Is Virtual Reality The Future Of The Video Games Industry?

Markus Rapp
Stuttgart Media University
mr113@hdm-stuttgart.de

Stefan Radicke
Stuttgart Media University
radicke@hdm-stuttgart.de

Abstract

In the past, Virtual Reality (VR) failed several times to be commercially successful in the games industry [6]. Today, Oculus VR tries to conquer the video games market place with their Head-Mounted Displays (HMD). Is the time right for VR games or is another failure of HMDs unavoidable?

The Oculus Rift Development Kit was utilized in order to answer this question. Two versions of a racing game prototype were developed to be able to compare a classical racing game with an Oculus Rift version, respectively. Since the degree of immersion in video games is a highly subjective and largely varies for each individual, a user test was conducted involving 40 people in order to find out if the gaming experience with VR is indeed more enjoyable. Furthermore, the user test was aimed to identify weaknesses of the Oculus VR hardware, which negatively affect immersion.

Keywords

Oculus Rift, Head-Mounted Displays, Virtual Reality, Games Development

CR-Categories

I.3.7 [**Computer Graphics**]:
Three-Dimensional Graphics and Realism---*Virtual reality*

---

1 Introduction

The Oculus Rift Development Kit [3] seems to be the starting point for the success of VR in video games. The Oculus Rift was designed from ground up with computer games in mind. The main features of this HMD are optical lenses, which allow a field of view of 110 degrees vertical and 90 degrees horizontal, low latency rotational head tracking and the use of affordable smartphone displays. This allows Oculus VR to have a low price tag, which is one crucial factor to make VR mainstream.

In the following paragraphs the racing game prototype, the execution and the results of the user test are described.

2 Racing Game Prototype

The two versions of a racing game prototype were developed in Unity 3D [8]. The classical display version has an option to change the camera perspective between cockpit, bonnet, bumper and outside-view. The Oculus Rift version provides only the cockpit-view but with the added advantage of an enhanced field of view and rotational head tracking. Handling of the car and game assets are identical for both versions. As input device an Xbox 360 Wireless Racing Wheel is used. The steering wheel setup provides a fixed, forward directed and seated experience with the possibility to look around. It has no additional side effects and it is possible to identify cockpit drifts.

Both prototypes were created with the car tutorial [4] of Unity Technologies. The car model was replaced with a free available car model [5] of the website Archive 3D.

3 User Test

Each participant of the user test played both prototype versions. Half of the participants started the Oculus Rift version first and the other half began with the classical display version. Each participant played each version for up to 9 minutes. Lap times and the overall playing time were recorded to capture player performance. A webcam was used to record the entire user test. Afterwards the captured video data was analysed for cockpit drifts, unexpected body movements and the excitement of the participants. At the end the participants filled out a survey for statistical evaluation.

4 Results

One of our key questions was whether or not VR gaming actually leads to a higher immersion. This was answered very clearly. On a scale of 1 to 10, the average immersion for the Oculus Rift was rated with 7.775. In contrast the average immersion of the classical display version was rated with 4.2.
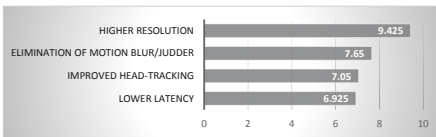
Figure 1: Possible hardware improvements

In terms of possible hardware improvements (Figure 1) our participants reported several issues. The relatively low resolution of the device was considered to be the most irritating aspect. Motion blur and judder [1] were recognized by most participants as an uncomfortable factor. Positional head tracking was identified as an important missing feature for more precise head tracking. Another problem was motion sickness. 75% of the participants suffered from motion sickness or dizziness.

Regardless of the technical issues and motion sickness, 70% had a better experience with the VR version and 60% would prefer to play a commercial racing game with a HMD.

5 Conclusion

VR has made huge steps forward. However, there are still technical problems and motion sickness that need to be solved before VR will be a commercial success. The biggest technical problem seems to be the display resolution. This is not surprising because Michael Abrash [2] and Tim Sweeney [7] claimed that for a field of view of 90 degrees a resolution of 8000-by-4000 for each eye is needed to reach the limit of human visual perception.

Despite all the technical issues the majority of the participants prefer VR. In taking to account that Oculus VR and their competitors are working on improved HMDs, it is likely that VR gaming experience will improve in the future.

6 References

[1]   Abrash, M. 2012. *Why virtual isn't real to your brain: judder*. http://blogs.valvesoftware.com/abrash/. Accessed 25 March 2014.

[2]   Abrash, M. 2012. *When it comes to resolution, it's all relative*. http://blogs.valvesoftware.com/abrash/. Accessed 6 March 2014.

[3]   Bolas, M. et al. 2013. Open Virtual Reality.

[4]   Echterdorf, J. 2014. *Car Tutorial by Unity Technologies*. https://www.assetstore.unity3d.com/. Accessed 7 March 2014.

[5]   Kvitelashvili, T. 2014. *Car McLaren MP4-12C N090211*. http://archive3d.net. Accessed 7 March 2014.

[6]   McFerran, D. 2014. *Reality Crumbles: Whatever happened to VR?* http://www.eurogamer.net. Accessed 25 March 2014.

[7]   Sweeney, T. *The Future of Gaming - Tim Sweeney (Epic) DICE 2012*.

[8]   Unity Technologies. 2014. *Unity - Game Engine*. http://unity3d.com/. Accessed 24 March 2014.