UmiDo

AI-Powered Smart Notification System

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The Problem: A Fragmented Life

Challenge: Individuals face increasing difficulty managing responsibilities across healthcare, work, and personal domains.

Cognitive Overload: Overlapping schedules and conflicting priorities lead to inefficiencies, missed commitments, and decreased productivity.

Tool Limitation: Traditional task management tools are often passive, disconnected, and lack the holistic integration and AI-driven prioritization needed for modern life.

The Vision: A Proactive, Intelligent Assistant

Project Goal: To develop an AI-powered system that intelligently coordinates and prioritizes tasks across different domains, moving beyond simple reminders to proactive support.

Core Objectives:

Develop an AI-Powered Prescription Parser for effortless task entry.

Create an integrated communication and monitoring hub with an AI chatbot.

Build a system that detects and resolves both scheduling and drug-drug interaction conflicts.

Implement robust offline capabilities to ensure constant accessibility

The Three Pillars of UmiDo

A New Approach to Life Management

Effortless Intelligence: Leveraging advanced AI/NLP to simplify complex tasks and provide proactive safety.

Absolute Reliability: Built on an offline-first, enterprise-grade architecture for unwavering access and data integrity.

Seamless Integration: Harmonizing health, work, and personal domains into a single, collaborative platform.

Pillar I: Effortless Intelligence - The AI Core

A suite of custom-built AI modules designed for maximum accuracy and relevance.

The guardian

A proprietary Drug-Drug Interaction

(DDI) detection engine.

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AI Module 1: The Guardian (DDI) - The Need

The Challenge: Access to commercial DDI APIs like DrugBank was restrictive, creating the need for a fully independent, autonomous solution.

Our Solution: We built a proprietary DDI prediction model from the ground up to ensure data sovereignty, local relevance for Korean medications, and seamless system integration.

The Guardian (DDI) - Data & Feature Pipeline

Multi-Source Data Foundation:

Korean drug data from MFDS -> Biomedical literature from PubMed Abstracts -> Statistical signals from FDA Adverse Event Reporting System (FAERS)

Advanced Feature Engineering:

For each drug pair, we compute multidimensional features -> Chemical Similarity (e.g., Tanimoto coefficient) -> Biological Targets (e.g., shared proteins, CYP3A4 inhibition) ->Side Effect Overlap (e.g., common adverse reactions)

The Guardian (DDI) - Model Comparison & Results

Model	Accuracy
Gradient Boosting	96.12%
Neural Networks	90.11%
Random Forest	89.09%
Logistic Regression	81.25%
K-Nearest Neighbors	72.00%

Rigorous Model Evaluation: Multiple machine learning models were trained and tested to find the highest-performing solution for predicting interaction risks.

Strengths	Weaknesses
High predictive accuracy	Computationally heavier
Captures complex dependencies	Requires large training set
Robust, handles complex data	Less transparent
Simple, interpretable	Limited non-linear capture
Simple, non-parametric	Sensitive to irrelevant features

AI Module 2: The Translator (Parser) - 4-Stage Pipeline

Goal: To transform raw prescription images into structured, validated, and actionable data with high accuracy.

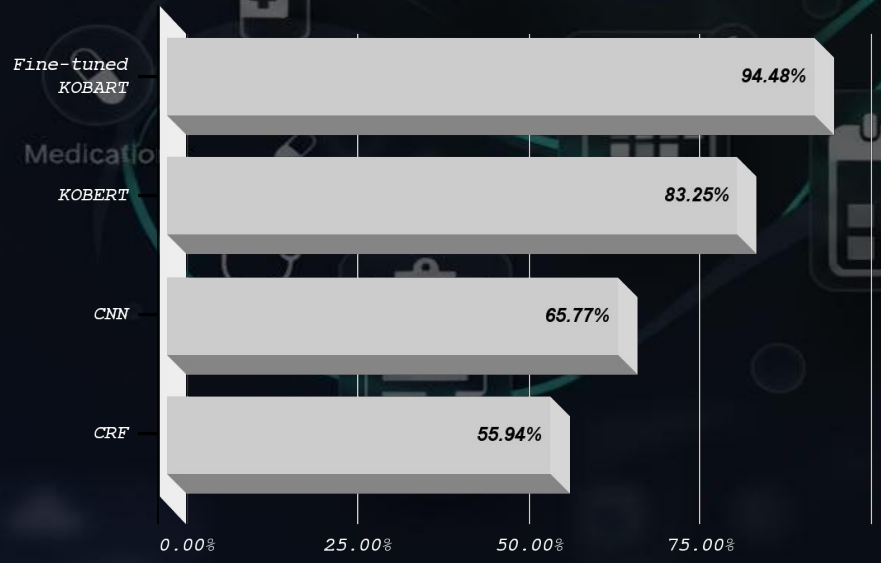
Stage 1: Image Encoding -> Converts images to Base64 text for secure API transmission

Stage 2: Info Extraction -> Uses a specialized extractor to identify key entities like medication name, dosage, and frequency

Stage 3: Med Matching -> Applies RapidFuzz fuzzy string matching against a normalized drug list to ensure accuracy

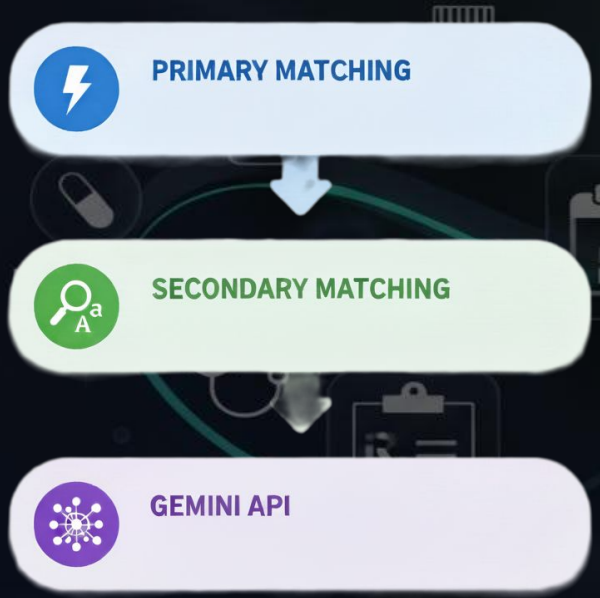
Stage 4: Instruction Analysis -> A fine-tuned NLP model decodes natural language instructions into structured JSON

The Translator (Parser) - Information Extractor Benchmark



Choosing the Right NLP Model:

We evaluated several models to find the best for converting natural language instructions into structured data.



AI Module 3: The Conversationalist (Chatbot)

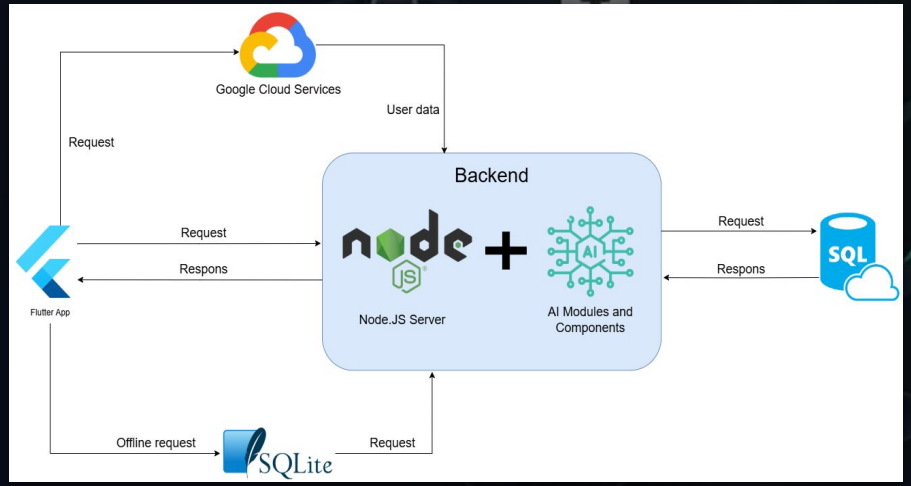
A Multi-Tiered Pipeline for Natural Interaction:

Tier 1: Primary Matching – Fast, keyword-based matching for common, high-confidence queries.

Tier 2: Secondary Matching (Fallback) – Flexible fuzzy string matching to handle typos and variations in phrasing.

Tier 3: Gemini API (Fallback of Fallback) – Leverages a powerful LLM to handle complex, ambiguous, or open-ended user requests, ensuring a robust and context-aware experience.

Pillar II: Absolute Reliability - System Architecture



Frontend: Flutter application for cross-platform (iOS, Android, Web) deployment.

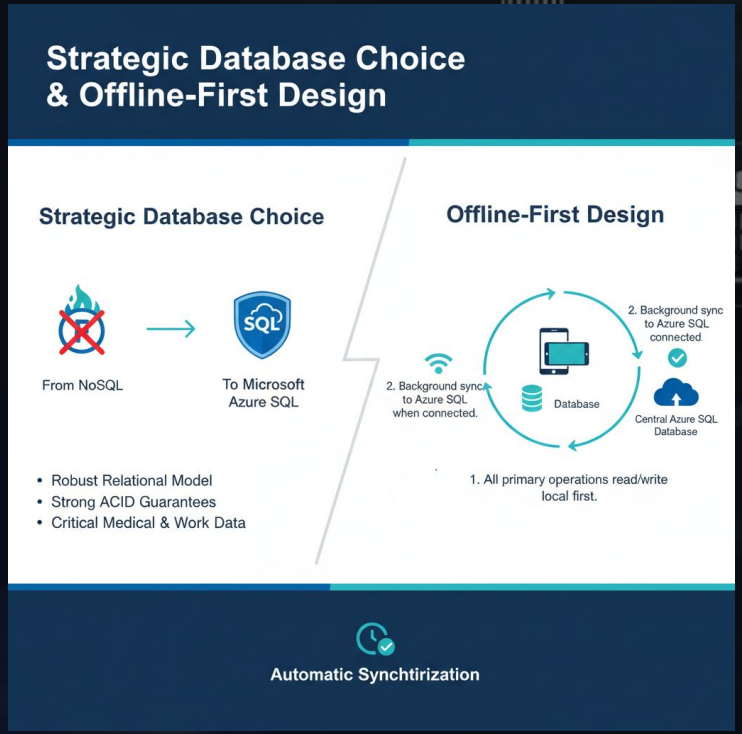
Backend: Node.js server hosted on Microsoft Azure App Services handles all business logic and API requests.

Primary Database: Microsoft Azure SQL Database ensures data integrity and consistency.

Offline Database: On-device SQLite allows for core functionality without an internet connection.

Notifications: Firebase Cloud Messaging (FCM) delivers timely alerts and reminders.

Absolute Reliability - Data & Offline Strategy



Strategic Database Choice: Transitioned from NoSQL (Firestore) to Microsoft Azure SQL for its robust relational model and strong ACID guarantees, which are essential for handling critical medical and work data.

Offline-First Design:

All primary operations read from and write to the local SQLite database first.

A background service automatically synchronizes local changes with the central Azure SQL database when a connection is available.

Pillar III: Seamless Integration - A Unified Platform

Breaking Down Silos: UmiDo is designed to be a holistic solution combining the strengths of dedicated medical reminder apps and project management tools.

Collaborative by Design:
Multi-Role Access Control allows for seamless and secure interaction between different user types.

Roles: Doctor, Manager, Normal, and Mixed users, each with specific permissions to assign or receive tasks.

Conclusion: The Ultimate Life Assistant

More Than an App: UmiDo is an intelligent partner that reduces cognitive load and restores focus.

Key Strengths:

- Our most intelligent parser: Effortlessly translates complex prescriptions into simple, actionable tasks.
- Our most vigilant safety net: Proactively protects users with a highly accurate, custom-built DDI engine.
- Our most intuitive interface: Provides a unified view of your life, accessible anytime, anywhere.

Thank You