



## A Piece of Psychotherapeutic Medical Device for Metaverse Virtual Medicine

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## **A piece of psychotherapeutic medical device for metaverse virtual medicine**

**Abstract:** In 2020, a new type of coronavirus swept the world. The advent of this disease has had a very heavy impact on our social and economic development . Due to the limited medical resources and regional differences, this virtual medical model. appear more valuable. In this paper, we create a shared virtual medical space based on the metaverse, in the process, it relies on a tool called COVID-19 Disease Diagnosis (CDD) [1], using artificial intelligence deep learning AI technology, To provide users with automatic symptom detection and medical services. Through user research, we found that this low-cost and low-cost model can not only provide users with solutions quickly, but also provide medical consultation and services to some poor people who cannot afford high medical expenses, even in emergencies. The difficult problems can also be solved through this virtual medical inquiry and even incurable diseases.

**Keywords:** virtual medical, care metaverse, medical service, 3D/VR

## 1 INTRODUCTION

In the context of the epidemic, coughing and cold has also become a fearful word. We are affected by the epidemic and need to detect nucleic acid and body temperature. Especially during the epidemic, when the city is closed and quarantined, we cannot go out casually. We need to report and wear masks to prevent infection when going out. Our mental health and physical health are affected.

At present, the development status at home and abroad mainly includes virtual medical teaching, virtual customized fitness, virtual psychotherapy, virtual medical nursing, virtual rehabilitation training, virtual obstacle treatment, virtual clinical assistance, etc. Virtual medical care has attracted the attention of scholars at home and abroad. Researchers at the University of Texas and Harvard have developed a simulation of a variety of scenarios for treating depression in teenagers to help them better control themselves.

In this article, we introduce a shared virtual medical station based on the Metaverse. Users can apply for virtual medical consultation through the mobile app. After the application is successful, they can put on the virtual headgear and enter the virtual medical room, where they can feel the warmth and The feeling of caring is very different from our usual medical space. Users can interact and then independently choose a variety of medical scenarios and medical services such as psychological counseling, health care guidance, medical care and so on.

To build this virtual space, we went to the hospital to conduct research and worked on a prototype. To understand what users think about the product, we conducted preliminary field research. It was found that users very much hope that virtual medical services can be used to provide the fastest medical services and solve problems quickly in emergencies at home or away. Our work is mainly: (1) Create multiple different medical scenarios. (2) An interactive system is made as a medium for application and virtual medical services.

## 2 RELATED WORK

### 2.1 Psychological consultation in virtual medical room

In real life, mental health problems may be shared by many people, and it is hidden in people's hearts and unwilling to reveal them. Many people are embarrassed to do such psychological counseling, but in fact, psychological counseling is a very normal thing, it is to make our minds healthy and bright.

At this stage, virtual reality technology has been used in medical fields such as autism . With the higher and higher level of our economic development and the improvement of people's overall quality, more attention has been paid to psychological problems, and the spiritual needs will also increase. The emergence of this technology has provided the possibility of virtual medical treatment in the metaverse. On the basis of this aspect, we will build a virtual space in the metaverse, similar to our real hospital. This scenario is based on your ideas. And Mood provides you with different scene options, gamified medical experience, and completely private medical services.

## 3 DESIGN PROCESS

In order to design and build this virtual medical space, we first discuss its rationality with the experts, secondly discuss the design proposal with the instructor, and then demonstrate the process and goals of our design.

### 3.1 Design Survey

We conducted a preliminary investigation with two psychological research experts with more than 5 years of experience in Guangzhou Psychological Consulting Research Center, Guangdong Province (average age = 45, SD = 9.58, M1, M2, M3), and communicated with them for about an hour. , shared their experiences, and then shared with me their views on my research topic: they believed that the Metaverse is a future Internet, and the

establishment of virtual medical rooms in this new Internet is a feasible solution. At the same time, some suggestions were put forward: (i) M1 and M3 suggested that there should be user evaluation and user feedback after user service to adjust the medical service structure; (ii) It is important to maintain an immersive and undisturbed space.

### 3.2 Design Goals

Based on previous research and discussions with psychologists, we have constructed several goals to support users of psychological counseling: (1)

Timely feedback is required in the practice process (2) Consider a safe, private and undisturbed space.

## 4 SYSTEM DESCRIPTION

On the basis of our previous design and research, we designed a text model, which is mainly composed of hardware and software. Hardware refers to a private virtual medical space that allows doctors and users to establish a variety of modes, while software refers to It is the credential for users to enter medical services and the carrier for us to get feedback from users. The software and hardware are connected through Bluetooth.

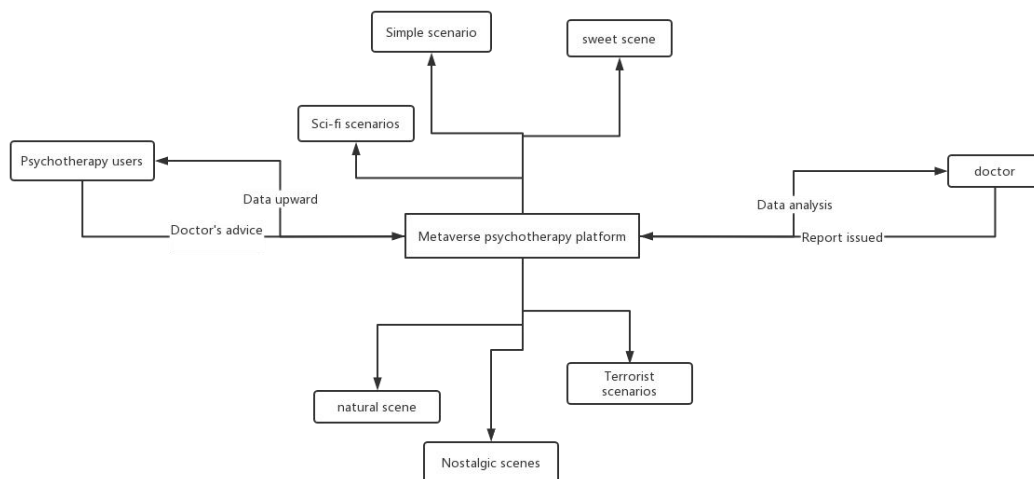


Figure 1: Conceptual Framework of the Metaverse 'Medical Messenger' Healing Platform

### 4.1 Software Design

Users can use the app as a medium for virtual medical consultations and then enter medical services. At the same time, users can choose different scenes in the APP, or wear hardware devices to choose in the virtual space. Users first need to be in an undisturbed environment, then use a software program to select medical scenarios and start accessing medical services. In addition, the app will follow the user in a form of virtual reality until the end of the treatment. During this process, the user can wear a somatosensory suit to feel the real touch, and at home, they can also feel medical services around the world. This kind of virtual medicine could change our current imbalance of resources.

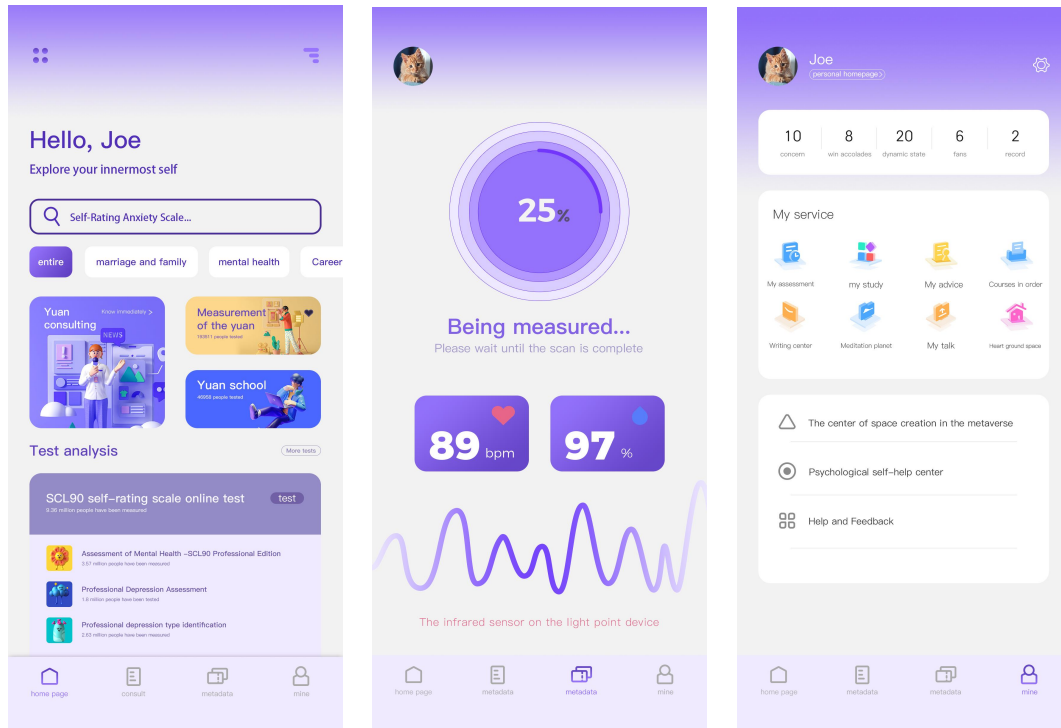


Figure 2: 'Medical Make' APP interface treatment selection and user feedback

## 4.2 Hardware Design

The hardware equipment is mainly used to enter the metaverse by the VR headset, and at the same time, the sensor suits are combined to simulate the reality in the metaverse. The VR virtual reality technology is to simulate the real scene through the computer, software and database, and then use the virtual equipment to make the user interact with the virtual scene. Including the design of the somatosensory suit, its implementation requires the assistance of sensors such as Kinect and Psmove. [5]



Figure 3:Hardware design and structure design drawings

## 4.3 Function and principle

The product adopts pancake technology, which uses the polarization characteristics of light to make the light foldable, thereby reducing the burden on the headset and improving the user experience. The product sensor uses a camera that collects scene information and other depth information in real time, and then through the software development kit, we can directly identify and track the skeletal point information of the human body. In the process of virtual psychotherapy, a relatively safe and quiet environment is required. Before psychotherapy, the system initializes the overall state of the user in the scene, and then records the user's state. The recognition of the user's body movements mainly tracks the key points of the human skeleton, and then interacts with the 3D objects in the virtual scene.

## 5 PRELIMINARY USER RESEARCH

In order to prove that users can enter the metaverse through VR technology for virtual psychotherapy and users' experience and feedback, we conducted some preliminary user studies. We found several users in need of psychological counseling from the Internet. They are M1, M2, M3, and M4 (average age: 24.8). All participants had a virtual psychological counseling experience through VR equipment, and the whole process was recorded with the consent of the participants. . When we asked the user a question, M1 looked at me and said, "I used to know about the metaverse a lot, and now I finally have the opportunity to experience a real instance of the metaverse, and it feels good." M3 said, "I think it's just for me. As a personal doctor, I can get the best service for the least amount of money." And both M1 and M3 are looking forward to more improvements in the future, such as the sensing of somatosensory suits and appointment waiting. M1 said: "What if I don't have a safe environment. " After a while, M3 followed suit: This should be the main problem of virtual reality technology. "

The difference is, M2 said: "I think virtual medical treatment is much more convenient than going to the hospital to register and queue up, and I don't like to communicate face-to-face with people. With this virtual interaction, I may be able to show my real side more. , so the treatment effect for me should be better." At the same time, we also visited the manufacturers of VR virtual equipment, and they said that it is good that the products can have timely feedback.

Table 1: User Questionnaire Survey Results

| question  | M1  | M2  | M3  | M4  | average |
|---|-----|-----|-----|-----|---------|
| 1. Are you willing to perform medical treatment in a virtual setting? (1: willing-6: unwilling) | 5.7 | 6   | 6   | 5.8 | 5.9     |
| 2. Is it easy for you to use the Doctor? (1: easy-6: not easy)                                  | 5.2 | 5.5 | 6   | 5.3 | 5.5     |
| 3. Are you willing to buy this product after experiencing "medical envoy"?                      | 6   | 5.4 | 5.8 | 5.7 | 5.7     |

### 5.1 Research Process

These processes were all conducted in-house interviews and then in their respective bedrooms. First, we briefly introduce the use of the product to the user. The user can then try the device to experience it himself. During the experience, we observed and recorded the whole process and filled in the record form. During the interview, the main interviews were: (1) Views on virtual medical treatment. (2) Development expectations of future psychological counseling .(3) The difference between traditional psychological counseling and virtual medical treatment.

### 5.2 Research results

According to the above figure, we can see that all participating experiencers expressed their high willingness to use the device to enter a personalized scene for experience. VR virtual reality application has many advantages in Metaverse virtual medical treatment: 1. Users can interact with virtual objects in a relaxed manner and show their real side; 2. Treatment can be customized according to the actual situation of users; 3. . Various forms of feedback can be obtained; 4. It is conducive to remote treatment and facilitates the time and work arrangement of both parties.

## 6 LIMITATIONS AND FUTURE WORK

Since the Metaverse is a virtual reality environment, the environment in which it is located in real life has great uncertainty, and it is very susceptible to the influence of the surrounding environment or the influence of the user in reality. At the same time, the data is also prone to lack of somatosensory acquisition and the limitation of the data acquisition range of the sensor, resulting in a low sense of immersion in virtual reality. Second, due to the impact of the epidemic, the collected data samples were insufficient.

In the future, we will update iterative products and further improve the functions to expand the medical field of products. In addition, based on user evaluations and feedback, we will continue to optimize the application system to make the user experience better.

## 7 CONCLUSION

In this paper, we introduce a virtual medical space for psychotherapy, which allows users to provide medical services in a virtual environment. "Medical Messenger" can provide users with a variety of scenarios, and collect data and feedback from each user after the service ends. Through user research, we can know that "medical envoys" can provide users with good medical services, allowing users to achieve face-to-face real-time communication and services without leaving home.

In conclusion, although VR technology has broadened the service channels for medical services, there is still a long way to go for our current technological realization. The development of this technology can certainly play a very important role in the development of medical undertakings and promote the development of medical undertakings in the world.

## 8 GRATEFUL

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