

AirINN Project - System Design Architecture

Project Overview

AirINN is an AI-powered hotel assistant and booking platform offering smart, voice-enabled recommendations, real-time hotel availability, booking management, and a future-ready ecosystem with IoT capabilities.

System Architecture Modules

1. User Module (Web/App Interface)
2. Hotel Partner Module
3. Admin Dashboard
4. AI Recommendation Engine (Python + FastAPI)
5. Voice Assistant Module (Rasa / OpenAI)
6. Database Layer (MongoDB / PostgreSQL)
7. File Storage (AWS S3 / Firebase)
8. Payment Gateway Integration (Razorpay/Stripe)
9. Notification & Email System (SendGrid, Twilio)

Tech Stack

Frontend: React.js / Flutter
Backend: Node.js + Express
Database: MongoDB / PostgreSQL
AI: Python (FastAPI)
Voice Assistant: OpenAI Whisper / Rasa
Authentication: JWT / OAuth2
File Storage: AWS S3 / Firebase
Payment Integration: Razorpay / Stripe
Deployment: AWS / Vercel / Render

Security Features

- OAuth2 and JWT for secure login
- HTTPS for all connections
- API Rate Limiting and Firewall
- Data encryption (AES-256)
- Regular vulnerability scans

AI/ML Recommendation Engine

- Filters based on location, ratings, budget
- Historical booking pattern training
- Seasonal demand-aware suggestions
- Travel history integration (optional)

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Communication Flow

User --> UI --> API Gateway --> Backend --> AI/DB
Hotel Partner --> Partner Portal --> Backend
Admin --> Dashboard --> Backend
Voice User --> Voice Module --> NLP Engine --> Backend

Hardware Requirements

- Minimum: Dual-core CPU, 8 GB RAM, 256 GB SSD (dev)
- Recommended: Quad-core CPU, 16 GB RAM, 512 GB SSD (prod)
- Hosting: AWS EC2 t3.medium or higher for prod backend

Software Requirements

- Node.js (v18+), Python (3.9+), MongoDB/PostgreSQL
- React/Flutter SDK, Git, Docker (for containerized deploys)
- Firebase CLI / AWS CLI for storage and deployment
- VS Code / Postman / Jupyter for local development