3D Painting App Built with Gear VR

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1. Introduction

Immersive Virtual Reality experiences whisk you away to an imaginary, impossible world where endless possibilities could be found. It also provides artists and designers a playground where they could realize creative thoughts from a whole new perspective. Imaging designers could walk around the virtual scenes they created, it would really push the 3D design to the next generation. Inspired by this idea, our project aims at creating a 3D real-time painting App where the whole world in front of the player is the canvas. With the VR controller as the brush, players could create whatever 3D models they have in mind. It could be as simple as a teddy bear and also as complex as a 3D scene.

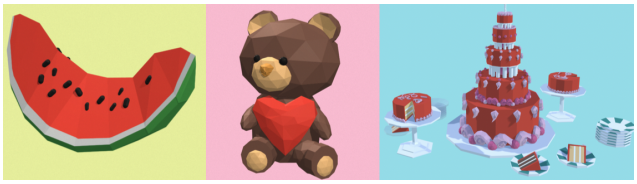

Figure 1. 3D model samples

2. Hardware

We used Gear VR together with Samsung Galaxy S6 as our Head-mounted Display device. Galaxy S6 provides IMU module that could track the rotation of head. Besides, we used a controller shown in figure 3 for human-computer interaction. The controller has 2D touchpad, home key, back key, volume keys and a trigger at the front.

However, Gear VR controller could only track the hand orientation but not position. In order to get depth information of the object in 3D, we shoot a laser ray from the controller orientation to infinite space as shown in figure 3, so that the ray could hit any object in sight. By detecting the collision between the ray and the target object, it would give us the position information and thus could work as controller that have 6 dimension of freedom (position and orientation).

Figure 2. Controller

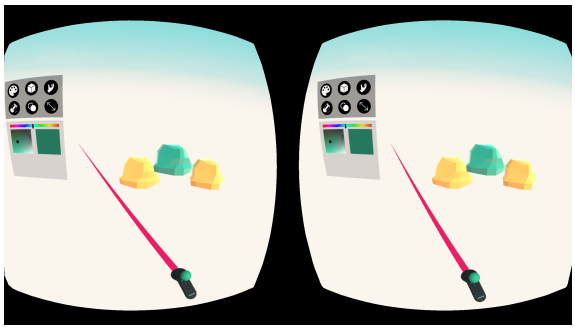

Figure 3. Controller

3. Software

We used Unity to create a 3D virtual environment shown in the figure 4. The tool panel that contains six buttons is on the left of the screen. Player should hold the home key for a few seconds to calibrate the controller's position and orientation. Then press the joystick trigger at the front of the controller to shoot a laser ray out of the controller as shown in the figure 3.

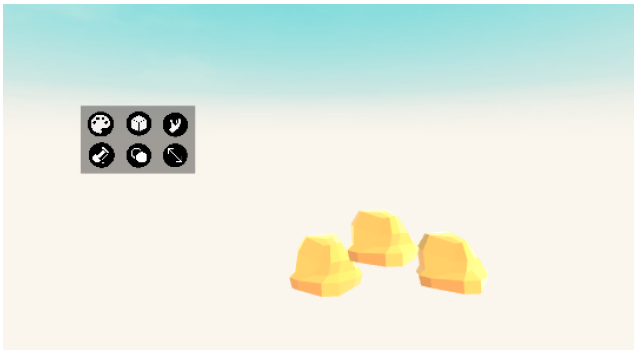

Figure 4. Scene of 3D painting environment

3.1. Function Description

Color Picker: When color mode is triggered by pressing the color button, a color panel will show up below the tool bar. You can move the controller around the color palette and press the joystick trigger to choose a color and then adjust its saturation in the left square panel. Each time you select a color, a color sphere will show up on top of the controller and it would remind you of your color selection, so that you won't forget about the color you selected when painting. After you select a color, you could simply click the object to change its color.

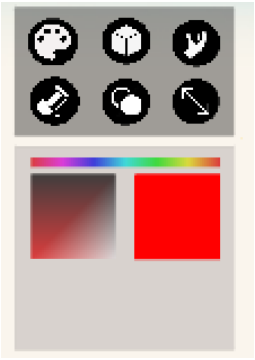

Figure 5. Color Picker

Object Creator: When you want to add a new 3D object to the scene, you could click this button to view object library in the shape panel. We provide 20 different kinds of geometry and primitives for you to choose from. The newly created object will appear on the top left of the tool bar.

Figure 6. Object Panel

Move Object: Press this button if you want to move object in the world space. You can point to one object, then press and hold the trigger to move the object. Since the controller only provide rotation information, the distance between the controller and object is constant. However, you can press the up/down button on the touchpad while holding the trigger to move the object back and forth. Besides, you're able to press the right/left button on the touchpad to zoom in/out the object.

Eraser: Eraser act as a demon in the our project, it would make things disappear for life. When this button is clicked, you can destroy any object in the scene that you are not satisfied with by pointing to it and pressing the trigger. Be careful when using the eraser, since it is irreversible.

Copy: When you want to make a copy of any existing objects in the world, you could press the copy button and then select the target object and copy it by dragging it with trigger pressed.

Scale: When this button is clicked, you can press the trigger to choose one object and then change its size. One amazing thing about the scaling function is that you can not only change its size in total, you could also change its size in a specific direction. By pressing up/down button on touchpad, you could scale it in vertical direction and by pressing left/right button on touchpad, you could scale it in horizontal direction. It really adds more freedom and possibilities when creating your own artworks.

4. Future Work

In the future, we would like to add save/load function as well as the brush panel to our 3D painting App. Save and load function enables the player to save his/her masterpiece and enjoy it again at any time. Players could also take a screen shot of their creative works and post them on Instagram. Also, we want try to add brush panel to the tool bar where player could be able to do some real painting on the objects. Brush mode would contains a collection of brush, such as ink, oil paint, water color etc.

5. Summary

We've created an exciting 3D painting App with Unity. We hope the player could immerse in the virtual world and enjoy the music and have fun painting. Virtual Reality project really provides us an opportunity to realize interesting ideas. Team work is also our great harvest in this project. We won't get this exciting project done without cooperation.