

# ReMind

An AI-Supported Mobile Assistant for Dementia and Alzheimer's Disease

Team T2518

CS491 - Bilkent University

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# The Problem: Dementia & Alzheimer's Care Challenges



Dementia and Alzheimer's disease are progressive conditions affecting memory, cognition and emotional stability.



Patients experience mood fluctuations, anxiety, confusion and behavioral changes.



These changes often develop gradually and are difficult to notice early.



Caregivers are under constant pressure because they are required to continuously and manually supervise the patient.

# ReMind

## Core Features:

- Role-based mobile platform for patients and caregivers
- Personalized reminders and routine support
- Safety and location-based monitoring
- Mood and behavioral understanding through MoodAI
- Privacy-aware data handling and consent-driven design

# System Architecture



Flutter App

- Role-based UI (Patient / Caregiver)
- Dashboards
- On-device MoodAI
- OS-level geofencing
- Local notifications



Firestore

- Authentication & user linking
- Secure summary storage
- Alert orchestration
- Push notification delivery

# High-Level System Architecture Diagram

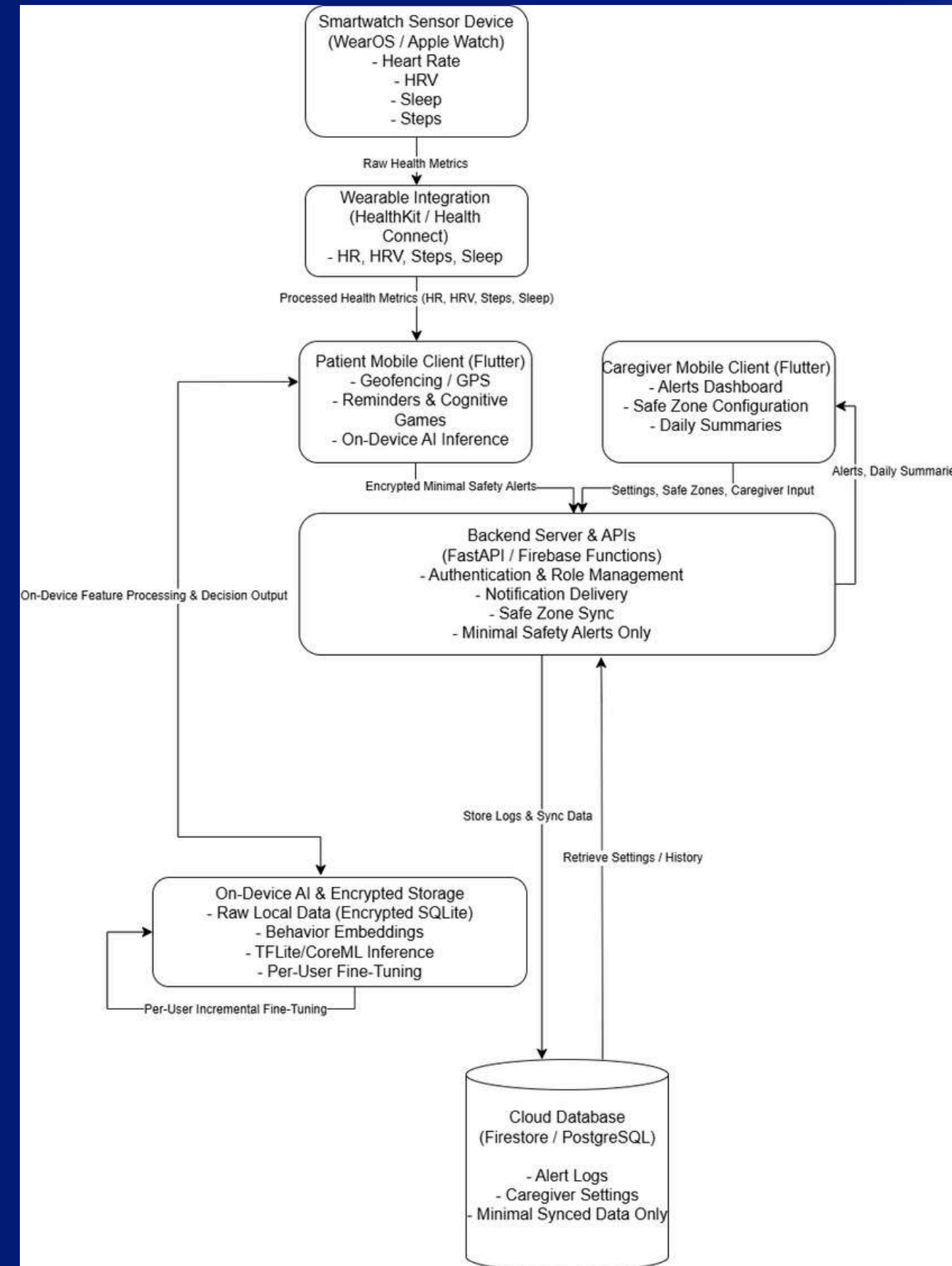


Figure 1: High Level System Architecture Diagram

# MoodAI

AI-Based Mood Understanding for Dementia Support

# MoodAI

 Detect mood anomalies

 Detect cognitive fluctuations

 Provide contextual input for alerts

 Continuous Feature-Level Personalization  
per Patient

# Change in Plans

Fine-tuning an existing pretrained mood related model

Training an FT Transformer

Personalizing with patient data

**initial plans**

**current plan**

# StudentLife [1]

- Mobile sensing dataset collected from Dartmouth University
- Longitudinal, real-world behavioral data
- Smartphone-based sensors (location, activity, phone usage)
- Daily self-reported mood and stress labels
- Covers routines, mobility, and social behavior
- Widely used for behavior and mental state modeling

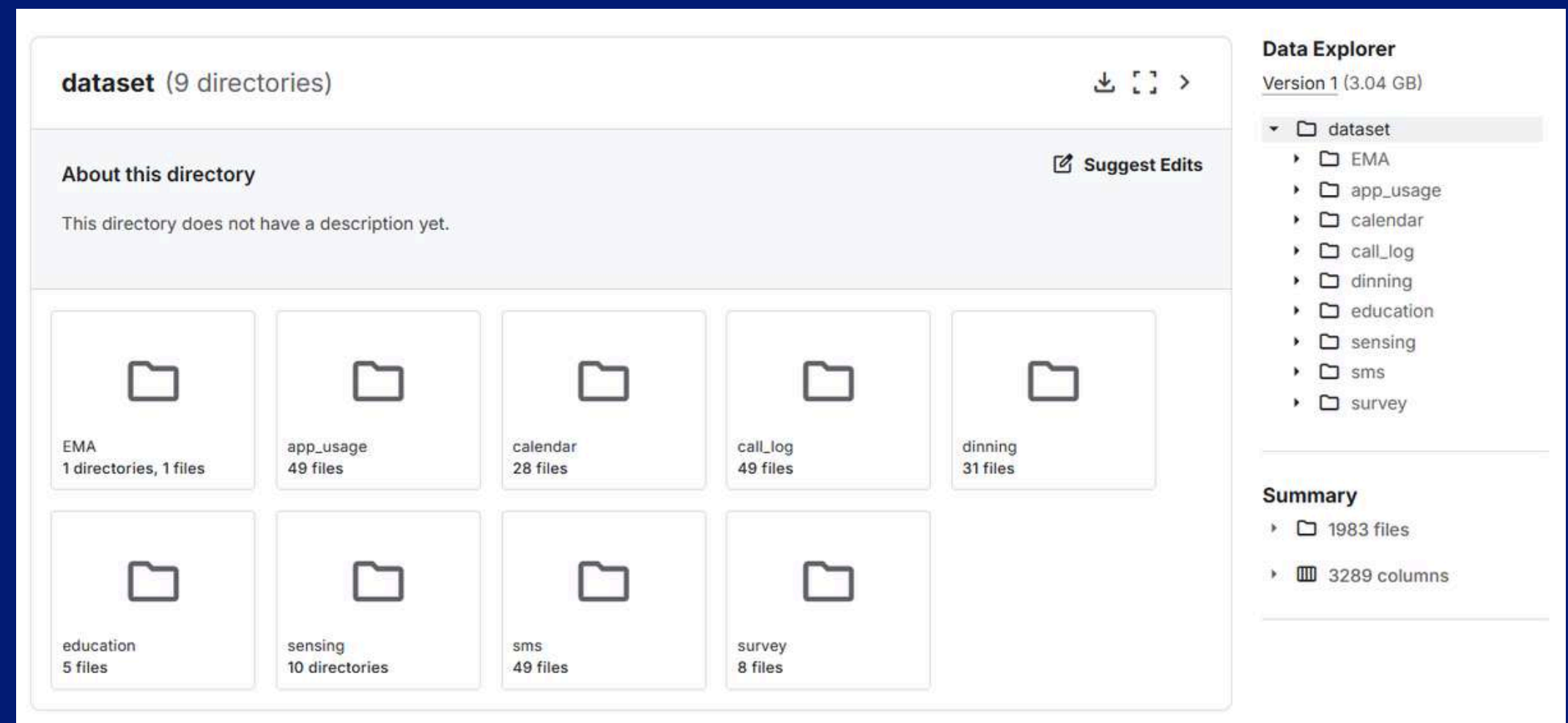


Figure 2: StudentLife DataSet Structure

# StudentLife

- StudentLife is used to pretrain a global FT-Transformer to learn general behavior–mood relationships with real patterns

## but

- The patterns belong to university students, not the elderly
- The dataset does not contain some attributes we plan to use in MoodAI
- The mood labels are sparse
- The dataset contains data in different data formats:
  - CSV-based time-series logs
  - interval-based event records
  - JSON-based semi-structured EMA

# StudentLife - Fixes

The dataset contains data in different data formats

The patterns belong to university students, not the elderly

The mood labels are sparse



Apply preprocessing and convert the data into daily tabular features



StudentLife is used only for pretraining general behavioral-mood relationships thus model learns patterns of change, not what is “normal” for a human



Labels are aggregated (daily) and treated as soft ground truth. Focus is on trend detection, not absolute prediction

# StudentLife - Fixes

The dataset does not contain some attributes we plan to use in MoodAI

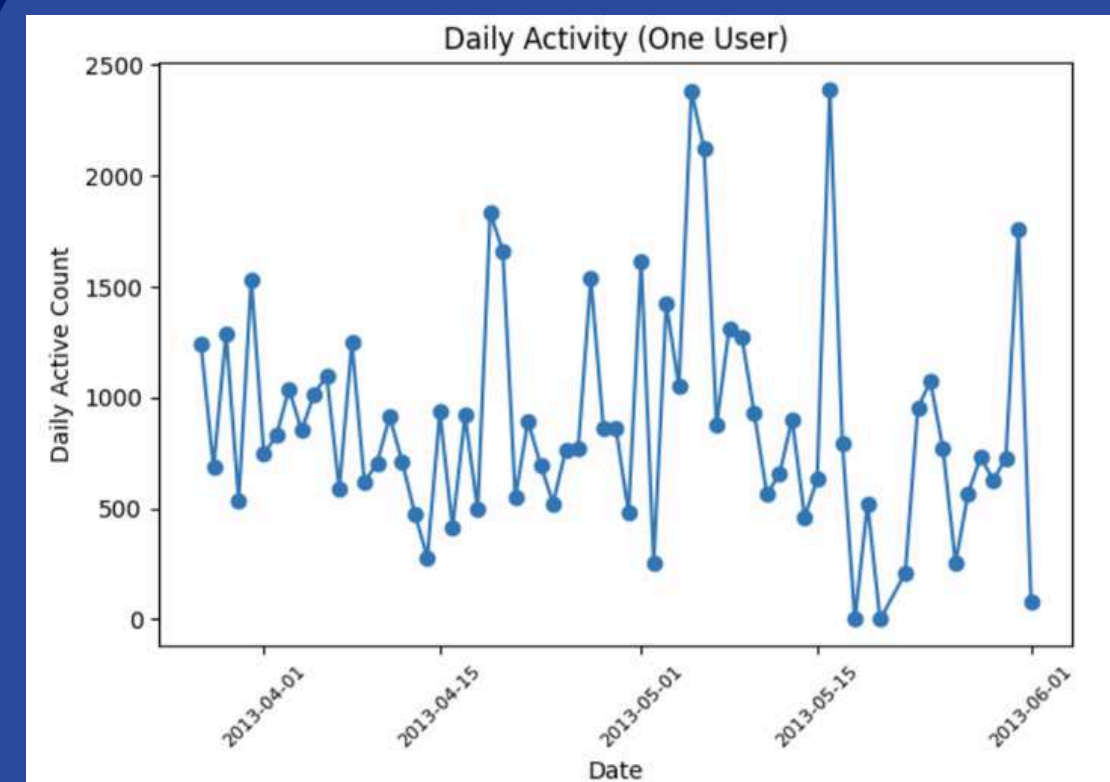
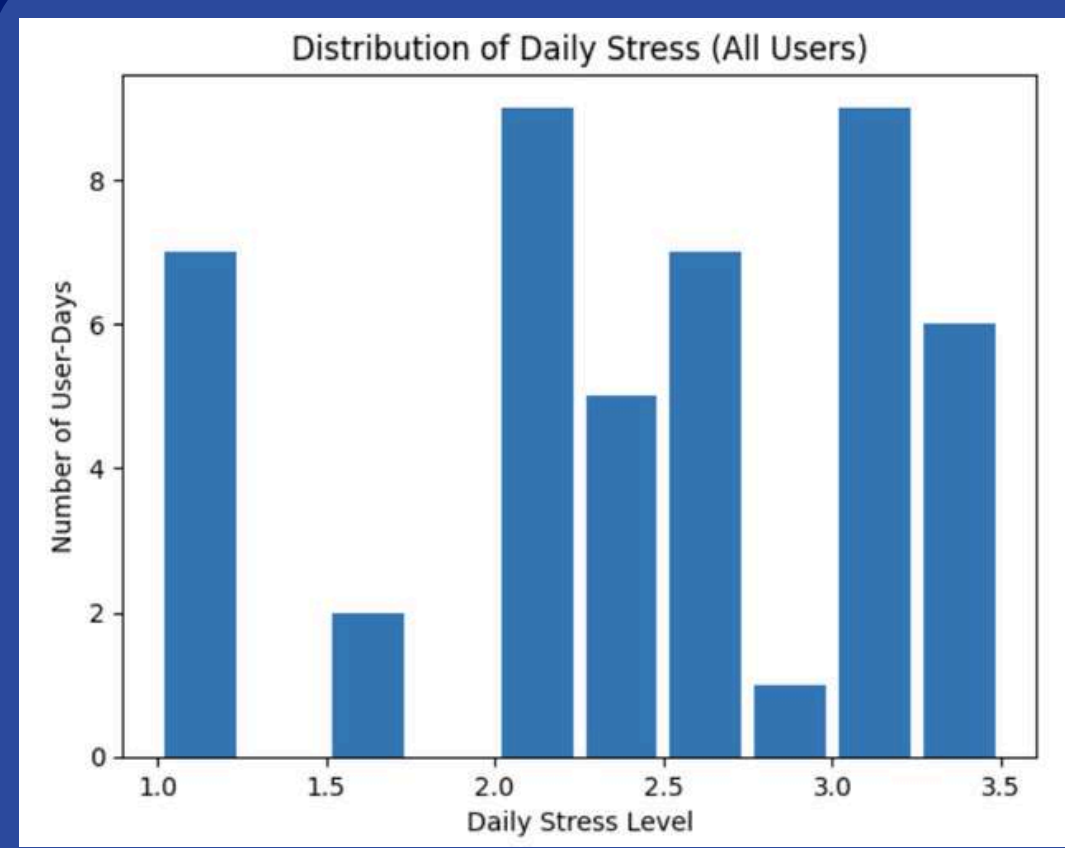
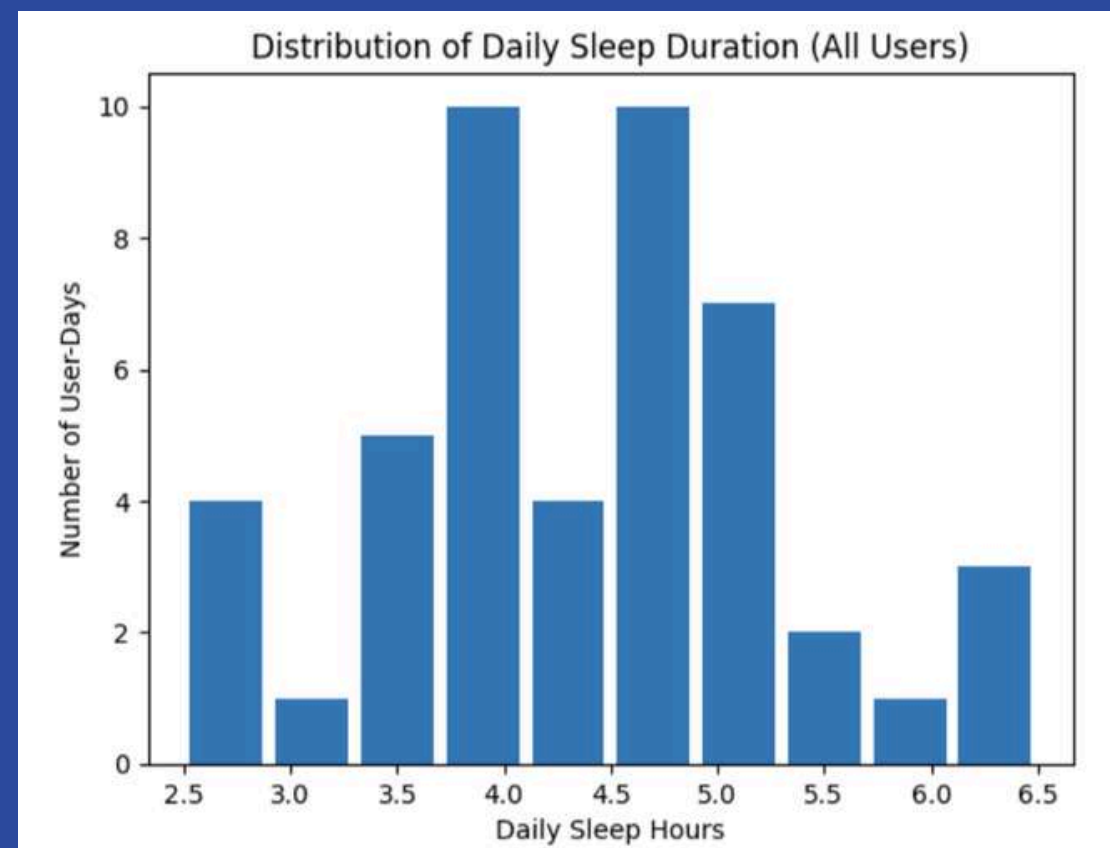
Behavioral	Sleep	sleep_total_minutes
		sleep_start_time
		sleep_end_time
		sleep_midpoint_hour
		sleep_variability_7d
	Mobility - Physical Activity	distance_traveled_km
		time_outside_home_minutes
		steps_total
		steps_variability_7d
	Phone Usage	phone_unlock_count
		phone_screen_time_minutes
		num_app_sessions
		evening_phone_usage_ratio
Physiological	Heart Rate	hr_mean
		hr_min
		hr_max
		hr_zscore
Psychological	Self Report	stress_level
		happiness_level
		sadness_level
	Mood Check-in (OASIS)	oasis_valence_score
		oasis_arousal_score
		oasis_dominance_score
Temporal Context	Temporal Context	day_of_week
		is_weekend
Missing Value Indicators	Missing Value Indicators	hr_missing, steps_missing, ...



- Final feature schema is fixed from the start
- Missing features are explicitly masked, accompanied by missing-value indicators
- These features become active only during patient-specific calibration

Figure 3: StudentLife DataSet Attributes

# Initial Data Exploration and Sanity Checks



- StudentLife data is noisy, irregular, and temporally dense. Therefore, direct model input is not feasible.

Raw data → time-series & event logs

Step 1: Daily aggregation

Step 2: Feature extraction

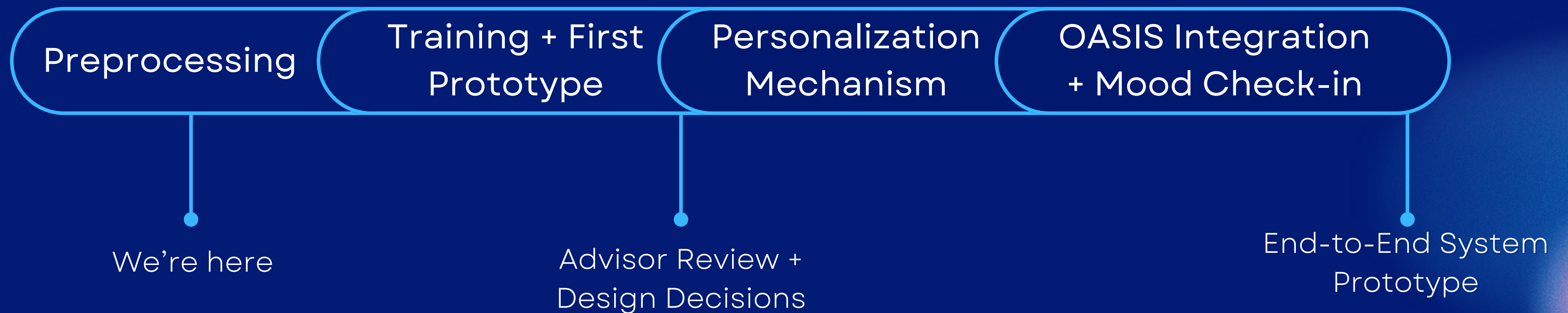
Step 3: Missing-value handling

Step 4: Baseline normalization

Figure 4,5,6: StudentLife Data Visual Representation

# MoodAI Timeline

- The OASIS dataset will be used for image labeling in mood check-ins [3].



# Privacy Challenges in Dementia Care Systems

- Health data (mood, vitals) is highly sensitive
- Location data risks surveillance and loss of dignity
- Patients may not fully understand data collection
- Caregivers need safety without constant tracking

# Data Categories in ReMind

Data Category	Examples	Purpose	Privacy Handling
Identity Data	Email, user role (patient / caregiver)	Authentication and role separation	Stored securely via Firebase Auth
Health-Related Data	Mood check-ins, behavioral patterns	Well-being monitoring and AI analysis	Processed locally when possible, minimal backend storage
Location Data	Safe zone entry/exit events	Patient safety alerts	Event-based only, no continuous tracking
Usage Data	Reminder completion, interaction logs	App functionality improvement	Aggregated, no raw behavioral profiling
Care Relationship Data	Patient–caregiver link information	Controlled data access	Role-based access, revocable by patient

Table 1: Data Categories, their examples, purposes and privacy handling for each

# Consent & User Control in ReMind

- Explicit consent during onboarding
- Patient approves caregiver linking
- Link can be revoked at any time
- Monitoring status is always visible

# Data Security Measures in ReMind

## Implemented (CS491)

- Firebase Authentication
- Secure account linking
- Role-based access (patient vs caregiver)

## Planned (CS492)

- AES-256 encryption at rest
- TLS 1.3 for data in transit
- Encrypted local storage
- GDPR & KVKK compliance

DEMO

# Project Gantt Chart

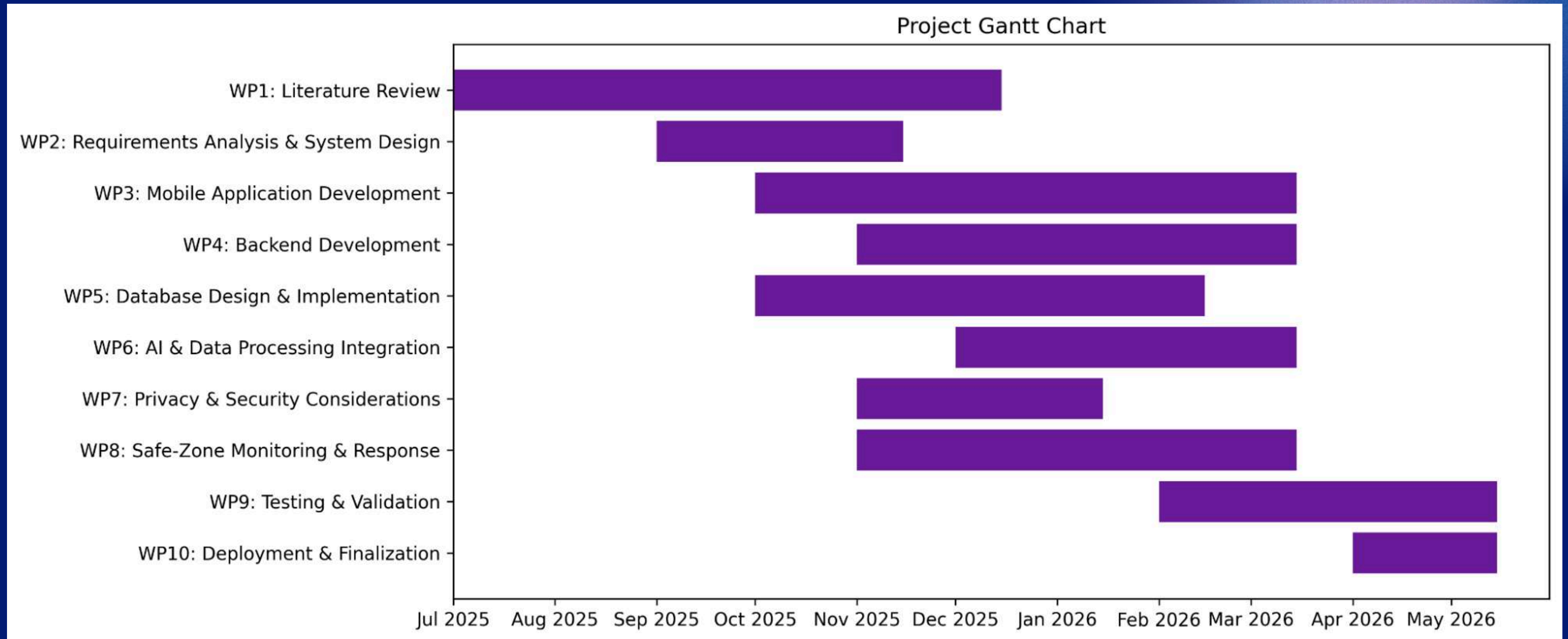


Figure 7: Project Gantt Chart

# Next Steps

- Complete daily support features
- Test location features and implementing geofencing
- Finish processing StudentLife, train an FT-Transformer model and create the first prototype of MoodAI

# References

[1] R. Wang et al., “StudentLife: Assessing mental health, academic performance and behavioral trends of college students using smartphones,”

ACM UbiComp, 2014. [Online]. Available: <https://studentlife.cs.dartmouth.edu/dataset.html>

[2] W. Wang, “StudentLife Dataset,” Kaggle, 2020.

[Online]. Available: <https://www.kaggle.com/datasets/dartweichen/student-life>. Accessed: Mar. 2025.

[3] R. Wang et al., “StudentLife Dataset,” Open Science Framework. [Online]. Available: <https://osf.io/6pnd7/>.

# Thank You for Listening!

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