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# Analysis of design requirements based on the components of healthy sleep APP products

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***Abstract:*** *With the progress of society and technology, people are paying more and more attention to sleep health issues. The APP are one of the methods widely used by people today. The design study of healthy sleep product APP has great significance today. Through analysis of the current state of sleep, user research, the functionality of hardware, and software sleep products. This research based on the user motivation, ability to use and environment of sleep products. Guiding and enabling user to perceive changes in their own sleep quality. Reducing visual distractions, enhancing user stickiness, improving perception and emotionality. According to the subjective and objective conditions of the use environment, a design method is proposed to balance the emphasis and weakness of visual design.*

***Keywords:*** *Sleep products, APP, Sleep quality, Design, Healthy*

## 1. Sleep status and related user research

Sleep occupies nearly one third of all human life. Healthy sleep is an important factor for a person to keep healthy, while insomnia is one of the most common factors affecting people's sleep health. According to the research, 60% of the middle-aged and elderly people over 45 years old in China have been troubled by bad sleep for a long time[1] . In a series of academic lectures on the 60th anniversary of the founding of the Second Xiangya Hospital in 2018, academician Lu Lin of the Sixth Hospital of Peking University proposed that sleep problems will cause and exacerbate depression in the elderly, sleep disorders will increase the risk of dementia. At the same time, the middle-aged and elderly people also have more energy and time to improve their own lifestyle, which greatly increase the possibility of sleep health. In today's mobile intelligence, the combined APP of sleep software and hardware products can meet the needs of user.

With the aging development of societies in many countries, the health of middle-aged and elderly groups directly affects the overall quality of people. Therefore, the design of sleep health products for middle-aged and elderly groups is more in line with the development of this era.

## 2. Research on sleep intelligent hardware and related products APP

### *2.1 Relationship between sleep intelligent hardware and related product APP*

At present, intelligent hardware devices for sleep are mainly divided into two categories[2]. One category is smart home devices, mainly including smart mattresses, smart pillows, smart desk lamps, etc., which use intelligent systems to adjust the sleep environment to directly improve the sleep quality of users. The other is smart wearable devices, mainly to monitor the health information of user’s sleep[3]. At present, there are many smart bracelets, smart watches, etc. On the market, many products use Wi-Fi, Bluetooth and other technologies to connect with smart devices, such as mobile phones and computers[4].

Most intelligent hardware devices will be equipped with a corresponding mobile APP. The sleep product APP, as a bridge between user and intelligent hardware devices, plays a crucial role in the user experience of the entire product by its information transmission and interaction effects[5].

### *2.2 Intelligent hardware equipment provides technical support for interface data information design*

The healthy sleep intelligent hardware device provides more professional and accurate data information for the sleep product APP through the generation of user sleep information. At present, the processing of user data information by intelligent devices is shown in Figure 1, which can be summarized

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into three stages: data collection, data analysis, and data feedback.

During data collection, the intelligent device collects the user respiratory rate, heart rate, body temperature and other physiological information. At the same time, the intelligent device collects the surrounding sound, light, humidity and other objective environmental information through sensors, chips and other technical means[6].

In the data analysis stage, intelligent devices mainly transmit data information to data integration platforms through LAN, Bluetooth, infrared and other network connection methods. Some was got by apple's Health Kit mobile medical platform, Microsoft's health cloud platform[7]. Then to store and share information, convert original data information into effective data information, and more specifically extract information, so that users can get effective guidance[8].

The data feedback stage is divided into direct feedback and indirect feedback according to whether the equipment needs third-party APP[9]. Direct feedback means that the analysis results of the data are directly reflected on the intelligent device, such as the light of the intelligent lamp is dimmed.

Indirect feedback needs to present the data information results on the corresponding APP or software interface[10]. It needs to effectively and reasonably visualize the shape, color, interaction, dynamic and other visual elements of the data information, so that users can easily and efficiently perceive the current information state. The user can use the APP to control and adjust hardware devices according to subjective needs.

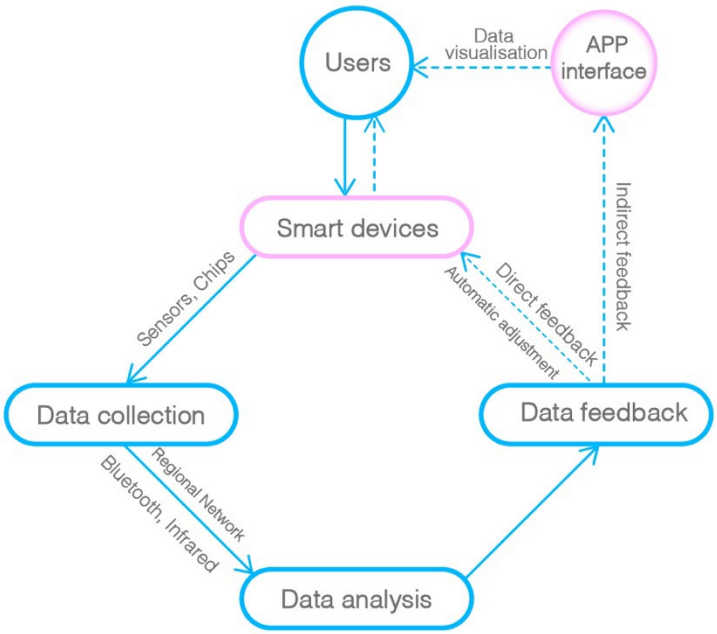


*Figure 1: Processing process of user data information*

### *2.3 Data information processing*

The data information is finally presented on the APP interface in the form of visualization, which is communicated to user to achieve the self "health quantification"[11]. People use data information to know themselves more scientifically and change themselves, which is the development trend in the era of "big data". The data fed back by the intelligent device to the APP is the source of information for user to contact [12]. After professional analysis, designers can make visual design based on this information for user to understand. If user can interpret high-quality data information and obtain effective information, it will greatly improve the health.

## 3. Analysis of the design points of sleep APP products for target users

### *3.1 Analysis of user's motivation and demand for using sleep product APP*

Motivation is the motivation and maintenance of a certain behavior by facilitating the user to achieve

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a goal. Generally, starting from the psychological cognitive level, according to research, user motivation to use sleep APP is mainly to understand their own sleep status, and ultimately improve sleep to improve health quality, which reflects user health beliefs.

When users start to use the product, they need to be motivated to increase user viscosity, so that user can feel that taking certain actions can improve their sleep. In the part of improving user sleep behavior, according to scientific methods, they should integrate audio visual and other multi-sensory participation, and use sleep aided design to guide user behavior. In the user's cognition of the improvement effect, on the one hand, the user subjective feelings are required. On the other hand, the user should be guided to interpret whether his/her health has changed according to the objective visual information. Therefore, the information that can reflect the sleep quality should be displayed to the user. So that the user can judge the effectiveness of the behavior through the change of the information. After user have recognized the effectiveness of their behaviors and observed good results for a period of time, their credibility will also increase, and they will believe that continuous use can achieve the expected results.

As the medium of communication between products and user, the interface needs to guide visual information on the one hand to help user operate and improve their sleep behavior. On the other hand, data analysis information is needed to enable user to clearly understand their own sleep status and development trend.

### *3.2 Analysis of user's ability to use sleep product APP and key design points*

The user ability to use sleep products can be divided into physiological ability and behavioral ability. The physiological ability is mainly reflected in the user vision based sensory ability and cognitive learning ability. The behavioral ability mainly refers to the frequency and proficiency use of sleep products. With the growth of age, the physical function of middle-aged people began to decline, and the visual impairment of middle-aged and elderly people gradually increased. According to scientific research, people began to have dizziness around the age of 45. They prefer characters with large font size. However, the design of many APP is more preferred by young people. The text on the interface is too small, making it difficult for middle-aged and elderly people to read. In fact, increasing the font size and spacing within a certain range can improve the reading efficiency, comfort and memory of older users and young user at the same time. The large font size has a higher impact on the efficiency of older people. The middle-aged and old people interpretation and cognition of health data interfaces will be more likely to cause some obstacles:

(1) Health data itself is huge, complex and highly professional. When it is understood by non-professionals, the cognitive cost is often increased;

(2) Due to the irreversible physiological factors, the memory and learning ability of middle-aged and elderly people have declined. In addition, some people have begun to retire, live alone and gradually become divorced from the society, so they lack some experience in cognition of the information of emerging intelligent products.

Therefore, the information shall be simplified, filtered and summarized according to the user needs, so as to reduce the interference of redundant information on the user visual interpretation, it is necessary to find visual elements that meet the user cognitive ability for expression.

In the user behavioral ability to use sleep products, frequency and proficiency reflect the user activity, loyalty and ease of product operation. According to the survey population, most user use sleep APP less than 20 times a month, which shows that the average familiarity of user of such products is medium to low. Some users report that they always forget to use it, which makes it difficult to develop the habit of continuous use. It can be seen that the attraction, guidance and intelligence of sleep APP are not enough. In the interface design, how to make user has a special liking for a certain product also needs to improve the emotional and aesthetic of the product.

### *3.3 Analysis of user use situation and visual focus*

The interface design focuses differently according to the characteristics of the use environment. Most people choose to use sleep products in the bedroom, which is a relatively quiet, suitable environment for sleep, and also has certain environmental commonalities. User needs to feel soft and relaxed before and during sleep. The most important sleep every day is at night, and people have dim requirements for ambient light when sleeping. Therefore, in the design of the interface for sleep assistance and sleep monitoring, it is necessary to reduce strong visual stimulation within the contrast range of the visual

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elements. They can be easily seen by user, meet the visual comfort of the night environment, and the visual style should be gentle and soft. The monitoring information feedback report, such as the interface style that user see after waking up, can be more lively, bring user vigor and vitality. Therefore, in the interface design of sleep product APP, it is necessary to balance the emphasis with weakness of visual design based on the unity of visual style, the subjective and objective conditions of the use situation.

## 4. Summary

This paper analyzed the current sleep APP products from the perspectives of user, functions, vision, etc. In view of the current situation of the middle-aged and elderly people around 45 years old who have the largest demand for sleep, this paper analyzed the demand and current situation of the group for the main functions of sleep products, and explores the breakthrough points with market development space. In the visual design part of the sleep APP product, three design improvements corresponding to the use motivation, use ability and use environment are analyzed:

(1) Guiding by vision and let user perceive changes in their sleep quality;

(2) When designing the visual interface, improve the cognition and emotion, thus enhancing the user stickiness and reducing the visual interference;

(3) According to the analysis of subjective and objective conditions of the use situation, we can balance the visual design with emphasis and weakening.

Through our research on the current situation, the design demand of the sleep market is analyzed, which provided a way for the effective combination of function and vision for future sleep products.

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