Sleep Manager – Sleep with Me

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*Abstract*—Modern people habitually watch videos through the media before sleeping. The Corona Blue phenomenon caused by COVID-19 intensified people's irregular sleep patterns, and more people couldn't sleep before going to bed and watched videos until late at night. Our team aimed to create an application that automatically provides people with the necessary functions before and after sleep, targeting LG's mobile monitor "Stand by me." Our application not only provides video recommendations and power control so that users can fall asleep, but also provides a function to maintain regular sleep time. Therefore, this helps users maintain their lifestyle. And we maximized the convenience of users by automating the functions of the application.

Role Assignment

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| --- | --- | --- |
| **Roles** | **Name** | **Task description and etc.** |
| User/Customer | Moon Myungkyun | Find out what kind of sleep patterns people who use electronic devices such as TVs and smartphones usually have before going to bed. Investigate what functions people with these lifestyle patterns can use mainly and whether they can help people with insomnia. |
| Development Manager | Yun Haeun | The development manager oversees the overall progress of the project. Prepare minutes and manage the schedule about the progress of the project. It also sets future goals for our team and plays a role in monitoring whether each job is performing well. |
| Software Engineer | Kim Minji | Software developers think about software systems. Investigate the software necessary to implement and think specifically about how to implement it. The best way to connect the application with the speaker-equipped “Stand by me” is to be found. With feedback from the development manager, continuous updates should be made so that it can be software that users can satisfy. |
| Designer | Ko Eunseo | The designer produces our team's logo and icon. 'Figma' will be used to design the overall app UI. In the final stage of manufacturing, 3D modeling and data analysis results reports for electronic devices will also be designed together. |

# **Introduction**

**Motivation**

Bedrooms are said to be the most important space for modern people, including the Mz generation, at home. However, as COVID-19 spreads, irregular life patterns become commonplace due to social isolation, and so-called "Corona Blue" is becoming a problem. Because of this, many people are staying up all night.

Modern people use electronic devices such as smartphones in their bedrooms before going to bed.It is known that the habit of using electronic devices before going to bed interferes with sleep. However, there are many people who can't stop even though they know this. This is because there are many people who can't stop watching their smartphones before going to bed, thinking that it's better to look at their smartphones than tossing and turning while they can't sleep.

People use electronic devices before going to bed, but it usually interferes with sleep. But what about electronic devices that help me sleep, rather than interfere with sleep? In fact, many people recognize the need for a good night's sleep, so they look up videos that help them sleep on YouTube or install and use sleep management apps.

However, smartphones are not suitable for the purpose of sleep management because they have to be held and viewed directly on a small screen. It is also inconvenient to use the smartphone until it gets overheated and then charge it all night again for the next morning.

By improving these points, our team devised Sleep with Me, which utilizes the advantages of LG's mobile TV Stand by Me. "Sleep with me" is an app linked to "Stand by me," which helps people get a comfortable sleep and have regular sleep patterns. In this paper, we will look at the main customer base of "Sleep with me" and the current market status that supports Sleep-tech. Based on this, I will explain the main role of "Sleep with me".

**Intended Audience & Use**

Currently, the customer base of "Stand by me" is mainly composed of MZ generation and newlyweds. In particular, "Stand by me" is a mobile TV, so you can enjoy video content anywhere in the house. In addition, it is cheaper than general TVs, so both primary and secondary pre-orders have been sold out, especially among MZ generation consumers.

In this way, we looked at the needs of the main customer base of "Stand by me," which succeeded in business feasibility. As mentioned in 1.1, we focused on 1) "Stand by me"'s property that can be used until sleep because it is mobile TV, 2) the majority of modern people's main TV viewing time is late at night after work, 3) not only those who are currently suffering from insomnia, but also those who want to be guaranteed regular sleep time even if they sleep well. Therefore, we set the user keyword of "Sleep with me" as "sleep". Since Sleep with me is an app that is linked to Stand by me, which is mainly used at home, end-user will be individuals at home.

**Existing Market**

As ‘sleep-tech’ spreads, various devices and applications for high-quality sleep are being released. By analyzing the advantages and disadvantages of sleep-tech currently provided in the market, we selected the functions to be applied and supplemented in our 'Sleep with me'. Current market trends are as follows.

**a. Device : Non-wearable Technology**

**(1) Representative product**

**⚫ Sleep Sense** : It is a thin and long plate-type device manufactured by Samsung Electronics and Israel's IoT healthcare venture.

**⚪Function**

(i) Recording Sleep Pattern : If you put the device next to the bed, you can analyze the pulse, breathing, and movement that occur during sleep in real time and provide information on your smartphone.

**(2) Advantages**

The device and smartphone are interlocked, making it convenient for users to  use.

**(3) Disadvantages**

If non-wearable devices simply provide functions for 'sleep', the number of users will inevitably be small compared to the price.

**(4) Application to ideas**

‘Sleep with me’ should choose a way to induce sleep without compromising the unique functions of LG Electronics' home appliances.

**b. Device : Wearable Technology**

**(1) Representative product**

**⚫ Smart Sleep HeadBand :** It is a sleep inducing product provided by ‘Philips’.

**⚪ Function**

(i) Sleep induction: When a user wears the device on his or her head, it helps to relieve sleep and tension through white noise.

(ii) Recording Sleep pattern : When linking with the headband application, the user's sleeping time and waking time are identified to manage the living pattern.

**⚫ AMO+** : ‘Amo+’ is a wearable device for sleep that is worn in the form of a necklace.

**⚪ Function**

(i) Frequency control: By applying ultra-fine strength and frequency electromagnetic signals to the human body in a non-contact manner, imbalance in the body is improved to improve sleep quality.

**(2) Advantages**

The wearable device is in the form of being worn or attached to a human body. Therefore, sleep can be measured with high accuracy, but poor wearability can interfere with sleep.

**(3) Disadvantages**

The wearable device is in the form of being worn or attached to a human body. Therefore, poor wearability can interfere with sleep.

**(4) Application to ideas**

The "Sleep with me" we will propose should pursue accuracy and think of a way that does not interfere with human sleep as much as possible.

**c. App ( Apple Store, the user rating >= 4.3 && the number of users >  100,000)**

**(1) Representative product**

**⚫  ‘Calm’** : ‘Calm' is an app that helps meditation and sleep.

**⚪ Function**

(i) ‘Sleep Story’ menu: You can induce sleep by listening to the stories you want (the stories of celebrities, fairy tales, etc.) along with the sounds of nature (rainy sounds, forest sounds, waterfall sounds, etc.). You can set as much time as you want with a timer.

(ii) ‘Meditation’ menu: The app provides a meditation guide for mental and physical stability.

(iii) ‘Music’ menu: You can choose music by theme, such as sleep, rest, and concentration.

**(2) Advantages**

The app is convenient to use because it has a lower price barrier than the device. It is convenient to use because it is a non-contact method.

**(3) Disadvantages**

Since the app is used in mobile phones, the user must hold the mobile phone himself to watch the video in the application, and the user can feel frustrated with a small screen. In addition, you may feel uncomfortable such as heat generation or battery consumption due to the fact that you charge it all night and use it all day the next day.

**(4) Application to ideas**

Our idea is to set the main device as a TV, not a mobile phone. In addition, based on the fact that CalmApp provides various contents, we intend to provide various sleep-inducing contents in the apps we will provide.

**Goal**

**a. It presents ideas using TV, the most commonly used LG home appliance just before going to bed.**

Most people fall asleep watching TV. Focusing on this point, we would like to propose ‘Sleep with Me’, which can help induce sleep and identify sleep patterns on TV without using wearable devices to prevent disturbance to sleep.

**b. It is intended to identify the user's sleep pattern by identifying the starting and ending points of the sleep time before bedtime.**

It provides a UI that allows users to check their sleep patterns through ‘Sleep with me’, collect data, and easily check the data so that they can regularly manage and grasp their sleep patterns.

**c. The function is automatically terminated during sleep time so that 'Sleep with me' does not interfere with sleep.**

If the TV monitor is operated while users are sleeping, it may interfere with sleep. Therefore, after being counted as the sleep start time, I would like to propose an automatic turn-off mode that can be automatically turned off without the user turning off the TV or setting the time himself.

**d. Taking advantage of TV's advantages, AI technology and IoT are utilized using monitor screens and sounds.**

‘Sleep with me’ supports personalized video services that can induce sleep and enables language commands through natural language recognition. In addition, when linking with a mobile phone application through an IoT function, it provides convenience to enable alarm service and mode setting on a mobile phone.

# **REQUIREMENT ANALYSIS**

## Profile

Due to the characteristics of home appliances, one device may have multiple users, so it is possible to create a personal profile that can use their own settings. The information you need to enter when creating a profile is the profile name, age, gender, desired sleep time, and preferred category. The created profile can be checked on the profile page where all profiles are gathered, and can be freely deleted. In the initial state where no user has created a profile, they are logged in with the default profile. In the case of a multi-person household, you can create a new profile and change the profile.

## Sleep mode

When the user presses the “Sleep Mode” button (or speaks through the speaker) as a trigger, the sleep mode is activated. When sleep mode is active, a translucent moon-shaped mark appears in the upper left corner so that you can check it. Most of the functions to be described later operate on the premise that sleep mode is activated.

## Recommend and play videos that are good for sleeping

"Sleep with me" recommends a list of videos to help you fall asleep by encouraging the user to press the "sleep video" button or speak through the speaker. A user can select a category of videos, and when a desired video is selected among them, a playlist related to the video is automatically created. If you do not like the video while watching, you can move to the next video by pressing the 'next video' button (or speaking through the speaker) as a trigger, and the list of videos the user watched until the end is recorded. By using this history to train your application, you can generate a highly accurate list of recommended videos. If the user wants to continue watching the desired video, this function does not work. For example, if the user wants to watch a movie or media transmitted from a platform other than Sleep Custom Videos, the sleep mode will remain and the video recommendation will not work.

## Exit stand by me screen and record bedtime

From the time the sleep mode is activated, a pop-up window appears at the top every 20 minutes. The pop-up window contains the text ‘Are you still awake?’ and an ‘OK’ button. The user can dismiss the pop-up window in two ways before the next pop-up window appears. The first way is to click the ‘OK’ button. The second method is a method in which the pop-up window disappears when the user's voice is recognized through the speaker. If the next pop-up window appears while the pop-up window already exists, it is assumed that the user is sleeping. The time when the user's sleep is confirmed is recorded as the bedtime, the video played in "Stand by me" ends, and the screen is turned off.

## Customized sleep time alarm

The user sets his or her sleeping time through the app in advance. It is based on manually setting an individual's optimal sleep time, but in the setting process, “Stand by me” recommends optimal sleep time according to gender and age to encourage users to be guaranteed optimal sleep time. When the sleep time is set, the time to wake up from the time when the user's bedtime time is recorded is automatically calculated to make the alarm sound in “Stand by me”. When the alarm goes off, two buttons appear on standby: a button to end the alarm and a button containing the meaning that the user has woken up. When the alarm end button is pressed, the sleep time alarm function of Standby Me is terminated as it is. When the wake-up button is pressed, the alarm function is terminated, and the wake-up time of the user is recorded to store the sleep time of the user.

## Sleeping pattern GUI provided

“Stand by me” provides a GUI that allows you to see at a glance whether the desired sleep time has been reached on a daily, weekly, monthly, or yearly basis through the user's stored sleep record data. It helps users intuitively know their sleep patterns by marking them green on the day they reach the optimal sleep time they set, red on the day they do not reach, and gray on the day they do not use “Stand by me” ‘s sleep mode. If you press the moon-shaped translucent mark when activating the sleep mode, you can see the user's sleep pattern GUI at any time.