Research on College Students' sleep journey system based on music therapy

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2022 IEEE 6th Advanced Information Technology, Electronic and Automation Control Conference (IAEAC) | 978-1-6654-5864-1/22/$31.00 ©2022 IEEE | DOI: 10.1109/IAEAC54830.2022.9929958

***Abstract*—With the rapid development of the economy and the increasing social competitiveness, college students are facing multiple pressures both academically and socially under the background of such an era. As a result, the insomnia of college students is becoming more and more serious. It is imminent to improve the sleep quality of college students. However, there are only two ways to treat insomnia, drug and non-drug. There are few studies on the combination of college students' insomnia phenomenon and music sleep aid. This article introduces the use of music therapy to stimulate the brain waves in the brain to achieve a good sleep aid effect, and designs a small program based on WeChat developer tools as the front end and Java software as the back end, using database technology, combined with Baidu AI Face recognition technology recognizes the current emotions of college students, gives a complete set of sleep aid recommendations, and finally comes up with a simple-to-operate system, dedicated to helping every college student relieve insomnia symptoms and face every day with plenty of energy.**

***Keywords*—music therapy;WeChat applet;sleep quality ; college student**

I. GENERAL

A. Project introduction

Sleep is the basic need of one's physiology. People can't live without sleep. Poor sleep quality will bring many adverse effects. Sleep is the basic need of one's physiology. People can't live without sleep. Poor sleep quality will bring many adverse effects. With the development of the times, the competition in society is becoming more and more fierce. However, under the heavy pressure of study, life, employment and social networking, insomnia has become particularly common among college students. Research shows that the proportion of sleep disorders among college students in China is about 18.1% to 44.1%[1], and compared with the research results of previous years, the proportion has an upward trend. The quality of sleep directly affects the physical and mental health of college students and the completion of their studies. Music therapy is an effective intervention. At present, the research on how music therapy can improve sleep quality at China or abroad is still in its infancy. Music therapy refers to various targeted music activities, which have an impact on the individual's physiology and psychology, so as to adjust the mood, alleviate physical and mental symptoms and promote physical health. At the same time, face recognition technology is used to judge the user's sleep status and psychological status through the recognition of the user's facial expression, and customize the music recommended treatment scheme for the user. At present, there are studies on solutions to insomnia at home and abroad, and many solutions have been put forward, but this problem is still serious, less involved in the form of music to help sleep, and there is no specific solution for college students to treat sleep quality, so this system was invented.

B. Music therapy

Relevant studies have shown that different tonal vibrations of music can stimulate specific regions of the brain, and then pass through the relevant nervous system of hypothalamus pituitary adrenal axis, so as to regulate our human system, such as digestive system, cardiovascular system, immune system and respiratory system. It can also greatly improve the quality of sleep by relaxing people's body and mind, distracting current attention, shifting attention to other places, and shielding some other external noise[2].Music has a positive effect on sleep therapy, but there are few studies on the mechanism of music therapy to improve sleep quality. Music has a certain frequency of sound wave vibration, and different types of music produce different sound waves, when people hear different music, the changes of brain waves are various. The potential fluctuations of brain waves are produced by the interconnection of individual neurons and thousands of neurons in the brain. When people suffer from insomnia, everyone's brain waves have unique changes. By finding suitable music and soothing nerves through music, they can achieve good sleep assistance and adjust the mood and body function disordered by tension and stimulation. The changes of brain waves during various activities are shown in Fig. 1.

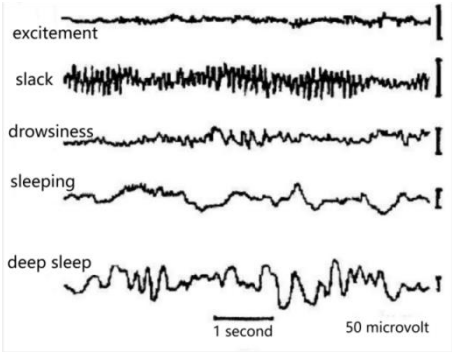

Fig. 1 Brain wave changes in different states[2]

The music sleep aid process starts with the user logging in, and then performing the face recognition function after logging in. The user places the face in the viewfinder and clicks to take a photo, then the system pops up the questionnaire function, and the user fills in the survey. The questionnaire survey has a total of 16 questions. The psychological and sleep aspects of the survey are divided into single-choice questions and multiple-choice questions, and the score for each question is given. Finally, the system generates the user's insomnia rating to recommend specific treatment options and Appropriate recommendations. The system music sleep aid process is shown in the Fig. 2.

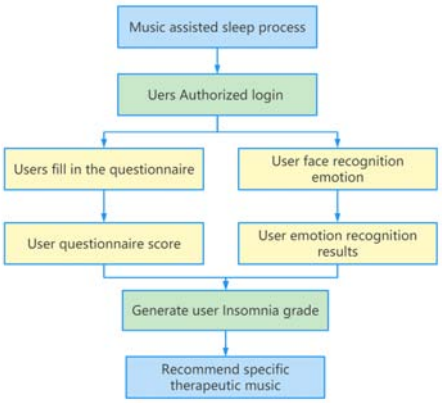

Fig. 2 System music sleep aid process

II. KEY TECHNOLOGIES

A. Face Recognition Technology

Baidu AI[3] face detection and model based on attribute analysis can detect and analyze the face in the picture, detect whether there is a face in the picture, mark the coordinates of the face if there is a face, support the recognition of multiple faces, and accurately identify the attribute information of multiple faces. The attribute information can include age, gender, current expression status, emotional status, whether wearing a mask, whether to close your eyes, whether to wear a mask, etc. To analyze the emotion of the detected face and return it to the Applet with a confidence score for analysis and processing. Identify emotions including anger, sadness, no emotion, happiness, fear, surprise, moving, etc, with high accuracy. The basic principle of the interface for Baidu AI face recognition and detection is described as follows. First, the user initiates the request for face recognition through the system. After receiving the request from the user, the system gives an authorization window page. After the user agrees, the Applet analyzes the user's facial feature spacing and skin relaxation, compares it with the emotion database corresponding to the face combined with the system call interface, and then fills in the questionnaire. So as to get the user's psychological state and sleep state. The system generates an analysis report to generate a user's exclusive treatment and sleep assistance suggestions and schemes.

B. WeChat Applet

The carrier of WeChat Applet is WeChat App. As long as users download WeChat, they can use WeChat Applet[7]. Users can open the Application by scanning the QR code of the Applet or searching the keywords of the Applet without installing it separately. The front end of the Applet is mainly developed and completed through WeChat developer tools. JavaScript controls the logic of the page. The static data is mainly stored by JSON configuration file. The content of the page is completed by WXSS style file, and the user interaction is mainly completed by JS script logic file.

The main framework of the Applet is divided into three parts which are system layer, logic layer and view layer. The logic layer is used to process data. After processing the data, the results are input to the system layer, and the events of the view layer are responded at the same time. The view layer will first convert the data from the logic layer into a view, and then send the events of the view layer to the logic layer. The system layer is mainly responsible for the transmission and processing of data and events, temporary data or cache, local file storage and network service call. The framework of WeChat Applet for college students' sleep journey based on music therapy is shown in Fig. 3.

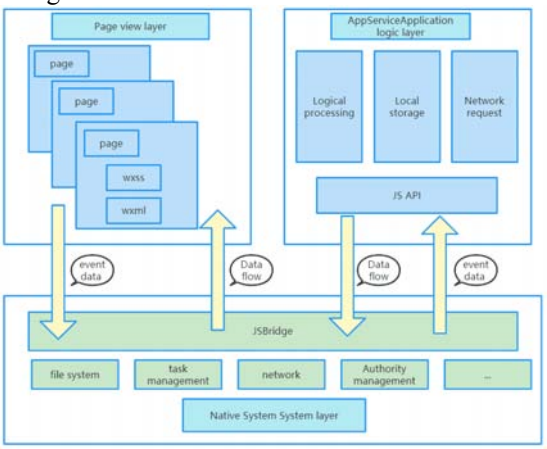

Fig. 3 WeChat Applet frame diagram

C. Database Technology

Database is a cloud computing based technology, which can comprehensively deal with the characteristics and basic information of various data in people's learning and life. By studying the basic structure of the database, the storage mode of the database, the design of the database, how to manage the database and the knowledge and implementation method of the basic theory of Application, and using these theoretical knowledge to process and analyze the data in the database. In practical use, it can be combined with computer technology and network communication technology, which plays an important role in promoting the further development of social economy[4].

The college students' sleep journey system based on music therapy uses MySQL database system to carry out data persistence processing for music, expression information, insomnia level, etc., which well stores the data information and classifies it in time. MySQL has the remarkable characteristics of high speed. By using optimized single scan multiple connections, the connection can be realized very quickly. The SQL function is realized by highly optimized class library, and the running speed is also very fast, At the same time, MySQL has a very low cost and supports the writing of languages including PHP, C, Java and python. Moreover, the database also provides

many API functions, which not only has high security performance, but also has a large amount of storage. Using MySQL database system can fully manage the data in the system more conveniently[6].

In this system, the data of the database is analyzed to establish the E-R diagram of the database. It is necessary to abstract the real objects and find the relationship between the entities and objects in the Applet. The entities include users, information, music, music types and test records. Users can use information, music, etc. ,music is divided into different music types, and users also have different test records, users and information There are many to many relationships between users and music, many relationships between music and music types, and one to many relationships between users and test records. For the analysis of the relationship between entities and objects in the implementation of Applet, the E-R diagram of database is made, as shown in Fig. 4.

Fig. 4 E-R diagram of database

III. SYSTEM FRAMEWORK

The college students' sleep journey system based on music therapy is mainly aimed at college students' insomnia. At the same time, it adopts the way of music therapy to alleviate college students' insomnia and anxiety to varying degrees. Music assisted sleep is a more effective way, but also reduces the cost and time. After logging in, users can see three sections: sleep information, sleep journey and personal center. Users can see bedtime exercises, breathing methods and some bedtime reading stories in the sleep aid information, so as to help them stretch their mood. There are many different kinds of music that can be played. Then there is the sleep journey page. First, users need to take photos, face recognition, and then conduct psychological tests. After the analysis of the system, users can push the sleep aid music, breathing methods and exercise methods, and generate a test report at the same time, Give Appropriate suggestions, accurately help users alleviate the trouble of insomnia, and help users effectively solve problems and save time to the greatest extent.The functional framework of College Students' sleep journey system based on music therapy is shown in Fig. 5.

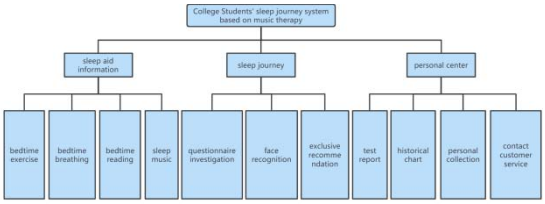

Fig. 5 System function frame diagram

IV. FUNCTION REALIZZATION

A. Data Analysis And Preprocessing

In the collection of user information, such as the total score of the questionnaire and the expression collection of face recognition, it is necessary to process a large amount of data to push the treatment plan for insomnia. After collecting the data, we need to analyze and preprocess the data, deal with the missing value, outlier and noise value, and then standardize the data, so as to compare the information in the standard library and realize the analysis of users' sleep quality and psychological state. Data analysis and preprocessing first need to collect the user's data, including emotion and psychological state. Due to the large and non-standard data content, it is necessary to clean the collected data. After cleaning, deal with a large amount of data, and then deal with individual abnormal data, and then analyze the correlation degree between data and data. The correlation degree of each individual is small, but the correlation degree of the same individual is very strong, After data warehousing, data visualization can be carried out and the best scheme suitable for users can be recommended. The flow chart of data analysis and preprocessing is shown in Fig. 6.

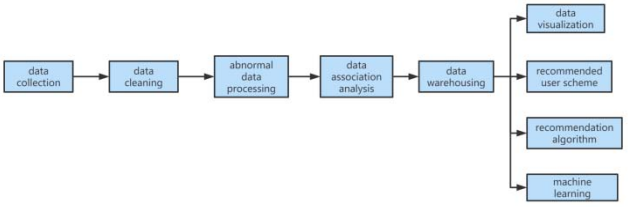

Fig. 6 Flow chart of data analysis and preprocessing

After completing face recognition and questionnaire survey, conduct data analysis and preprocessing, and then push the scheme to users in combination with the system functions, including the music push of the main functions of the system. The pushed music is also of different types. Use music to help sleep. Music can alleviate insomnia to a certain extent. In particular, beautiful, gentle and relaxed music can relax people's body and mind to the greatest extent, make people feel comfortable, slowly stabilize and calm, and then quickly enter sleep and improve sleep quality[5]. Music can improve people's psychological status and make it easier for users to enter sleep through the adjustment of users' brain waves. At the same time, breathing method and bedtime exercise method are also promoted. Users can choose according to their own needs to meet different needs of users, so as to achieve the effect of relaxing body and mind before bedtime and improve sleep quality.

B. Sleep Aid Information Module

Sleep information includes sleep music, sleep breathing, sleep movement and sleep reading stories. The user can click in to see the details of the method and follow it to relax. For each method, the user can praise and collect, or cancel the praise and collection. In the sleep music, it is easier for the user to find favorite music. At the same time,

the player can pause or end the playback regularly. Users can input the time they want to close regularly, and can also realize sequential playback, circular playback and random playback. Sleep aid exercise and sleep aid breathing are shown in Fig. 7.

Fig. 7 Sleep-aid exercise and sleep-aid breathing

C. *Sleep Journey Module*

The sleep journey includes the face recognition technology function and questionnaire survey in the system. An automatic music classification method based on emotion is used to generate the final push to users. The push includes music, breathing method and motion method. Users can choose what they need to get the most suitable scheme for users to improve their sleep quality. The questionnaire is shown in Fig.8.

D. *Personal Center Module*

The personal center page includes the user's Avatar and user nickname, including the test report. The test report is the user's test results after face recognition, including psychological state and sleep disorder, and gives Appropriate suggestions. The historical chart shows the trend of sleep disorder and psychological disorder in recent ten days, which is presented in the form of broken line chart, which more intuitively reflects the user's sleep trend, It also allows users to further grasp their own changes, so as to continue the adoption of sleep assistance in the later stage. The personal collection page includes the music, breathing method, exercise method and small reading stories before going to bed collected by users in the previous page, which makes it easier for users to find their favorite. The college students' sleep journey system based on music therapy can be shared, the location permission can be obtained in the system setting, and the problems in the Applet can be complained and fed back. The personal center is shown in Fig. 9.

Fig. 8 Questionnaire

Fig.9 Personal center

V. CONCLISION

This paper presents the design and implementation of a college students' sleep journey system based on music therapy. This paper introduces in detail how music can treat insomnia and the effectiveness of music in the treatment of insomnia. This paper introduces the three parts of WeChat Applet: data processing, sleep assistance information, sleep journey and personal center. It explains the relevant technologies needed to realize the Applet, such as face recognition, database technology, etc. Through WeChat developer tools and complete development and testing in Windows system, the cost is low. To some extent, it effectively alleviates the occurrence of this phenomenon and helps every college student have better sleep. It has good practical significance for individuals and even society. At the same time, the research and development of College Students' sleep journey system based on music therapy is committed to making every college student spend a better college life and face every day with plenty of energy.

ACKNOWLEDGMENT

The work was supported by Hubei University Student Innovation and Entrepreneurship Project：Zhihui school a classroom teaching quality feedback system based on face recognition technology (202211654010).

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