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# A virtual reality memory scene designed with memory reproduction as the concept

**Jiaying Li**

Faculty of Humanities and Arts, Macau University of Science and Technology, Macau, 999078, China

2220023487@student.must.edu.mo

**Abstract.** The use of VR (virtual reality) in memory recovery has considerable potential, and this is just beginning to materialize. Those exploratory studies conducted so far suggest that VR's participation will help improve the assessment of memory impairment and memory repair using recombinant techniques. Based on the current virtual reality technology is mostly used for game development, the relevant research on memory reproduction is relatively insufficient. In this paper, a memory gallery was built through 3D (three dimensional) modeling, and Metahuman technology was used to achieve character reproduction, combined with unreal5 development to achieve important memory reproduction. This work mainly uses 3D models to make a memory corridor, Metahuman digital virtual human technology and VR Chat VR social combination to bring users immersive precious memories reproduction, and can interact with it. Experiments have shown that recall reproduction is of great help to emotional repair. VR can help by making the presentation more immersive.

**Keywords:** VR, VR Chat, Chatgpt, memories recreated, immersive.

## 1. Introduction

The origin of the term "Virtual Reality" can be traced back to the famous 1938 French playwright's famous book Drama and Its Ghosting, in which Aalto described the theater as "la réalité virtuelle". By 1973, Myron Khurger was proposing the concept of "VR." VR is an emerging technology that provides an immersive experience to every user, which can also be called an immersive experience. With the development of science and technology, VR technology is widely used. People's psychological problems have become a social problem that everyone is increasingly concerned about. People are paying more and more attention to the reproduction of present memories, the separation of relatives, historical remains, emotional memories and other related issues. VR technology has a significant impact on dissociative experiences and presence. A VR experience model that integrates cognitive, emotional, and behavioral factors into the primary determinants.

The use of VR in memory recovery has considerable potential, and those exploratory studies performed to date suggest that the involvement of VR will help improve the assessment of memory impairment and memory restoration using restructuring techniques [1]. New research has revealed that utilizing VR exposure therapy can enhance treatment results by boosting patient engagement in exposure. VR is a powerful tool for improving exposure therapy for both civilians and disaster responders suffering from PTSD (post-traumatic stress disorder) symptoms [2]. VR has the potential to produce

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neuropsychological assessments that better mimic real-life situations, leading to greater ecological validity. Additionally, VR technology has been shown to be a valuable tool for evaluating the learning and memory abilities of patients with TBI (traumatic brain injuries) [3]. Immersive VR provides significant advantages for learning. It enables direct perception of objects and events that may be otherwise out of our physical reach, offers a safe training environment that minimizes potential real-world risks, and enhances learning by employing engaging and motivating play-based methodologies that broaden the spectrum of supported learning [4]. The project hopes to provide an immersive flow experience through VR technology, defined as the "pleasant state of mind of control, fun and joy" that users feel when interacting with the virtual environment [5]. The adoption of immersive technologies is anticipated to accelerate in the future, which highlights the necessity for additional empirical research to theorize the effects of engagement with immersive technology on user experience and performance [6]. VR can prevent daily expected memory loss in PD (peritoneal dialysis) patients [7]. And conceptual behavior in VR environments stimulates physical and perceptual behavior in design cognition [8]. VR technology is gaining momentum in various fields, including art and design, playing an important role in modeling, prototyping, and testing [9]. Efficacy of neuropsychological interventions in VR in improving cognitive function in patients with MCI (mild cognitive impairment) [10].

But at present, the combination of VR and digital virtual humans is still lacking. This article mainly uses 3D models to make a memory corridor, Metahuman digital virtual human technology and VR Chat VR social combination to bring users immersive precious memories reproduction, and can interact with it. The design of this paper different from the ordinary VR Chat interaction extensive, it has a certain degree of privacy, for known relatives and friends can enter a room at the same time for virtual interaction.

## 2. Implementation method

Record fond memories by presenting memory albums in VR, where memories of the past or deceased family members. Martin Heidegger said: It is not enough to have only a real world; we also need to have a poetic world. In some studies, anxiety was significantly reduced. Patients find VR useful; It enhances understanding and encourages adherence to treatment. Practical implications It is important to develop VR interventions in depth. It is recommended to apply a methodological framework for VR development. Coming to the realization of memory reproduction, family separation, historical loss, and emotional memory through VR technology. When you come to the photo album, you can enter fragmented memories and interact with your deceased loved ones. VR provides a more realistic sense of immersion, soothes the psychological problems of separation of loved ones from historical sites, and preserves common emotional memories. And it can be achieved through the technology of VR chat, but it is different. VR interaction with loved ones who enter the memory corridor at the same time, but with a certain degree of privacy, strangers cannot enter the virtual realm. The emphasis on clans in Asia is based on VR research that reproduces family histories.

### *2.1. Controller actions*

Family members need to control their characters' actions in the scene through VR controllers, take HTC (High Tech Computer Corporation) controllers, shown in Figure 1.

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**Figure 1**. HTC controllers.

- Left handle (left and right handles are assigned according to the boot order): "up, down, left, right, and left" correspond to forward and backward, left and right panning, "Shift" corresponds to a fist, the two side buttons correspond to the hand open, and the menu key corresponds to the screenshot.
- Right handle: "up, down, left, right" corresponds to "jump, back, turn left, turn right", and the rest of the controls are the same as above.
- Both the left and right handles can have an expression, and the two side buttons are one expression.

### *2.2. Methods and special effects*

Increase authenticity, in order to allow users to generate emotional links, the model of the deceased loved one uses three-dimensional modelling to sculpt, restore its realism, and in a specific scene, relying on the scene in the memory, set specific actions for it, and interactive content, this part can use ChatGPT for AI dialogue to enhance the sense of experience. Models of the rest of the family members can be implemented through Metahuman, which can be made in Unreal Engine 5 by taking multiple photos and using MetaShape to quickly generate a model that is basically the same as their face.

Family conversation scenes are mainly based on warm and happy style, and the ambient atmosphere is also an effective way to increase realism and emotional links, setting multiple scenes, considering that the maximum time of use of VR devices at different ages is inconsistent, and the rest of the users are offline and do not affect the continued use.

Of course, it is not enough to just remember the scenes that appear, most regrets actually arise from things that have not yet been experienced with their loved ones. In order to fill the regret, members can write down the expected scenes and unfinished emotions on the message board, and the developers will help them with subsequent design, and the new experience scene seems to be not nostalgic for the past, but imagining the future.

### *2.3. Model building*

In the VR scene, a 3D model of the Memory Gallery is first built. First of all, the corridor belongs to a media scene that travels back in time to the past, where the focus is on digital virtual humans simulating real people in the past, interacting with them to make users feel immersed. Here recalls the corridor scene as a medium scene to various time nodes, in order to make the initial user adapt to understand this environment faster, the design style considers a simple sense of technology. Secondly, Matehuman's virtual digital human technology is currently only compatible with Unreal Engine, so the model building of the entire scene is first considered Unreal Engine as the development of the entire work. This is shown in Figure 2.

AIGC (Artificial Intelligence Generated Content) is a very hot text continuation image tool at the moment. AIGC is content generated through instructions, which is characterized by automated production and high efficiency. The rapid development of the digital age has led to the maturity of language generation technologies NLG (natural language generation) and AI (Artificial Intelligence) models. It can automatically generate text, pictures, and more to work. AIGC has greatly promoted the

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development of the metaverse to a certain extent. A lot of digitally native content in the metaverse will require AI to build.

AIGC usage method, the keywords: simplicity, technology style, interior, digital screen, corridor, etc. Key information is entered into AIGC for image generation. And form a rough scene model design prototype diagram.

**Figure 2.** Scene demo.

Midjourney is a very efficient image generator that improves the 3D scene design output of the work in making this work efficient in terms of design ideas for model prototypes, as well as color brightness saturation references.

The scene model is established with reference to the corridor style, and considering the problem of VR interaction, three rooms are expanded in the middle of the corridor, two of which are connected in parallel, and can shuttle to interact with relatives in another room.

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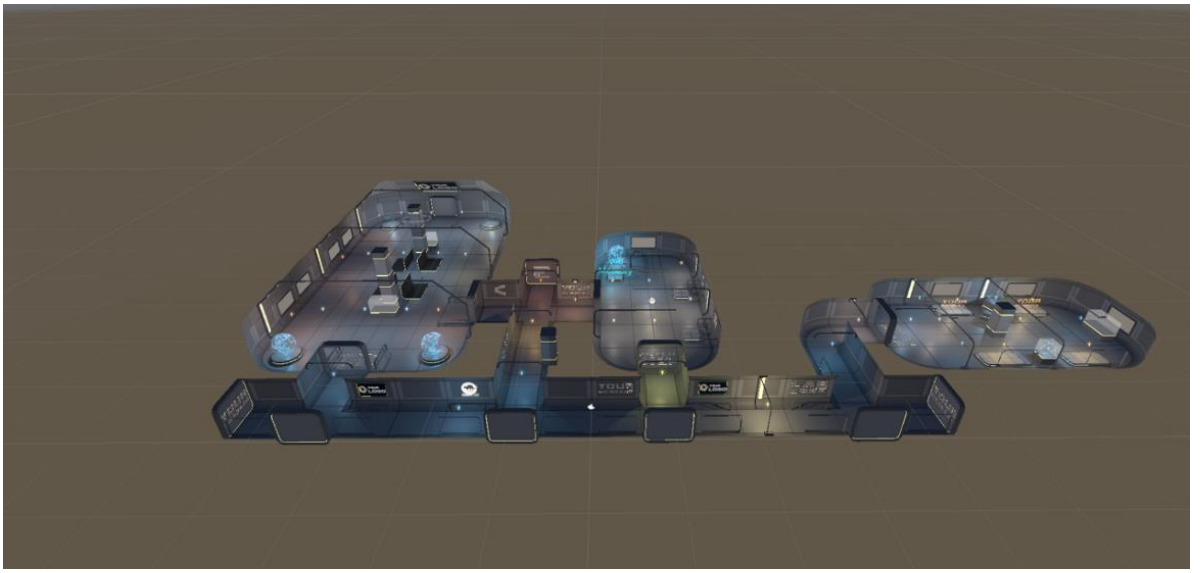

**Figure 3.** Scene model.

The character model design uses Metahuman technology. It allows for parametric production and transformation of hierarchical rhythms. Metahuman is a comparative system 3D character maker that gives any creator the ability to use highly realistic human characters in any way imaginable. This is shown in Figure 3.

### *2.4. Character setting*

The scene characters are special, and the proposal of this work is open, which is a DIY (do it yourself) memory designed for the user itself. Metahuman technology can restore the image of the person according to the 3D photography technology of the avatar scan. Restore the image of the deceased great-grandmother, using the photos in the record to manually restore her facial features and body proportions as much as possible during her lifetime. This is shown in Figures 4 and Figure 5.

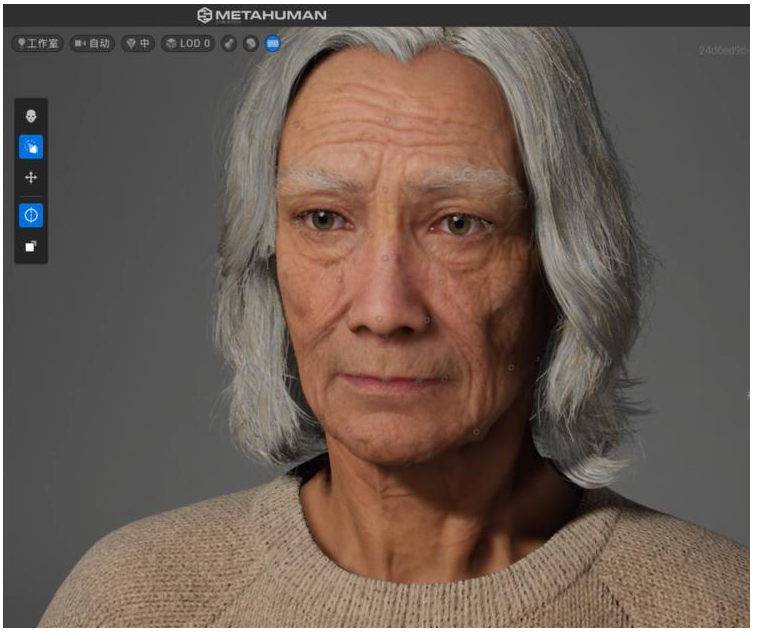


**Figure 4.** Character details.

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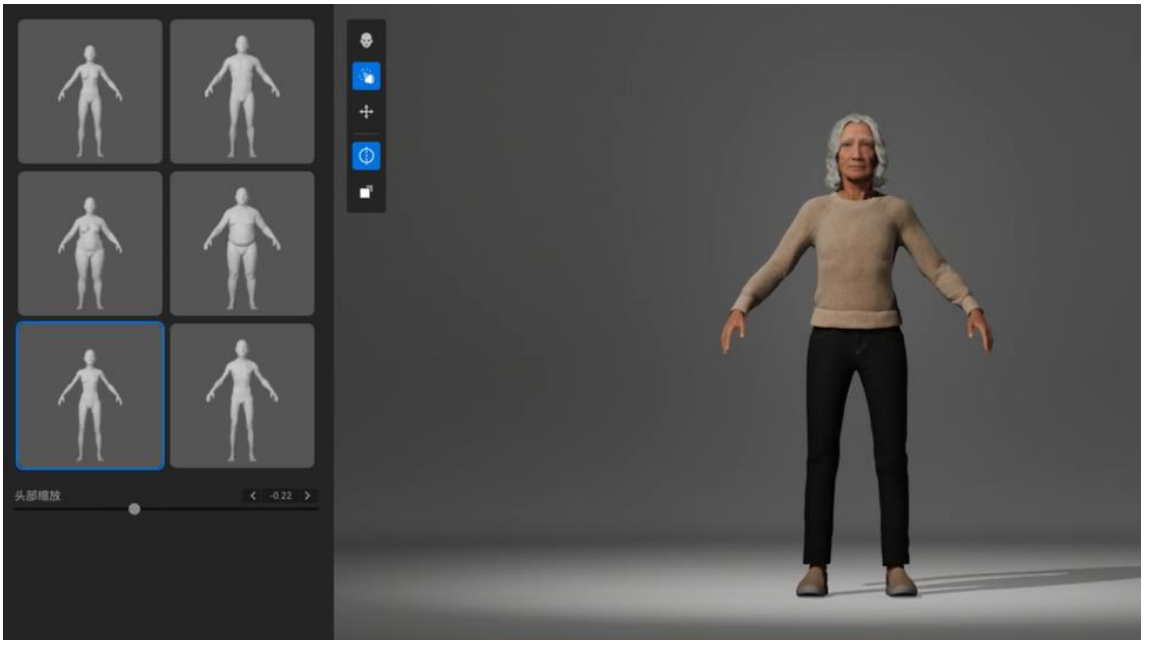


**Figure 5.** Human object state.

*2.5. Story design*

Enter the VR scene and see the memory corridor. You need to walk to the door of the room you want to go back to, and then through the window of the room you can travel back to an important memory that you want to return to, and interact with it in this scene. This is shown in Figure 6.

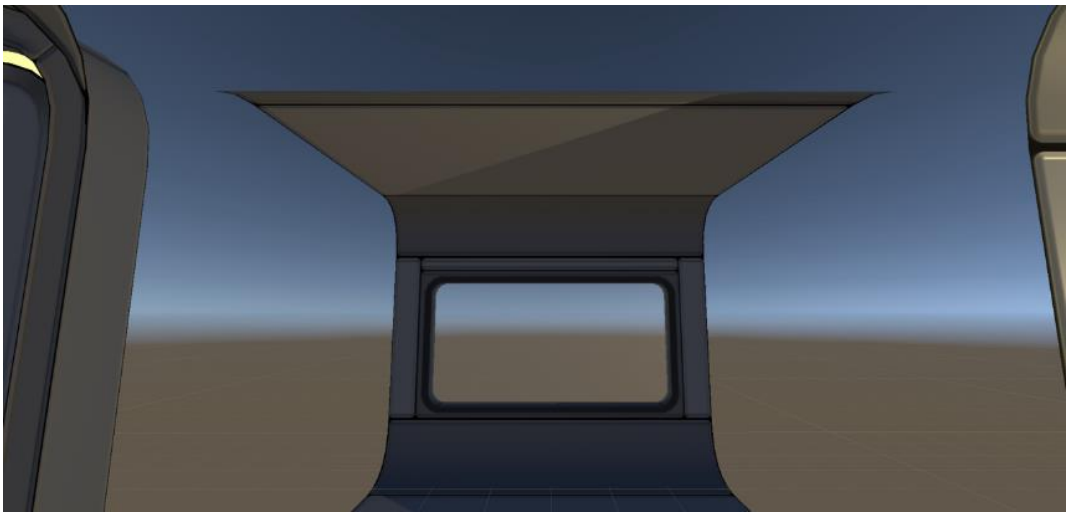

**Figure 6.** Scene change.

Examples of scene settings: Users choose to go back to the early morning of 2018 with their deceased great-grandmother. After selecting the scene, you can choose to call other family members to join, enter it through the first perspective, gather with the avatars of your loved ones, sit around the rest table of the botanical garden, and experience the scene in the memory again. Family members can send each other emojis or voices to relive the conversation with their great-grandmothers. At the same time, family members can have a conversation about what happened recently, the great-grandmother will look at everyone with a smile, and if a member wants to communicate with the great-grandmother, the AI will take over the conversation and give the user a real sense of communication. This is shown in Figure 7.

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**Figure 7.** HTC controllers.

## 3. Experimental process

A memory gallery model of a virtual space built from a 3D model. Recording memory fragments at different time nodes can be understood as a three-dimensional memory album made by a three-dimensional model, through which we can return to important memory nodes in the past. It's like opening the door to memoirs, and we return to the past time and space. Combined with Metahuman digital virtual human technology to create characters in the scene, this can cleverly avoid the uncanny valley effect. Then users can interact with the memory node room, which will restore the scene in the memory, and let users have a better immersive experience through the method of reproduction of memories. For example: interacting with deceased loved ones. What they said and did before their death is repeated in the scene, as if they were right next to you and never left.

*Experimental analysis*

In order to compare the experience of the scene, 50 participants were randomly selected to score the work. Finally, according to the scene experience, the immersive experience, interactive experience, and character restoration of the discussion scene are evaluated and discussed (Table 1).

**Table 1.** Statistical evaluator evaluation scores.

| score | Immersion | Interaction | Character realism |
|---|---|---|---|
| >90 | 90% | 84% | 86% |
| >80 | 6% | 8% | 10% |
| >70 | 4% | 8% | 4% |

**Immersion experience:** From the experimental data, it can be seen that 90% of the experiencers believe that the system has a strong sense of immersion. This is thanks to the fact that we have added elements of technology to the model, designed the memory corridor, and the memory transition gives the user the illusion of traveling through time.

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**Interactive experience:** In terms of interactive experience, 84%,8% and 8% of the participants gave a rating of 90 points, 80 points or more, and 70 points or more, respectively. The results show that the proposed system can improve the interactive experience through communication and physical interaction, and through the enhancement of the sense of interaction, the evaluator can have a deeper feeling of the past time, and greatly improve the deep experience of good memories.

**Character restorative similarity:** 86%, 10% and 4% of experiencers gave evaluations of 90 points, 80 points or more, and 70 points respectively. The results show that the Matehuman technology is used to realize the reproduction of the character image, and the character image characteristics are restored more realistically.

From the recall interview data, the memory gallery and interaction with deceased loved ones in a VR scene helped users process and become accustomed to memories and strong emotions associated with traumatic events. But it also supports multiple family members to enter a memory space at the same time. In addition to real memories, users can write down new experience scenarios that have not yet been shared on the message panel and hope that the new experience scenarios developed in the future will meet virtual relatives and no longer leave regrets. The realization of this work has a uniqueness that other VR Chat did not have before. Remembering loved ones together has special requirements, and only clan blood relatives can enter a memory album at the same time. The work is characterized by personalization and privacy for each family member to use.

## 4. Conclusion

In this paper, for the existing Chatgpt (Chat Generative PretrainednTransformer) technology, combining 3D models and digital virtual human technology to create a VR environment to record the memory gallery space for the experiencer itself. Users can personalize the people and scenes they need to miss based on their important memories. Choose a room in the promenade to enter and travel back in time to the past. Metahuman technology can restore the hyper-realistic character model, put it into the scene and use ChatGPT technology to reproduce what she once said, and heal the present self by nostalgic for the beautiful scenes of the past. VR technology helps people overcome emotional barriers and deepen cognitive needs. Before people recorded the good memories of the past through diaries, there are photos and videos to help us recall the good past, we hope this work can help people record the good of the past, relieve suffering, VR technology provides 2D objects can not give immersive experience.

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