

# Software Design Document

Sleep Fixer App

Group 6

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December 2025

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## Revision History

User	Date	Reason for Changes	Version
Dang Nguyen	12/6/2025	Added core app foundation	1.0
Rafael Caldera	4/6/2026	Added notifications, streaks, weekly reports	2.0
Yohei Oya	8/8/2026	Added insights, community, journal, improved charts	3.0
Yuanwei Chen	12/9/2026	Added performance, accessibility, security, languages	4.0

# 1 Introduction

## 1.1 Purpose of This Document

This Software Design Document (SDD) describes the design of the Sleep Fixer App across four snapshots of development. It explains how the system structure, core features, and user interface evolve over time. This document is written as a simplified, junior-college level mock SDD for practice.

## 1.2 Intended Audience

This SDD is intended for:

- Developers implementing app features
- QA testers reviewing functionality
- Project team members who need a clear, organized overview of the design

## 1.3 Overview of the System

The Sleep Fixer App helps users improve sleeping habits through gradual bedtime adjustments. Key ideas include:

- Users enter current and desired bedtime.
- App generates a day-by-day shift plan.
- User logs progress daily.
- The app provides notifications, insights, and streak tracking.

The system grows in features across **\*\*Snapshots 1–4\*\***.

## 2 System Architecture

### 2.1 High-Level Workflow

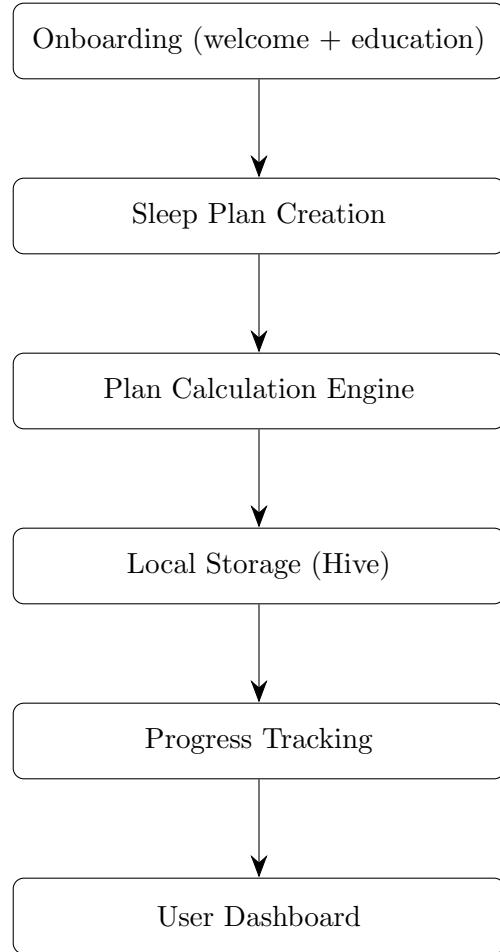


Figure 1: High-level system workflow (Snapshot 1 foundation)

The main flow of the app is:

1. User completes onboarding.
2. User enters bedtime information.
3. App generates a personalized schedule.
4. App saves the schedule and progress data.
5. User records progress each day.
6. Dashboard shows status, tips, streaks, or insights.

## 2.2 Main Components

### 2.2.1 Presentation Layer (Flutter UI)

- **OnboardingScreen** – introduces app purpose.
- **PlanCreationScreen** – collects current + target bedtime.
- **FullPlanScreen** – displays daily targets.
- **ProgressTrackingDialog** – allows entering actual bedtime.
- **ProfileScreen** – shows summary and settings.
- **Notifications Panel** (Snapshot 2).
- **Journal Page** (Snapshot 3).
- **Community Page** (Snapshot 3).
- **Language + Accessibility Settings** (Snapshot 4).

### 2.2.2 Business Logic Layer

- **SleepPlanCalculator** – determines shift size and plan length.
- **ProgressTrackingService** – evaluates bedtime accuracy and streaks.
- **WeeklyReportGenerator** (Snapshot 2).
- **InsightsEngine** (Snapshot 3).
- **NotificationScheduler** (Snapshot 2).

### 2.2.3 Data Layer

- **HiveService** – local offline storage.
- **FirebaseService** – cloud backup + community features (Snapshot 3).
- **SleepPlan Model** – holds a user's schedule settings.
- **SleepProgress Model** – holds daily progress.
- **JournalEntry Model** (Snapshot 3).
- **CommunityPost Model** (Snapshot 3).

## 3 Core Design Details

### 3.1 Data Storage

#### Snapshot 1 – Local Database Only

- sleep\_settings: plan configuration.
- sleep\_progress: daily entries.

#### Snapshot 3 – Cloud Storage Added

- Firebase stores:
  - community posts
  - cloud backups
  - challenge participation

### 3.2 Example Progress Entry

```
{  
  "date": "2025-12-02",  
  "targetTime": "22:00",  
  "actualTime": "22:15",  
  "status": "within30Min",  
  "notes": "Felt good tonight"  
}
```

### 3.3 Example Sleep Plan

```
{  
  "currentBedtime": "23:30",  
  "goalBedtime": "22:00",  
  "shiftSize": 20,  
  "planLength": 9,  
  "startDate": "2025-12-01"  
}
```

### 3.4 Key Algorithms

#### 3.4.1 Shift Size Calculation

```
IF difference <= 60 min → 15-minute shift  
ELSE IF <= 180 min → 20-minute shift  
ELSE → 30-minute shift
```

#### 3.4.2 Plan Duration

```
shifts = CEILING(totalDifference / shiftSize)  
daysPerShift = 1 or 2 depending on difficulty  
totalDays = shifts × daysPerShift
```

### 3.4.3 Progress Status Rules

```
0 minutes → onTarget  
<= 30 min → within30Min  
<= 60 min → within1Hour  
> 60 min → offTarget
```

## 3.5 Additional Logic by Snapshot

### Snapshot 2 – Engagement Logic

- Notification reminders 30 minutes before bedtime.
- Morning check-in questions.
- Streak tracking increases motivation.
- Weekly report generator summarizes progress.

### Snapshot 3 – Personalization Logic

- Insights identify user patterns (ex: “Fridays are harder”).
- Journal entries connect habits to sleep quality.
- Anonymous community sharing.
- Improved long-term charts and exportable reports.

### Snapshot 4 – Stability and Security

- Faster loading and battery-efficient performance.
- Larger fonts, better contrast, screen reader support.
- Fingerprint / Face ID lock.
- Encrypted local data.

## 4 User Interface Design

### 4.1 Using the App

#### Snapshot 1 – Basic Flow

1. Onboarding screens introduce the concept.
2. User enters current and desired bedtimes.
3. App creates a gradual plan.
4. User logs bedtime daily.
5. Dashboard shows progress.

#### Snapshot 2 – Added UI Features

1. Streak meter displayed under the daily goal.
2. Notification settings page.
3. Weekly report card on dashboard.

#### Snapshot 3 – Added User Tools

1. Journal entry modal.
2. Insights screen with personalized suggestions.
3. Community challenge page.
4. Expanded charts for weekly/monthly views.

#### Snapshot 4 – Final UI Polish

1. Larger font mode.
2. Multi-language selection (English, Spanish, French).
3. Security settings panel (biometric lock).
4. Smooth transitions and refined animations.

### 4.2 Navigation Layout

- **Home:** daily goals, progress, streaks
- **Insights:** personalized advice
- **Community:** achievements + challenges
- **Profile:** settings, language, privacy

## Glossary

- SDD - Software Design Document
- UI - User Interface
- MVP - Minimum Viable Product
- API - Application Programming Interface

## References

- Flutter Documentation — <https://docs.flutter.dev>
- Hive Database Documentation — <https://docs.hivedb.dev>
- Dart Language Guides — <https://dart.dev/guides>
- National Sleep Foundation — <https://www.sleepfoundation.org>
- Harvard Medical School Sleep Research — <https://sleep.med.harvard.edu>
- Material Design Guidelines — <https://material.io/design>