



Smart-Sleep

**make your house help you follow a
more natural sleep cycle**



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01

Overview

Backgrounds
Market Analysis
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Motivation



Backgrounds: Smart Homes

- System that aims to make home life more **comfortable** and **secure**
- Devices are **interconnected** and have access to the internet
- Remote **personalization** of house attributes

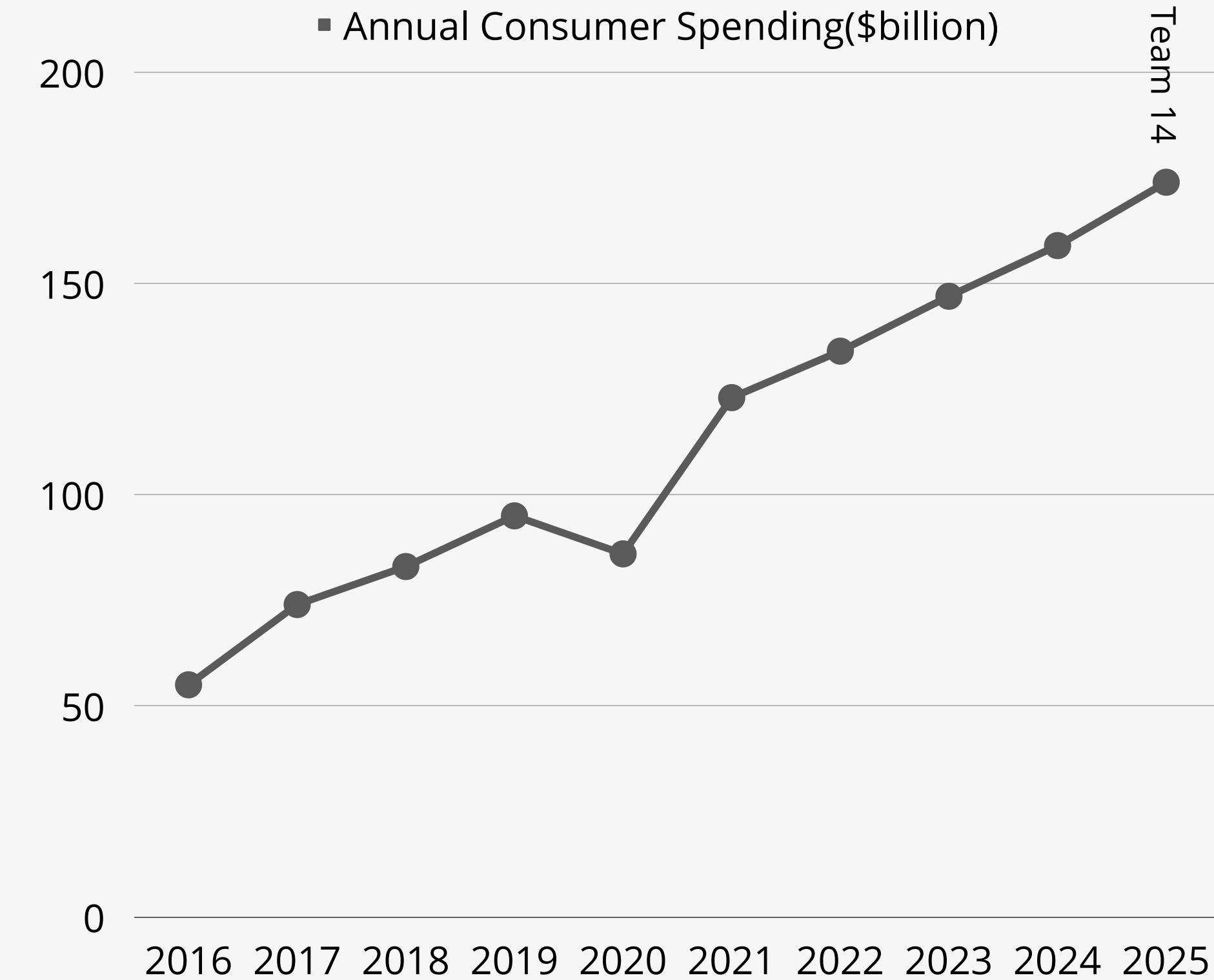


Market Analysis

USD 123 billion in 2021

USD 173 billion by 2025

Largest market: North America

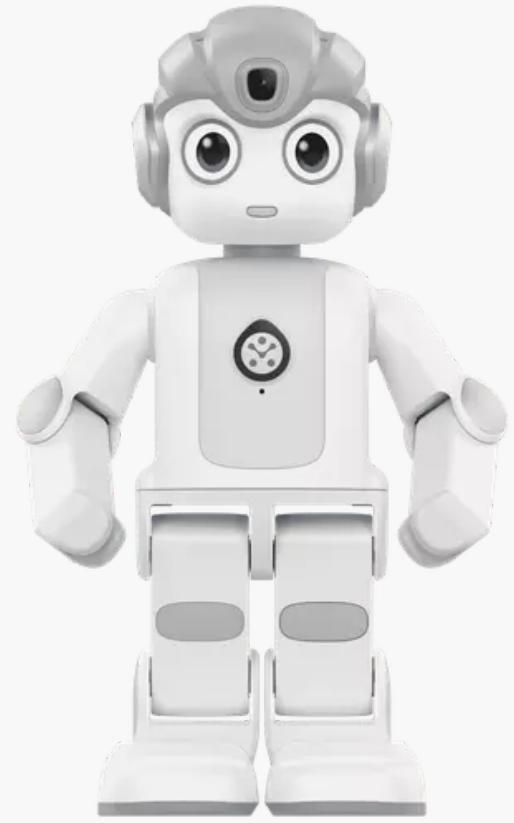


Trend & Examples

- **Centralized control:** connectivity hub
- **Robots:** household works, caretakers, etc.
- **"Sentient house":** The home system takes decisions according to the habits of the user



Philips SmartSleep Wake-Up Light



UBTECH Alpha Mini



Warmee smart heated blanket

Improve Health

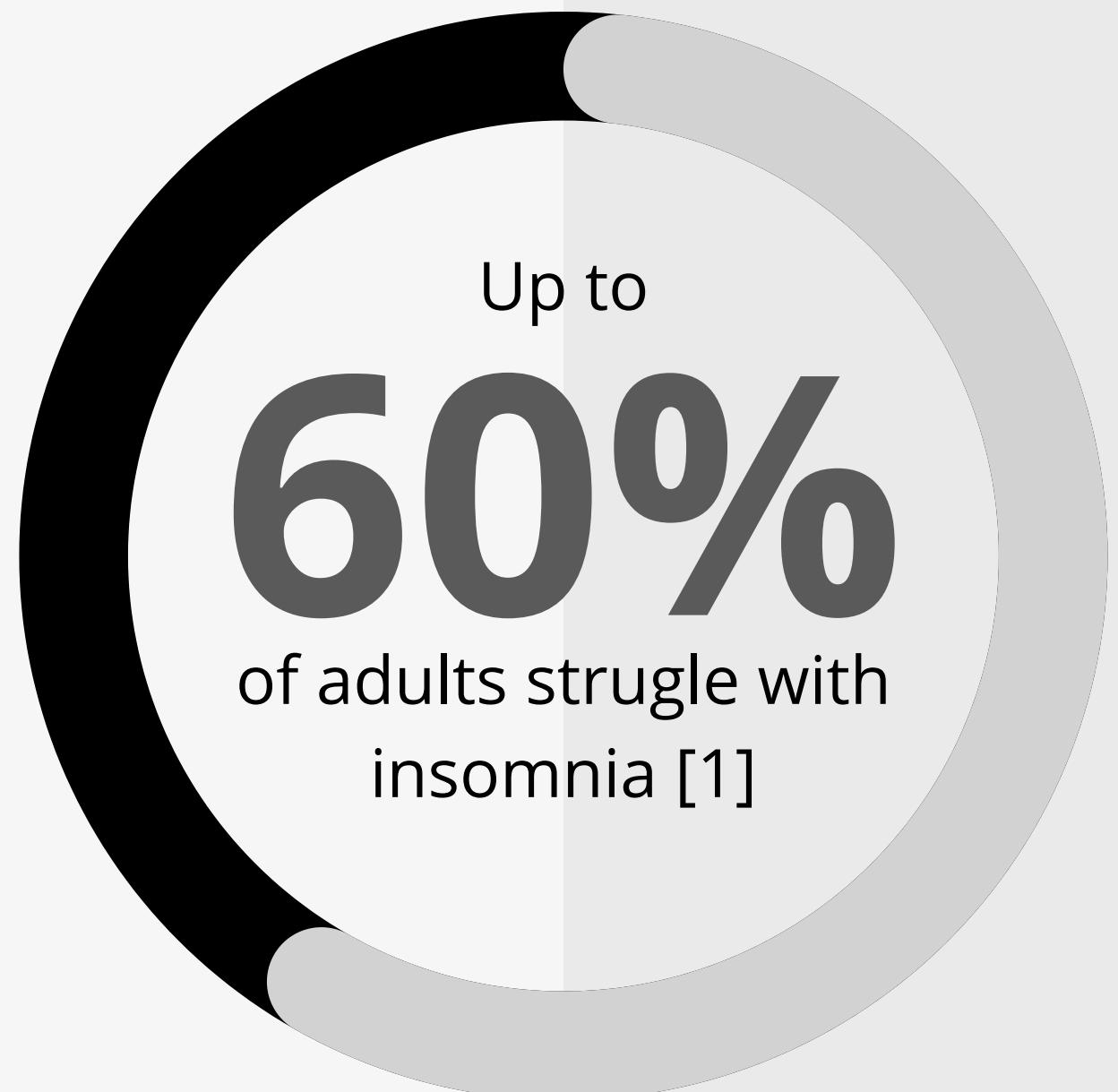
Mood Disorders : increased stress, anxiety, depression and cognitive impairment.

Physical Health: Obesity, heart diseases, diabetes and increase mortality risk.

Factors For Low Sleep Quality

High intensity light at night.
Hot environment
Environmental noises a

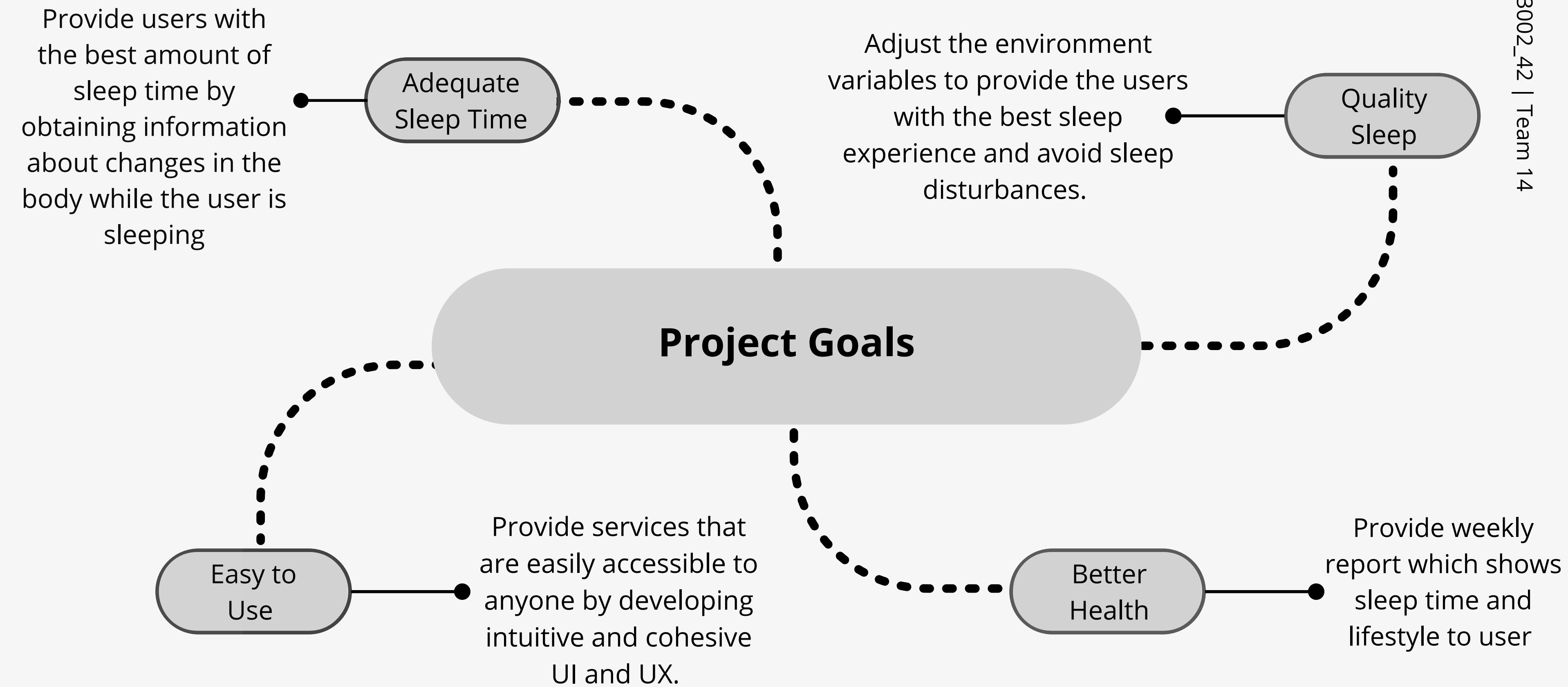
Motivation



[1]<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5353813/>

02

Project Goals



03

Implementation Plan

Overview

Application (Front-end)

Server (Back-end)

Overview

IoT devices control the light, temperature, and white noise as the user sleeps.

Before sleep, the central hub recreates the dawn, warms up the bed, and sets relaxing music to help the user fall asleep.

During sleep, the hub uses the live feedback provided by the sleep tracker to avoid sleep disruptions.

During waking time, the system recreates the sunrise and wakes up the user at the optimal time.



Light

Sun and light play a key role in maintaining the circadian rhythm which controls sleep

Temperature

Body temperature decreases as the body gets ready to sleep
Sleeping in a hot environment can disturb sleep, increasing the number of times one may wake up

Noise

Environmental noises and other sounds lower sleep quality.

Sleep Quality

Detailed Implementation Plan

01

Application/Front-end

02

Server/Back-end

Application Frontend

1

2

Smart Watch

Smart Phone

Smart Watch

Application for smart watch for the user to choose sleep time.

User can choose when to sleep and to wake up.

If users' heart rate is too high, application recommends user not to drink coffee or liquor before sleep.



Smart Watch Development



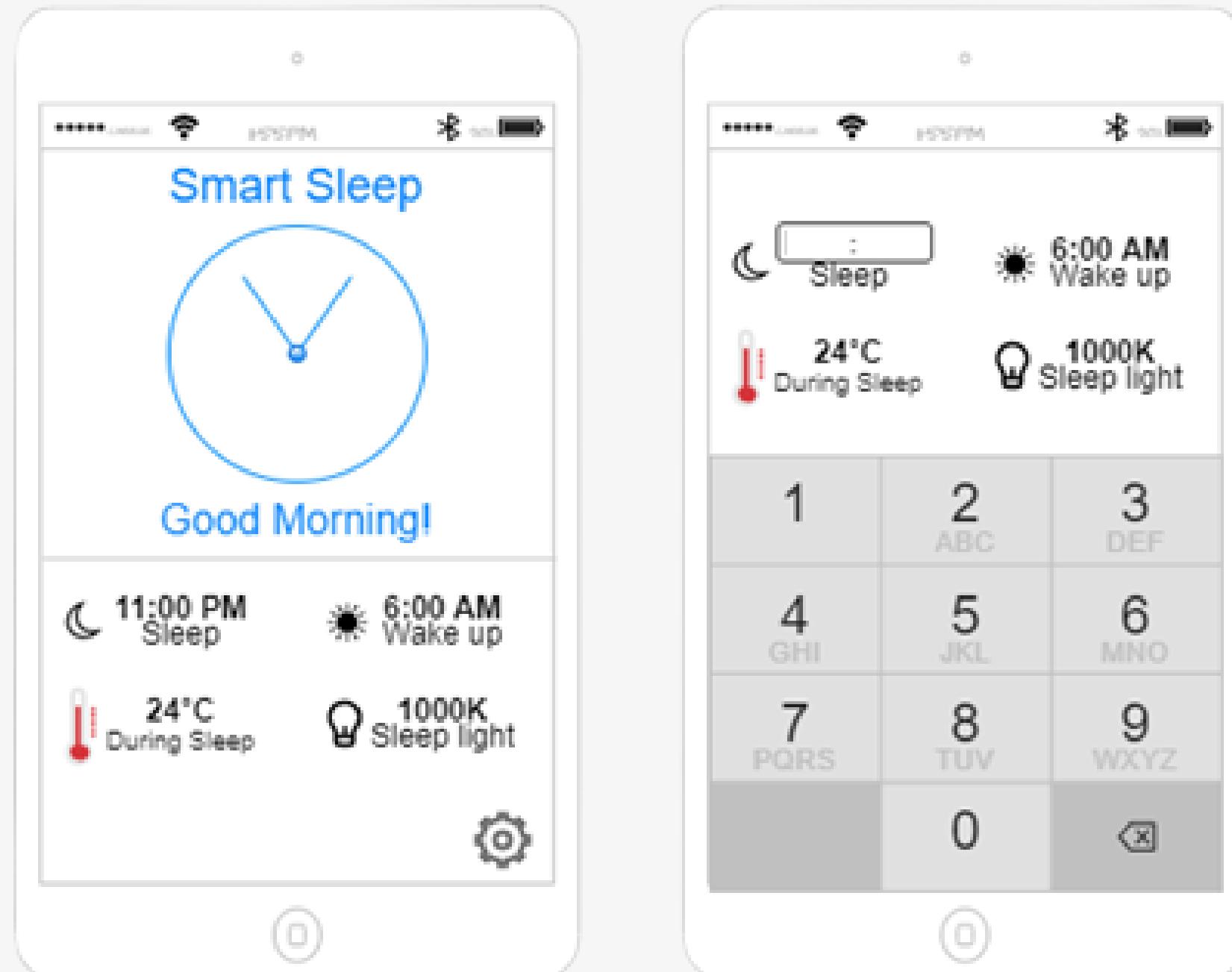
Wear OS

Wear OS is development platform for Galaxy Watch. It is based on Android OS.



Watch OS

Watch OS is development platform for Apple Watch. It is based on iOS.



Smart Phone

Application for the smart phone
to choose the schedule
parameters

User is able to regulate the
lamps and shades with voice.



Mobile development

Flutter

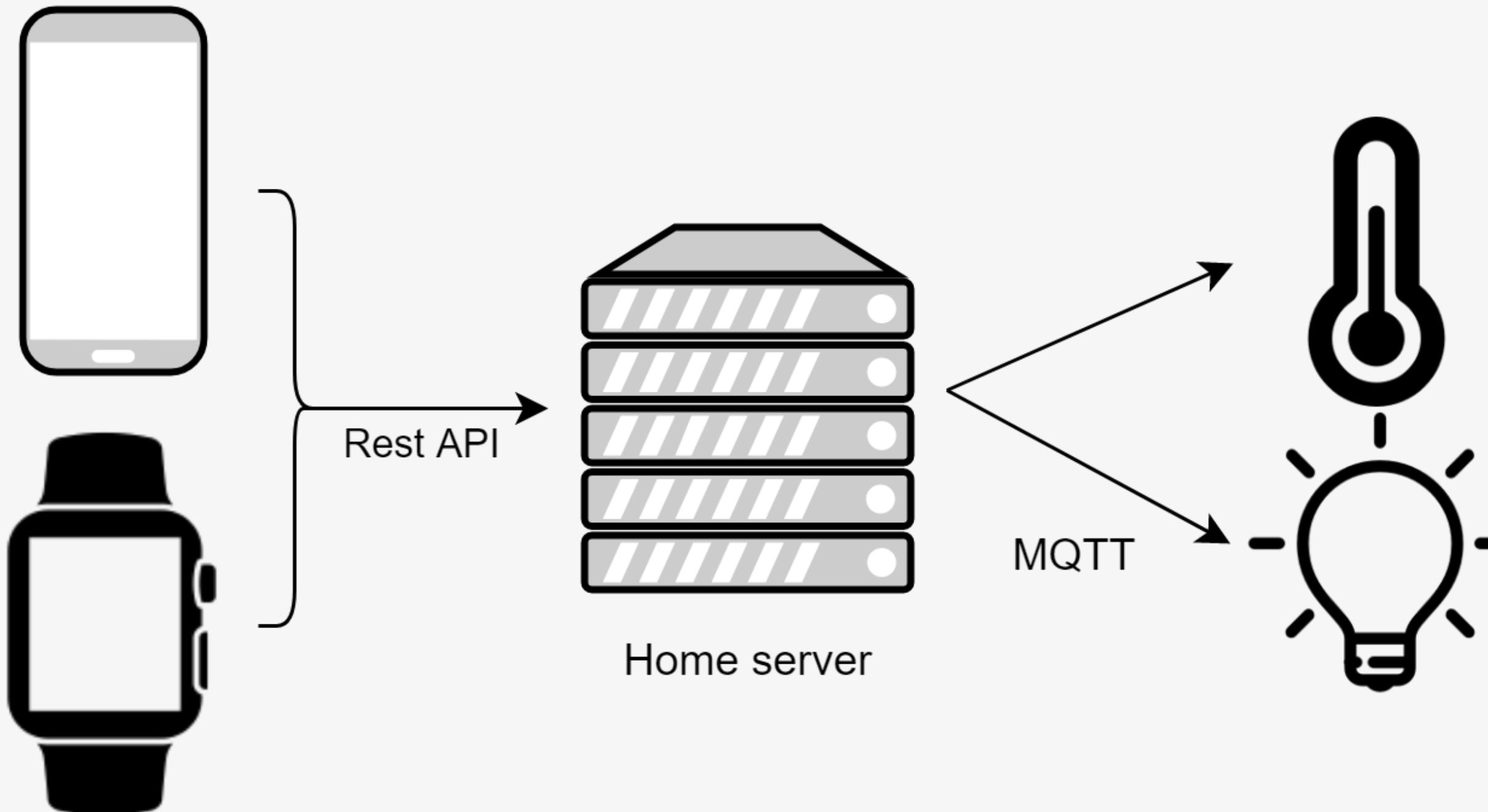
Flutter allows developing IOS and Android applications.

It's multi-platform framework, So it fits our goal to make cross-platform apps in single codebase.

Serverside Backend

Backend server is connected with IOT devices. It includes time scheduling system.

Backend Protocol



Backend Library

Python



Flask

Backend server can communicate with mobile device and smart watch with REST API using flask.



Paho

To communicate with real-life IOT device such as light bulb, MQTT is great protocol to be used. Paho is python library to support MQTT.



Schedule

Schedule is python library supporting schedule behavior. By using it, server-side code can be executed in given schdule.

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Project Plan

Team member Role
Project Schedule

Team member Role

Design

송은기

General Design

MOROTE MARTINEZ
AITANA

Mobile UI Desinger

전영훈

Watch UI Desinger

Develop

손희관

Back-end Developer

김세령

Front-end Developer

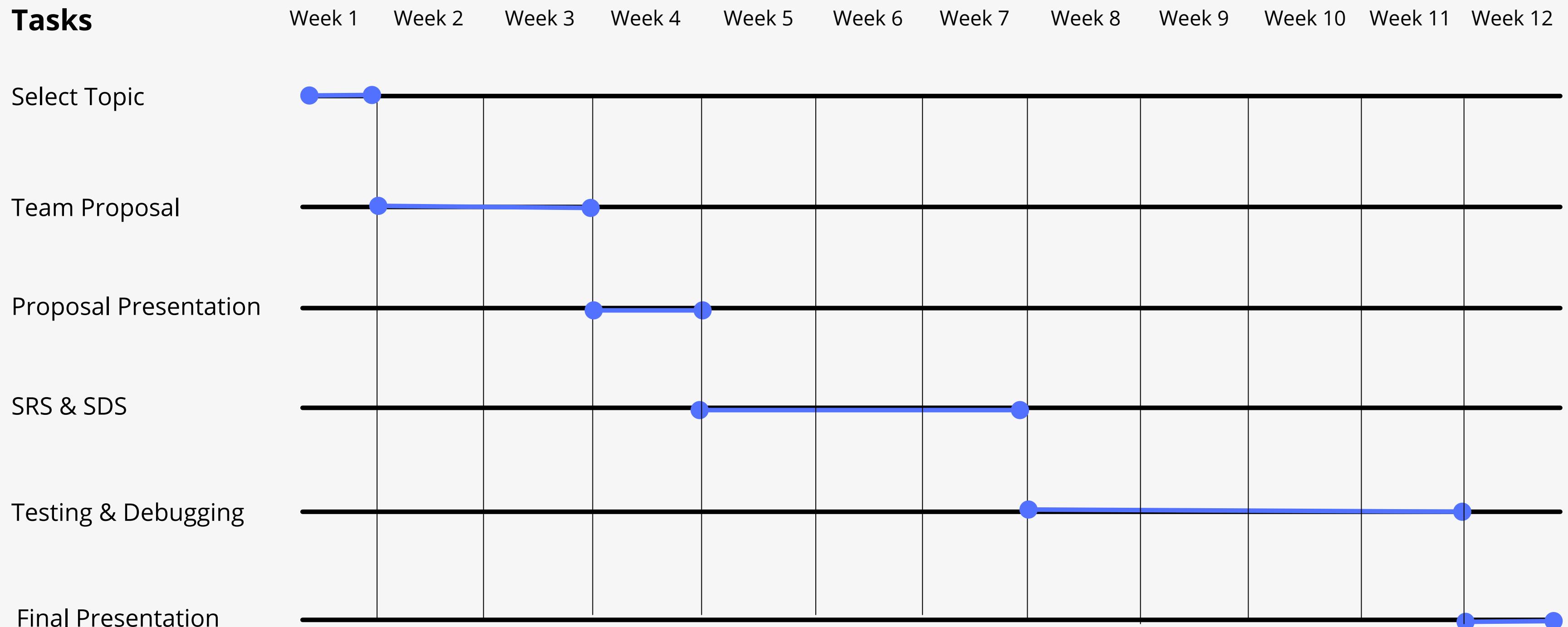
마리아

Manage Hardware

김윤성

Embedded Developer

Project Plan

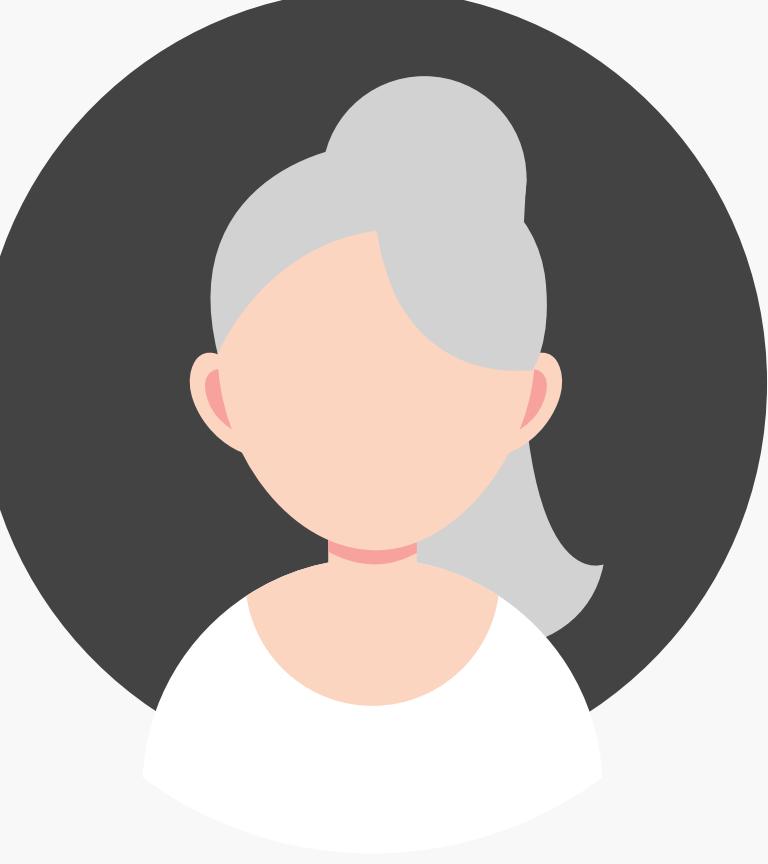


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Expectations & Effects

Effects





I work at night, but I cannot sleep well in the daytime.



I have trouble sleeping. I need to spend about 2-3 hours to fall asleep.

Thank you!