“Retro You”

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ABSTRACT

Our project aims to bring the mental representation of the physical self and the mental representation of the virtual self in virtual space closer together. What might happen, we wonder, if the physical body were more closely identified with the virtual body? Might the actions and experiences of the virtual body be able to affect the physical body in some way? Might the mannerisms and constraints of the physical body have more influence on actions in the virtual world?

Keywords

Virtual Environments, Physical Self, Camera, Mirror, Trompe L’oeil

1.INTRODUCTION

We intend to use the idea of the mirror as a way to further integrate the user’s sense of physicality into the environment. By placing mirrors in 3D space and using a camera feed to input the users face, we will juxtapose the live feed of the face with the reflected virtual environment behind the user (after removing the background).

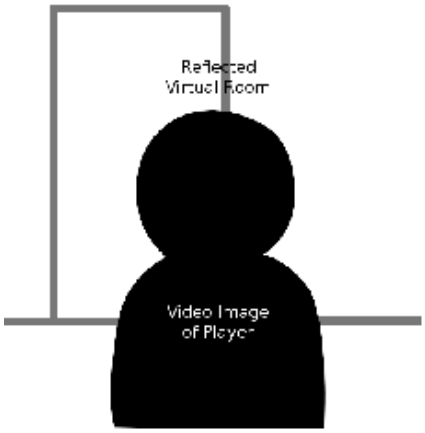

Figure 1. Placing the real image in the virtual environment

To bridge the physical and virtual selves, we bring an aspect of the physical self into the virtual world: a live video feed of the player taken from a webcam on top of the monitor as they control the virtual self in the virtual world. They player is able to walk about the virtual world in first-person view. There are several rooms that he or she can enter that contain a mirror on one wall. The mirror shows a reflection of the virtual room. It also shows the live video feed of the player's physical body to represent the player's reflection in virtual space. The video feed will follow the player's virtual body as the player moves about the room so that the image of the physical body is always directly in front of the virtual self when the player turns to face the mirror the way a real reflection would be. The video will also mimic the virtual movements in depth by moving forward or backward in the reflected space.

2.IMPLEMENTATION

There are four rooms in the virtual world connected by tunnels. Each room has its own mirror and its own 3d scene against which the player can be reflected. The objects in each room are 3d cutouts of screen shots from classic computer games, each room with a different game. The games are Super Mario Bros., King's Quest, Doom, and Alone in the Dark. The player thus is able to see his or her physical image not only in the context of our virtual world, but as part of the worlds of several classic games.

2.1Trompe L’Oeil Presentation

The 3d cutouts of the 2d game screen shots are modeled and arranged so that there is one place and angle in the virtual environment from which they can be viewed so that pieces all add up to the original screen shot. From this spot the player can see the scene directly or he or she can turn around and see the reflection with his or her own image in front, placing the player's physical self into the world depicted by the screen shot. The image is broken and distorted from all other angles, so the player must walk around the room and find the point where the angle is correct.

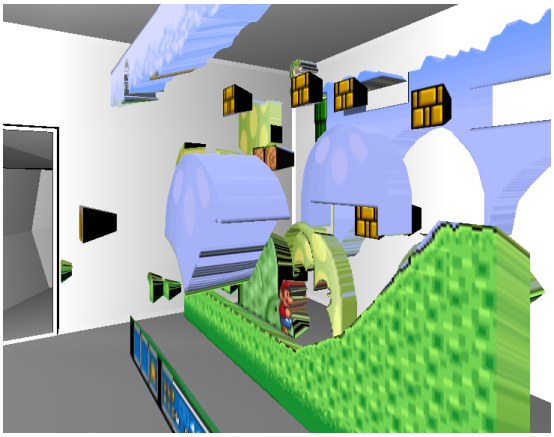

Figure 2. Trompe L’Oeil room depicting Super Mario Brothers

3.RESULTS

Overall, the project was a success. We were able to achieve the technical and visual effects that were necessary for implementation. A few problems arose throughout the design process, but they were easily solved by slightly adjusting layout.

3.1Problems encountered

The first major problem encountered was the ability to use real-time mirrors in a 3D game engine (Blender). We solved this by simply mirroring the geometry so that it appears that user is looking in a mirrored room, when in actuality there are two copies of the room. By creating two copies of the room, we were able to allow the user to step behind objects and accordingly their reflection would move behind the same "reflected object."

The second major change to the original layout was the arrangement of the rooms in a line rather than a circle. This change was made to allow the game engine to have only one reflected camera stream running at once. By lining up the mirror planes in the four rooms, we no longer had to capture the camera stream four times, and we could reuse the programmed movement of the reflection throughout the environment.

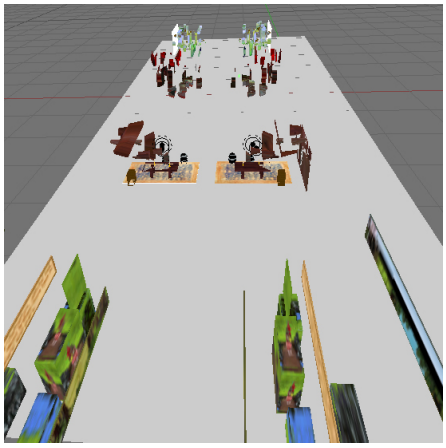

Figure 3. Doubled geometry creates mirror effect.

There were a couple of technical aspects that may detract from the user's physical immersion into the environment. First, webcams are usually setup to include only the head and shoulders of the person they are viewing. This led to a disembodiment of the user. This could be solved in the future, by modeling a torso, arms, and legs which could be appended to the webcam stream. Secondly, the camera streams are captured on a two-dimensional surface, so any rotation within the virtual environment will not be translated to the reflected camera stream. This problem is unfortunately innate within the medium and simply must be ignored within the constraints of this project.

3.2 Technical Successes

Perhaps the most challenging aspect of this project was the implementation of the technical elements required to capture streaming video and apply blue-screen to the reflection. Using Python scripts, all of these challenges were overcome and the project could move forward.

The next challenge was modeling from a single perspective in order to create the "Trompe L'Oeil" effect. By setting up a camera from a single view point, the effect was fairly easily achieved.

When we realized that the camera stream was successfully imported into the environment and the modeling could proceed. We were able to implement reflective movement of the captured image also using Python scripts. A welcome side effect of having the mirrored image follow the user around was the fact that it kept the user from crossing into the mirrored space because it would come closer to the reflection plane as the user did. With physics enabled, the user could not push past the "mirror".

4.CONCLUSION

Overall our project succeeded in bringing together all of the technical elements required to bring the user into the environment. It is yet to be determined whether or not the user will feel more immersed in the environment, or that the barriers between the virtual and physical self will perceptually be decreased by this project. Possible future implementations of this idea could work to enhance believability in game-play storylines that are intended to include the user or in online environments that allow the user to interact with others, whose live video stream represents them. If one were to imagine an online implementation of such an environment, then the dynamic would be completely different, focusing on self projection rather than self realization.