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Sleep Well: Mobile Application to Address Sleeping Problems

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ABSTRACT

Background: Sleeping issues are associated with sleeping disorder whereby the user is having a problem to sleep and to remain sleeping.

Problem: Anxiety, depression, and stress are among the identified factors which lead to a sleeping problem.

Purpose: This paper presents a proposed system, "Sleep Well," which is a mobile application to overcome sleeping problems. The questionnaires which were distributed to 80 people via google form has revealed the need to have an application for this purpose.

Outline: The first section of this paper is an introduction and followed by a literature review. Next is data collection and continued by findings and data analysis. Finally, the paper concludes by making some recommendations.

Key Words: Applications, Mobile, Sleeping, Insomnia, Sleep Well, User Acceptance Testing

INTRODUCTION

Insomnia is a sleeping disorder problem by many people in the world. Insomnia is known as having difficulty falling asleep or staying asleep. This condition can be within a short term or can last long. Insomnia causes many different problems physically and mentally, for example, tiredness, depression, anxiety, and many more. Insomnia is triggered by pain, health conditions, lifestyle, and medication. Research in the United States shows that 30-40% of adults have symptoms of insomnia within a year¹. This project aims to propose mobile application applications known as 'SleepWell' to address the sleeping problems. Some of the advantages of the proposed system include: solving the sleeping problem, encourage better sleeping habits, and improve user health.

Literature Review

Insomnia impacts a person physically and mentally, and it could be caused by many different factors, for example, medical issues like chronic pain, low back pain, allergies, and different medical issues or mental illness like depression,

anxiety, or panic attacks². There are many different methods of overcoming insomnia, such as limiting naps, eliminating alcohol, caffeine consumptions, and many more³.

According to research and studies by the American Academy of Sleep Medicine (AASM), college students maximize their performance on final exams through study and a good night of sleep⁴. The studies show that students that are getting enough amounts of sleep performed better than the students that deprived of sleep. Their recent studies pointed out some other interesting facts which are: students who had a poor sleep or bad sleeping habits (sleeping late) affect their academic performance and daytime functioning, and students who have sleeping problems also have more mental health problems compared to the ones that don't.

This shows that how much sleep benefits a person's daily performance. There are many mechanisms to address the sleeping problem. Firstly, relaxation exercises or techniques for better sleep. Generally, people who are having sleeping problems have their mind racing or preoccupied, which makes it difficult to sleep. An interesting fact has revealed

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that students who have listened to music 45 minutes before going to bed had a good sleeping quality⁵. Furthermore, having an alarm and tracker is advisable for quality sleep. An alarm tracker helps to keep track of the amount of sleep the person should be getting and how to plan their routine better.

From the literature, there are three (3) commonly used applications to keep track of sleeping habits. These applications include Sleep Cycle, White Noise Lite, and SleepTime. Table 1 explains the characteristics of each of the applications.

Table 1: Applications Description

Similar Systems	Description
<p>Sleep Cycle: Sleep Analysis & Smart Alarm Clock</p>	<p>Alarm Clock which wakes users during light sleep</p> <p>Tracks users sleeping patterns</p> <p>Uses users sleep data and generates a report</p> <p>Analyze the user's data, light sleep, deep sleep, and overall health</p> <p>On the iOS App Store and Android Play Store</p>
<p>White Noise Lite</p>	<p>Music Player playing ambient sounds of the environment such as light rain</p> <p>Calms the users with their music and attempts to relax and reduces the user's stress</p> <p>On the iOS App Store and Android Play Store</p>
<p>Sleep Time: Sleep Cycle Smart Alarm Clock Tracker</p>	<p>Set alarm clock and chooses soothing & peaceful alarm sounds</p> <p>Tracks sleep score and analyze the duration of sleep</p> <p>Tracks the sleep trends to let users better understand when they should sleep</p> <p>On the iOS App Store and Android Play Store</p>

From the review, it is evident that many factors lead to sleeping problems. Therefore, this research proposes a system which aims to address bad sleeping habit and thus offers more features as compared to the existing system in the market.

RESEARCH METHODS

This research used a quantitative method, and the instrument utilized was questionnaires. One hundred questionnaires were distributed, and 80 questionnaires were collected. Respondents are selected based on several criteria which are:

age between 18 years old and above, from Malaysia and having the sleeping problem. Google Forms were used as a platform due to its advantages in questionnaire distribution and provide quick summary analysis and charts. The main purpose of the questionnaire is to understand what triggers people to have sleeping problems and to probe further the requirement from the user for the proposed application.

Data Analysis

Figure 1: Respondents Gender.

Based on the data collection, several findings will be reported in the remainder of the paper. Fig. 1 illustrates the majority of the respondents are male. Fig. 2 displays the respondent's age, while Fig. 3 shows the respondent's occupation. Based on these figures, it can be summarized that the majority of the respondents (71.3%) are above 21 years old, and the nature of their occupation vary including student executive, banker, manager, and human resources and administration.

Figure 2: Respondents Age.

Figure 3: Respondents Occupation.

Figure 4 Illustrates the activity or action that leads to a sleeping problem. Most of the respondents (68.8%) answered that they have difficulty in sleeping due to work or study-related. Fig.5. illustrates the majority of the respondents (78.8%) having sleeping problems from 12 am to 4 am. This indicates that the respondents are awake during the time they are supposed to sleep.

Figure 4: Activity or action that leads to a sleeping problem.

Figure 5: Respondents Stay up Time.

Figure 6 shows the technique respondents used to overcome their sleeping problems. Results indicate that most of them would practice early sleeping times, eating certain food or beverages, or sleeping exercises to address or overcome sleeping problems. Therefore, an app which emphasizes relaxation exercises, and sleep tracker is crucial to overcome the sleeping problem.

Figure 6: Methods to overcome the sleeping problem.

Fig.7. Illustrates that most (43.8%) of the respondents think that having different types of sleeping exercises helps to overcome sleeping problems while Fig.8. shows the result of the respondent's opinion in having calming music to address their sleeping problem. It can be denoted that the majority of the respondents (67.5%) agree on the needs of calming music. Therefore, the proposed system will integrate multiple features of sleeping exercises.

Figure 7: User opinion on sleeping exercises.

Figure 8: User opinion on calming music.

Proposed System: Sleep Well

The proposed system, known as Sleep Well, has been divided into four features which are Music Player, Alarm Clock, Sleeping Exercises, and Sleep Tracker. The first feature is a Music Player. As mentioned previously, music helps a person calms their minds, and people fall asleep easily. The second feature is the Alarm Clock. The Alarm Clock comprises a time picker that allows the users to set a time for the reminder to wake up. When it reaches the pre-set time, the device will pop-up notification and play a ringtone to wake the user up. The function also comes along with the ability to cancel the alarm and set a new one if needed.

The third feature is Sleeping Exercises, which focuses on teaching different exercise methods to help the user fall asleep easier. This feature will assist the user via clear instructions on how to do the exercise. The last feature is Sleep Tracker to monitor the user's sleeping habits and saves a record of their sleep. This is to help the users to keep track and modify their sleeping habit records. Fig. 9. illustrates the main menu in Sleep Well, which consists of four (4) main features, as stated before. Fig.10. demonstrates the Music player interface, which allows the users to play or pause the music.

Figure 9: Main Menu in Sleep Well.

Figure 10: Music Player.

Figure 11: shows the Alarm Clock Function, which allows users to set or cancel an alarm. The alarm is set using a time picker and notifies the user if the alarm is activated. Fig. 12. Illustrates the interface for Sleeping Exercises, which displays all the different exercise methods to help people for better sleep. Fig. 13. Demonstrates the Sleep Tracker interface where the users can track their sleeping habits by saving the data into the database.

Figure 11: Alarm Clock.

Figure 12: Sleeping Exercises.

Figure 13: Sleep Tracker.

The proposed system has been validated via Unit Testing and User Acceptance Testing (UAT) with three (3) users. Results from Unit Testing indicates that all the outcome are well-functioning without having any major issues. Furthermore, some of the comments from UAT testing has revealed that Sleep well application is the ease of use with simplified navigation.

CONCLUSION

To summarize, this paper has highlighted the motivations, which lead to the development of the proposed system known as “Sleep Well”. Although there is other software in the market which helps to address the sleeping problem, some of the existing functionality requires further improvement. The main aim of this paper is to investigate the factors

that lead to the individual sleeping problem and propose an application to overcome the challenges.

Sleep Well is a system carefully designed to improve the currently existing system in the market. Sleep Well was developed by taking into account user requirements. It is evident that from the data collection and analysis stage, there is a crucial need to have a system to overcome the sleeping problem. Sleep Well was validated through Unit Testing and User Acceptance Testing (UAT). The users accepted the system without any major issues.

For future work, the system can be improved by adding more functionality, more specialized to the target group for example students or workers, a real-time tracker to identify the sleeping habit among the individuals and integrating the app with the latest technology and innovation.

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Conflict of Interest

The authors involved in the current study does not declare any competing conflict of interest.

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