THE EFFECT OF USER SATISFACTION BASED ON DIFFERENT VISUAL RESPONSES TO USER MOTION INPUT IN VIRTUAL REALITY

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Introduction

Virtual Reality is an cutting-edge industry, this means there have been growing pains. There is a painful lack of good content available for VR gaming, with only 3-4 titles per year. This is likely due to developers not knowing what will work, leading to many bad games. This project investigated and tested research that detailed what makes a VR experience good or bad in order to identify what makes VR games enjoyable.

Aim and Objectives

The aim of the project will be **to understand what type of visual responses leads to the greatest player satisfaction based upon players motion input.**

1. To investigate and identify what is needed to make a VR game enjoyable.
2. To investigate and identify suitable methods of video game interaction for use in a VR environment and create a list of implementable methods.
3. To design and develop a game that will allow players to compare different methods of chopping a tree and record which the player prefers.
4. To analyse and evaluate the data collected from the game and produce an analysis that shows if there is a statistically significant result.

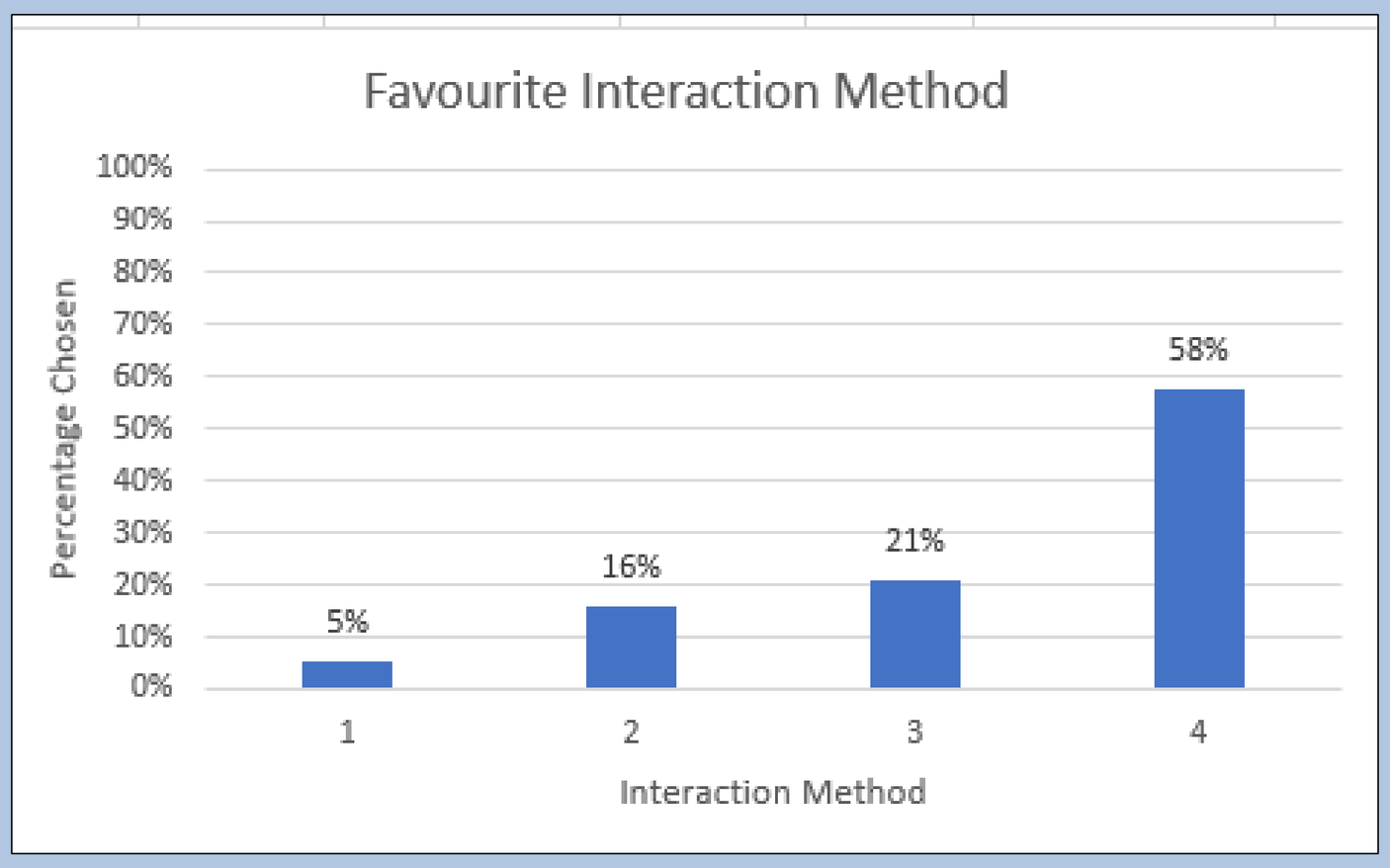

Figure 3 – Favourite Interaction Method

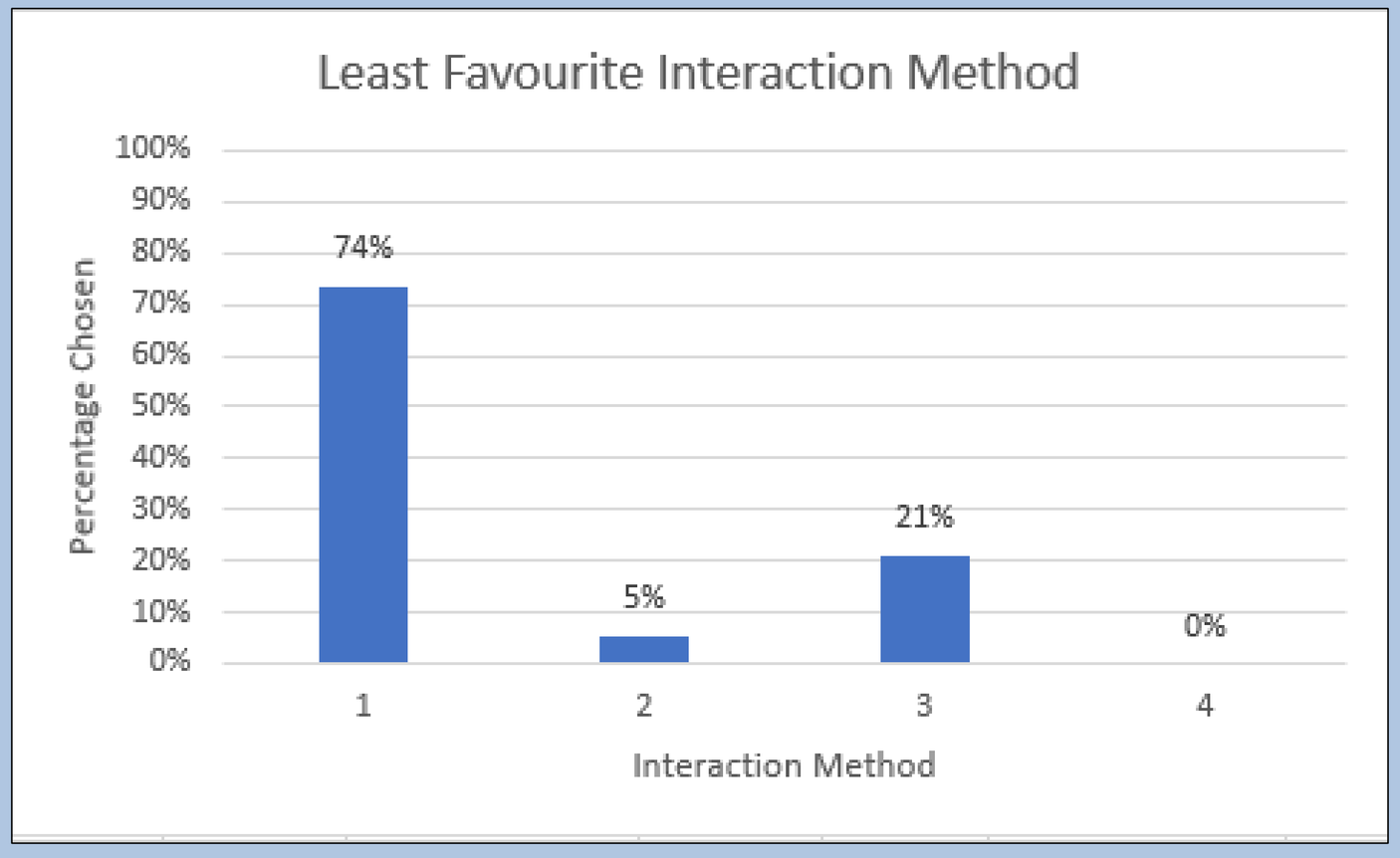

Figure 4 – Least Favourite Interaction Method

Figure 1 – Oculus Quest 2 Headset with Unity in Background

Development

The software was developed using Unity, OpenXR SDK, Oculus XR SDK, Unity Interaction XR Toolkit and Google Forms. The game had six scenes, the first was a deceleration to the user that data was going to be collected. Scenes two to five, in each, a player would use an axe to hit a tree.

Each scene had a different interaction method. Scene two's tree had no collision and scene three's tree did. Scenes four and five were the same as two and three, just with sound added when the tree was hit.

Scene five allowed for the user to enter their favourite to least favourite by hitting four different buttons. Then by manipulating Google Forms, a POST request was sent directly to where google is expecting a form response to go and the data is collected by Google's services. (Figure 2)

```
    public void submitResults(string results)
    {
        // Start coroutine to submit results
        StartCoroutine(Post(results));
        Application.Quit();
    }

    // Creating and sending the POST request with field data.
    IEnumerator Post(string inputField)
    {
        // Google Form POST URL
        string URL = "https://docs.google.com/forms/u/0/d/e/1FAIpQLSchzbiGRK_NDW33IFQW6Nu9J8lfXWG5ThN0cDfndnH0OuxqAw/formResponse";

        // Creating a form
        WWWForm dataCollectionForm = new WWWForm();
        // Adding data to form with the correct field that Google Forms will recognise.
        dataCollectionForm.AddField("entry.1631537808", inputField);

        // Use UnityWebRequest to send the form as a POST request into the POST URL.
        using(UnityWebRequest resultsSendRequest = UnityWebRequest.Post(URL, dataCollectionForm))
        {
            // Yield the coroutine with the POST request.
            yield return resultsSendRequest.SendWebRequest();
        }
    }

}
```

Figure 2 – Google Form Manipulation

Analysis

Nineteen responses were received. This data was ordered as a string of four numbers. In order to perform an analysis on the data, the string was splint into each number and then the favourite could be plotted by choosing only the first digits and least favourite by looking at the last digit. (Figure 3 and 4).

Then by performing a proportion test the results were confirmed to be statistically significant by disproving the null hypothesis.

Conclusion and Future Work

In conclusion, this project successfully fulfilled it's objectives and answered the aim by showing that method four using sound and collision was the favourite and method one that was lacking those traits was the worst.

For future work, a similar survey method should be used to test for more complex interaction methods in order to find more was to increase user enjoyment in VR.