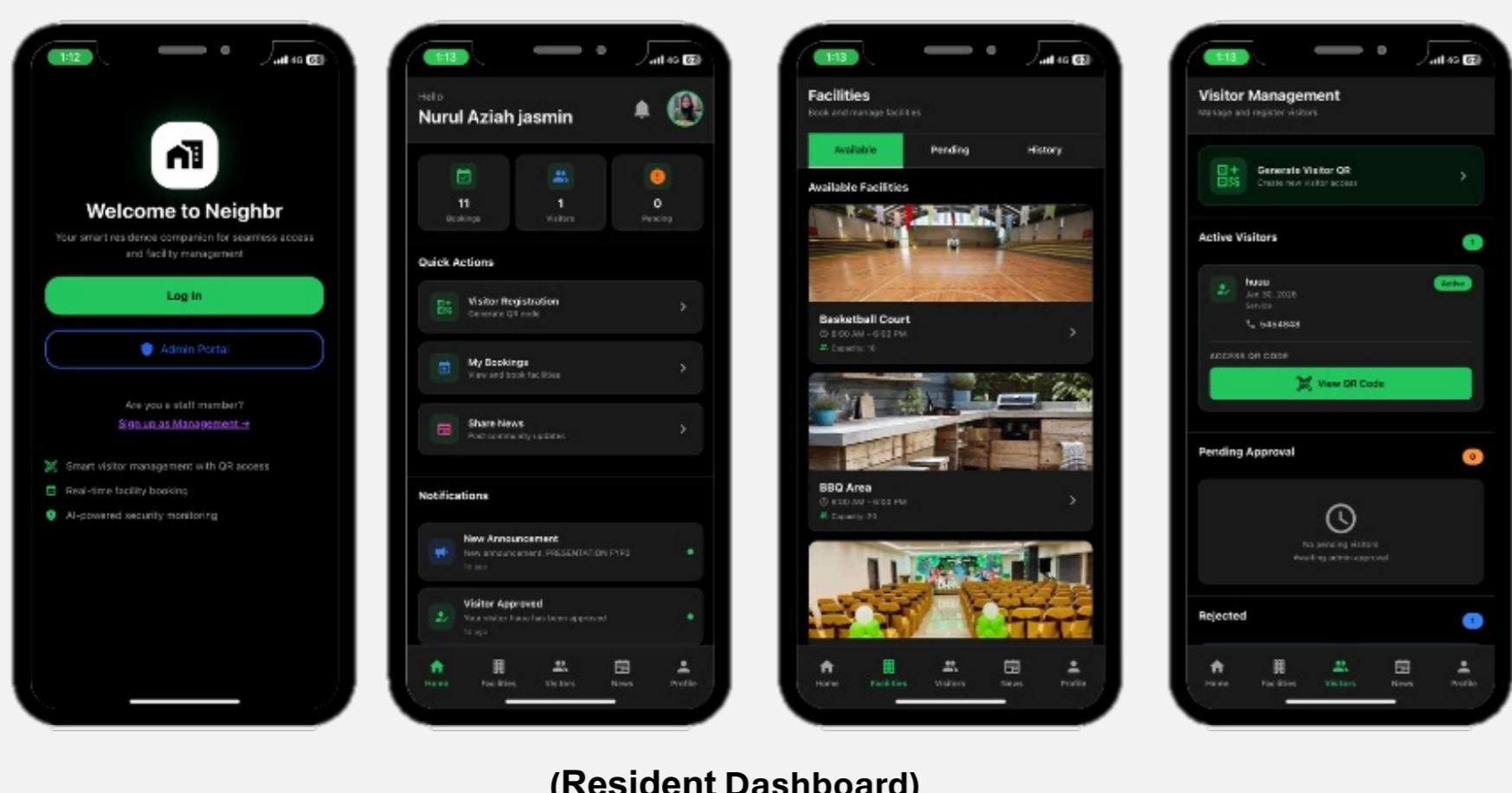
Objective

Transition to Proactive Management: Move facility operations from reactive logging to data-driven maintenance budget forecasting using predictive analytics.

Enhance Visitor Security: Replace vulnerable static passes with time-sensitive, encrypted dynamic QR codes to secure visitor entry.

Guarantee User Authenticity: Unify operations and ensure complete data integrity through a verified "Offline Onboarding" protocol for all residents.

NEIGHBR: UI/UX Design



Literature Review

Aspect / Theme	Traditional / Existing Methods (Problem Context)	NEIGHBR Approach (Proposed Solution)
Facility Budgeting & Maintenance	Relies on reactive logs and guesswork for financial planning, with no forecasting capabilities. This leads to fixing things only after they break or when funds run out.	Introduces a "Smart Budget Prediction" engine that moves from reactive logs to proactive forecasting. It aggregates historical booking data and applies Linear Regression algorithms directly on the client device to generate precise maintenance budget forecasts for upcoming months.
System Architecture & Technology	(Implicitly) Relies on disparate, often manual or legacy systems.	Built on a Mobile Client-Server Architecture using React Native for a cross-platform frontend and Supabase as a cloud-based backend. This decoupled architecture ensures scalability, maintainability, and real-time data synchronization via secure APIs.
AI & Predictive Modeling Implementation	Not typically applied in traditional residential management.	Employs a client-side Linear Regression model for time-series forecasting of budget trends. This is executed directly on the device using a lightweight JavaScript library (simple-statistics), which is efficient and avoids the need for heavy external servers.

Result & Conclusion

Project Achievements

- Successfully developed the NEIGHBR smart residence system, featuring **predictive analytics for proactive facility budgeting**.
- Implemented a dynamic, **time-sensitive QR code security system for visitor access**, eliminating the need for static passes.
- Established a secure "Offline Onboarding" protocol to guarantee 100% resident authenticity and data integrity.

Project Outcomes

Delivered a functional cross-platform mobile application built on a scalable client-server architecture using React Native and Supabase.

- Integrated a client-side AI engine for real-time maintenance budget forecasting without relying on heavy external servers.

Future Enhancements

- Direct integration of payment gateways for seamless in-app maintenance fee transactions.
- Integration with IoT systems for automated physical access control (e.g., smart locks, boom gates).
- Expansion of the analytics engine to forecast other community trends, such as utility usage.

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