SLEEPING TRACK APP FOR BETTER NIGHT'S REST

Team Members

M.Akshaya Kamali

20203271401207(Team leader)

S.Aksha	*20203271401206*
P.Archana	*20203271401208*
F.Arockia Salet Misma	*20203271401210*

Under the guidance of

Mrs.P.S.Sujatha,M.Sc,M.C.A.,M.Phil(Phy.).,M.Phil(C.S) **Assistant Professor**

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1 INTRODUCTION

Sleep is an important restorative process for both mind and body. While the body is mostly inactive during sleep, the brain goes through several stages of activity, believed to be a way of consolidating memories.

How many hours of sleep a person needs varies, with age being one crucial factor. The U.S. National Sleep Foundation recommends seven to nine hours a night for adults, but six to ten "may be appropriate". For school-aged children (age 6 to 13), the recommendation is from nine to eleven hours. Numbers from the Norwegian Institute for Public Health indicate that Norwegian men sleep for slightly less than seven hours on average, while women sleep more than seven hours on average.

A lack of sleep has been shown to negatively influence short term memory and the ability to learn. Purely physically, recovery from exercise is also affected. Even slightly reduced sleep – less than 7 hours – over several days may have ill effects, including higher instances of illness.

The Norwegian Institute of Public Health writes that one in three adults have weekly symptoms of insomnia. From 2000 to 2010, the percentage of adults with insomnia in Norway has gone from 11.9% to 15%, showing that it is an increasing problem. This report also notes that especially adolescents sleep less than recommended, getting only 6 hours and 25 minutes on weekdays.

1.1 Overview

Sleep Cycle is a top-rated sleep tracker app that helps you get better rest and improve your overall sleep quality. The app uses your phone's accelerometer to track your sleep patterns throughout the night, providing detailed insights into your sleep quality including sleep phases and wake-up times. **Sleep** tracking is the process of monitoring a person's sleep most commonly through measuring inactivity and movement.

A device that tracks a person's sleep is called a sleep tracker. Devices capable of tracking a person's sleep include dedicated sleep trackers, trackers that clip onto a person's pillow, smartphones, fitness trackers, smartwatches and other wearable devices.Some sleep trackers are capable of tracking the stages of a person's sleep, the length/duration of a person's sleep, the quality of a person's sleep, and the consistency of a person's sleep. Some sleep trackers offer other features, such as "sleep scores" that rank how well a person slept, "smart alarms" that wake a person up within a set period of time based on the circumstances of the person's sleep, and the ability to track the amount of light and/or the temperature in the person's bedroom.

UseSleep Cycle**,** an intelligent sleep-tracking app with a built-in alarm clock that helps you to relax, sleep better and track your sleep routine. You will also get a detailed analysis of your sleep cycle to monitor your sleeping pattern from bedtime until you wake up which later can be used to improve your sleeping Get sleep-related trends along with weekly and monthly data stats to improve sleeping quality.

1.2 Purpose

- Get sleep-related trends along with weekly and monthly data starts to improve sleeping quality.

- Records the snoring and grinding sounds you make during sleeping and allows you to listen to them later on.

- Consider your drinking, eating, exercising and any other medical or emotional conditions and illustrates its impact on your sleep.

2 PROBLEM DEFINITION & DESIGN THINKING

2.1 Empathy map

The traditional empathy map begins with four categories: says, thinks, does, and feels. At the center of the map, a user or persona is displayed to remind practitioners and stakeholders what type of individual this research is centered around. Each category of the empathy map represents a snapshot of the user's thoughts and feelings without any chronological order.

- **Says** category contains what the user says out loud during research or testing. Ideally, each point is written down as close to the user's original words as possible.
- **Thinks** category contains what the user is thinking. While content may overlap with the *Says* category, Thinks category exists to capture thoughts users may not want to share willing due to social factors, such as self-consciousness or politeness.
- **Does** category contains the user's action and behaviors. This contains what the user is physically doing and captures what actions users are taking.
- **Feels** category contains the user's emotional state in context with their experience. This typically contains information or phrases as to how they feel about the experience.

Empathy maps could vary in forms, but they have common core elements.[3] Other than the four traditional categories mentioned above, empathy map could also include other categories. Here are two other categories commonly used:

- **See** category contains information users observed through eyes. It could be what users see in the marketplace or in the immediate environment, other people's saying and doing, or the content they watch or read.

- **Hear** category is what user hears and how that impacts the user. It could be personal connections as well as other recourses such as media. Instead of documenting superficial information streams, team should focus on details that influence the user.

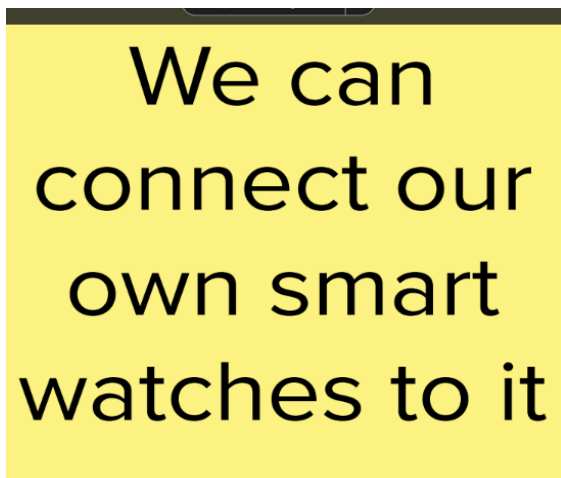The following image is the empathy map for sleeping track for better night'srest
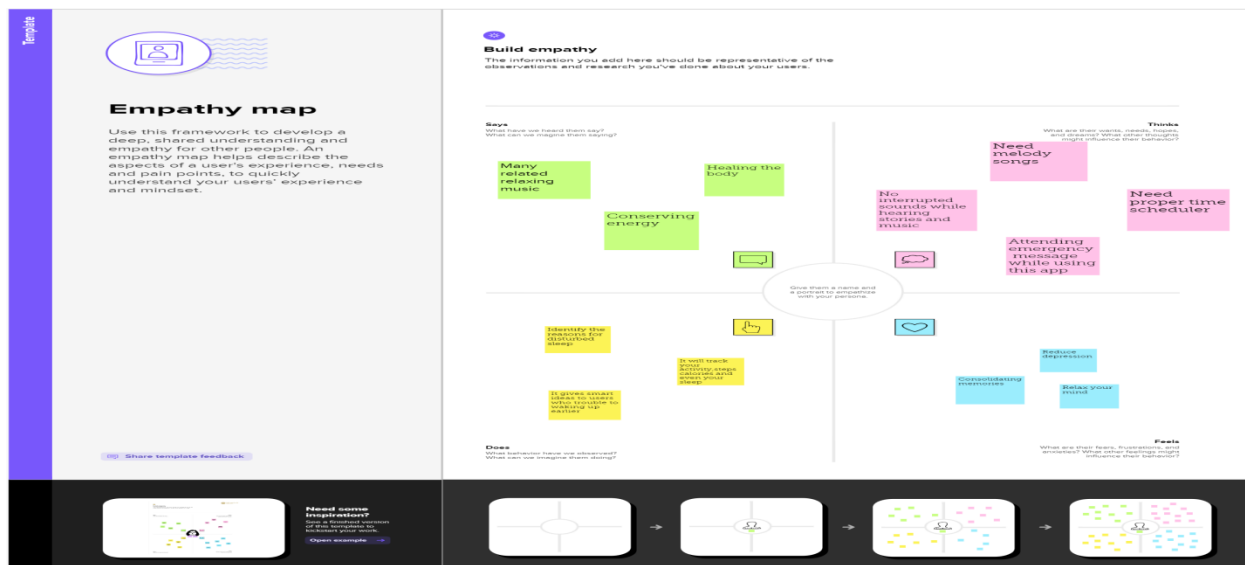
2.2 Ideation & Brainstorming Map

Brainstorming is a group creative techniqueby which efforts are made to find a conclusion for a specific problem by gathering a list of ideas spontaneously contributed by its members.
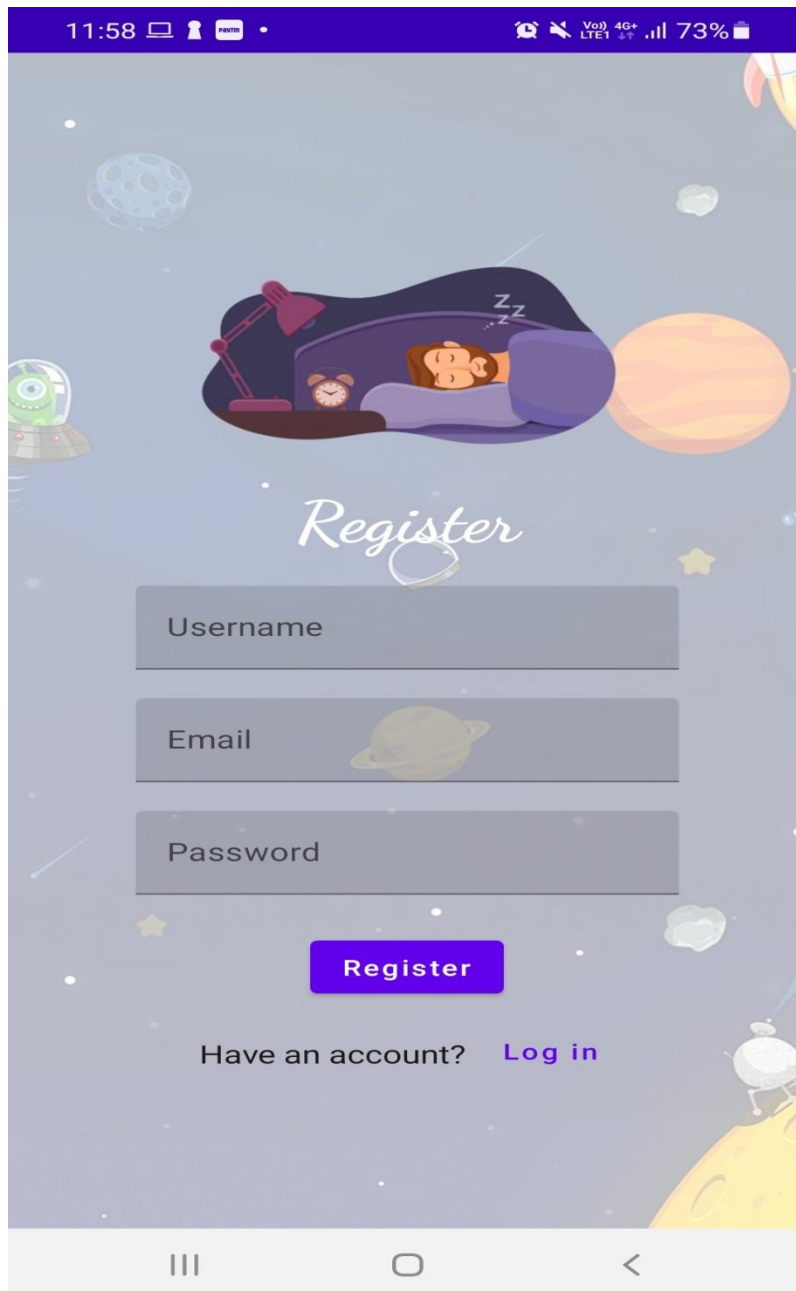
In other words, brainstorming is a situation where a group of people meet to generate new ideas and solutions around a specific domain of interest by removing inhibitions. People are able to think more freely and they suggest as many spontaneous new ideas as possible. All the ideas are noted down without criticism and after the brainstorming session the ideas are evaluated.

The following image is the brainstorming map created by our team

We can connect our own smart watches to it

3 RESULT

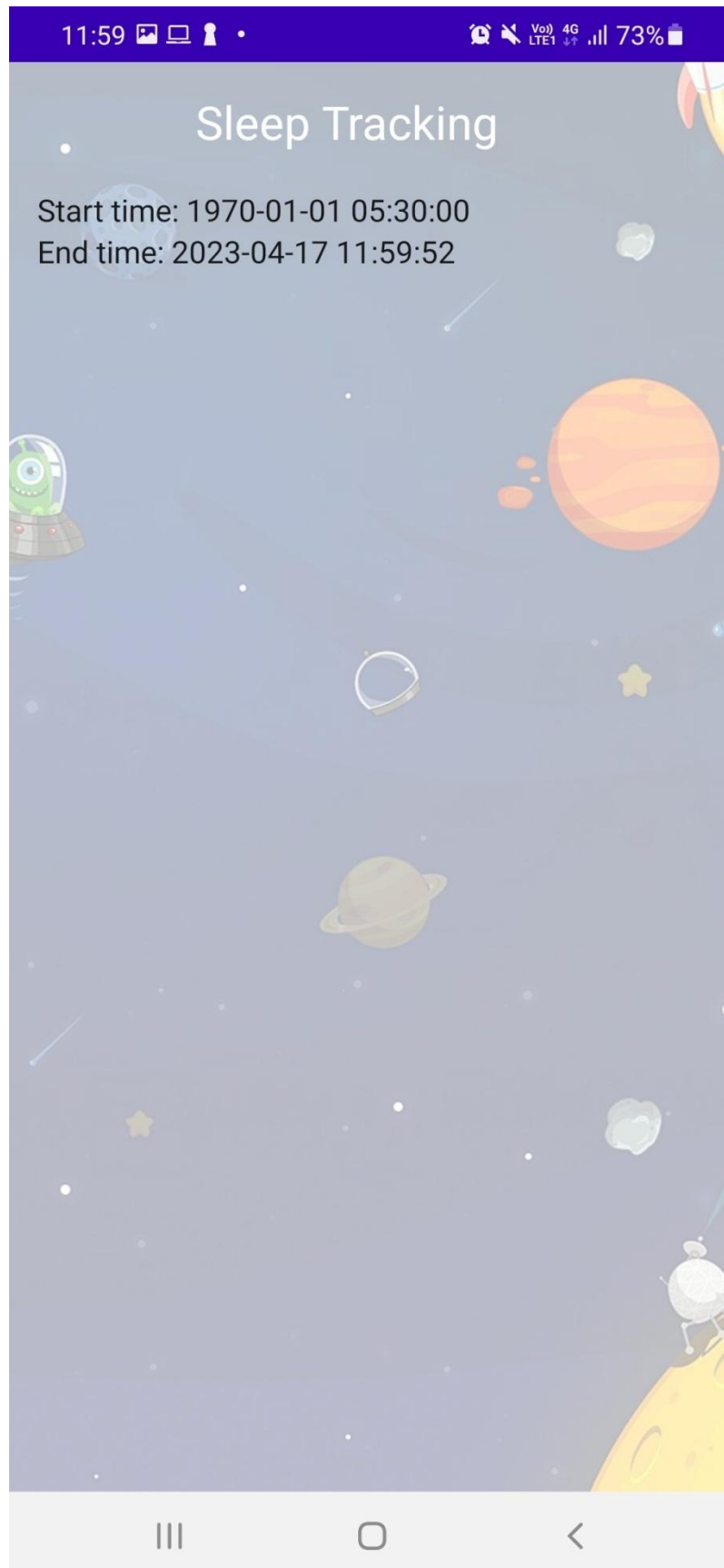## Sign up

Login page

4 ADVANTAGES & DISADVANTAGES

Advantages

- **Sleep Trackers promote increased awareness**

  There are several apps and wearables that can help you monitor your sleep, and these sleep trackers offer an invaluable benefit: heightened awareness. By diligently monitoring your sleep, these devices empower you to better understand your nocturnal habits.

  As a result, they can encourage you to prioritize and adopt improved sleep hygiene practices. In essence, sleep trackers serve as a tool for enhancing your relationship with slumber, transforming it from a mere unconscious activity to a deliberate, well-informed pursuit, like any other aspect of your health and well-being.

- **Sleep Trackers can help you identify sleep issues**

  Sleep trackers can prove to be incredibly insightful when it comes to detecting potential sleep issues. By closely monitoring your nightly rest, you can identify irregularities, such as sleep apnea or insomnia, which may have gone unnoticed otherwise.

  By shedding light on such issues, sleep trackers may be the factor that finally leads you to seek professional help, ultimately paving the way for a more restful, rejuvenating slumber and a higher quality of life all around.

- **Sleep Trackers offer long-term sleep trends and analysis**

Knowledge is power, and when it comes to sleep, long-term data can be truly illuminating. Sleep trackers are designed to collect and analyze information over extended periods. They help you monitor trends and observe the effectiveness of interventions, like waking up consistently at the same time every day, reading a book before bed, or screening off two hours before bedtime.

Disadvantages

- **Sleep Trackers may not be entirely inaccurate**

  In the realm of sleep trackers, accuracy can be a hot topic since not all devices and apps are created equal, leading to varying degrees of precision. Of course, if your sleep tracker is inaccurate, that means the information you collect might cause you to make assumptions about your sleep habits that may not hold.

- **Sleep Trackers place an overemphasis on qualification**

  In the pursuit of better sleep, you may become overly fixated on numbers and metrics, inadvertently neglecting to listen to your body and address the underlying issues affecting your sleep.

  This number-centric mindset can lead to over-analysis and anxiety surrounding sleep data, creating a counterproductive cycle where your search for sleep perfection disrupts the relaxation needed for a good night's rest.

- **Sleep Trackers may introduce privacy concerns**

Consider reviewing the manufacturer's or developer's privacy policy and data-handling practices. Understand how your data is collected, stored, and potentially shared with third parties. The last thing you should want is concerns about how your private information is being used affecting your ability to get a restful slumber.

5 APPLICATION

The best sleep tracker apps use input such as sound, heart rate, bedtime, or wake time to give you an accurate picture of your night. Many apps use data from wearable devices such as an Apple Watch to provide you with a sleep score and create graphs that show changes over time. Some apps allow you to export your data so you can share it with your healthcare professional to get assistance with your sleep issues. We looked at several sleep tracker apps to find the best ones to help you identify issues and improve your sleep quality.

Sleep tracking can be simply described as the act of keeping track of sleep. For medical treatments, sleep diaries have been used to measure the length of sleep, subjective sleep quality and potential disruptors of sleep. Traditionally this was done using pen and paper, but more recently sleep tracking has become a selling point of wearable devices and smartphone applications.

Wearable sleep tracking systems, as part of medical treatments of sleep disorders, has also shown promise. Wearable sleep trackers use sensors to measure sleep so that the user does not have to remember when they went to bed, and when wake up. Some also attempt to measure 14 sleep quality, showing the user how much time they spend in different sleep stages.

Smartphone sleep tracking system does also exist, often requiring the user to place their phone in or near their bed. These systems usually rely on the accelerometer or microphone of a smartphone. A regular feature of a smartphone system is the "smart alarm", that attempts to wake the user up when their sleep is lighter. There are also applications that more closely mimics the traditional sleep diary, as will be described in the next section.

6 CONCLUSION

This chapter will conclude the thesis by answering the research questions that were established in the introduction. Further, it will identify future research and development opportunities.

How users interact with sleep tracking systems

In the survey, there were both users of wearable sleep tracking systems and smartphone systems. While they were almost even in terms of the number of users (18 vs 17), the demographic was quite different. Smartphone systems were primarily used by the youngest demographic (18-24), while users of wearable systems tended to be older. This is an indication that smartphone sleep tracking systems may appeal more to a younger demographic. The survey also showed that many interact with their sleep data on close to a daily basis. There is also a substantial group that do this weekly. The interviews showed similar tendencies and gave the impression that those who check less often are more interested in evaluating trends. Sleep tracking systems should attempt to cater to both sets of users by providing interfaces that fit their needs. The interviews suggest that users of sleep tracking systems often interact with their data in the morning. Designers of sleep tracking systems should keep this in mind when considering to add features that require the user to interact at different times of day.

User motivations for using sleep tracking systems

From the interviews, three groups of users stood out. Many were goal driven and wanted to improve their sleep or fitness. Some focused on reaching a total amount of sleep, while others had goals related to sleep quality. Other users were health driven. These users used their sleep tracking system as a measurement of their

health. One interviewed user had changed medications based on their sleep data. Technology driven users were motivated by the technology itself and did not have any set goals. Additionally, the survey showed one substantial user group: those that gave "smart alarm" as a reason for using a sleep tracker. 12 of 36 sleep tracking users gave this as a reason, which is considerable. As this is mainly a feature of smartphone systems it may be wise for developers of wearable systems to include this feature.

Necessary functions of sleep tracking systems

The survey asked participants to rate the importance of different features of sleep tracking systems. Features such as 69 "automatic tracking" and "show time spent in sleep stages" were highly rated. "Reminder to go to bed" was rated the lowest. This was also the case when the sample was divided by sleep tracking use, but this also showed that sleep tracking users rated certain functions higher. "Alarm function" and "ability to enter additional data" did better with the sleep trackers, but "sleep score" and "advice" did worse. It could be that users of sleep tracking have seen these functions already and did not enjoy them.

From the interviews, it became clear that users used both the daily view and longer-term views. They used a daily view to study sleep quality and awakenings. The longer-term view they would use to make comparisons, either by periods of time or with other data such as exercise and diet. Supporting such comparisons should be considered a necessary feature. The prototype currently supports comparing time spent sleeping with a subjective rating. The survey showed that exercise and diet tracking was common among sleep trackers, and as they both can influence sleep they may be integrated into such a comparison.

Some current systems do give some advice, specifically Fitbit with their "sleep insights". Fitbit users that were interviewed did not feel that they were that personalised. Users were unsure of why they got the advice they got, and they felt that it was too generic. One user was not sure why the system told him to get a new pillow and thought it was product placement. Nevertheless, they all agreed that a more suitable version of this would be a useful feature. The prototype shows how such advice could be displayed, although the proper algorithms have to be developed in order to generate interesting advice.

The wireframe evaluations showed that the participants favoured more straightforward input methods, but did not want them to be too simple. This suggests that they too see the value of capturing more data. In the "feedback" interface, user preference was towards the interface that included a sleep score. This could mean that a sleep score is preferred to text-based advice, which was one component of the other wireframes. The current prototype includes both, and could be modified in order to test this hypothesis.

How sleep tracking systems can better support healthy sleep behaviour

 The medical research shows that consistency, both in the amount of sleep and timing of sleep, is an essential factor of healthy sleep. Current systems may reward quantity and quality of sleep, but rewarding the consistency of sleep timing has not been done. In the prototype developed, this was done by including consistency as a factor of a total sleep score. Interviews showed that users want personalised advice. It also showed that such advice should include explanations for why it is given, and why it can help the user in the given situation. It should not be too generic and also be something that the user can realistically do. Sleep tracking systems should attempt to provide learning experiences, perhaps via ad70 vice or

by including a learning module. Concepts such as chronotypes and social jetlag can be used. Previous research has shown that many users have different views on sleep than does medical science, which was also an impression given by the interviews. For the technology of sleep tracking to reach its potential of helping users sleep better, more user education is needed.

7 FUTURE SCOPE

The Global Sleep Apps and Sleep Tracking Apps market is anticipated to rise at a considerable rate during the forecast period, **between 2022 and 2029**. In 2021, the market is growing at a steady rate and with the rising adoption of strategies by key players, the market is expected to rise over the projected horizon.

In order to assess the performance of the prototype, it should be user tested. This can be done both quantitatively and qualitatively. As with the wireframe evaluations, it could be compared to other sleep tracking systems using the SUS questionnaire, which may be better suited to functional prototypes. Task-oriented experiments are another possibility. Qualitative research such as observational studies, diary studies and case studies can also be used to gain user opinions regarding the functionality of the prototype. These methods can be combined with additional interviews and surveys in order to get more information on the user experience.

8 APPENDIX

Source Code

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```xml
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23

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</project>
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