

# **Investigating the impact of photorealistic 3D simulated environments on audience reaction in virtual reality space**

## **Introduction**

The next generation processors such as the ones that use graphene-based transistors, increase the speed of the process of codes up to 1000 times (Schlueb, 2017). At the same time, the researchers of computer science are developing rendering algorithms in which the physical world will be simulated better and faster. One of the results of improvement in these two fields is the possibility of processing and displaying photorealistic 3D environments and scenes in virtual reality space in real-time. Although even now with the available hardware we can reach these contents, but in near future using photorealistic content will direct the attention of producers of this field.

The scenes that are produced with 3D computer graphics and photorealistic in terms of visual quality have features that separate them completely from non-photorealistic scenes. The photo-like realism in these scenes is in a way that the audience considers them real. Applying these features in producing virtual reality content will result in its improvement in some ways:

First, when the audience is surrounded by the photorealistic environment, his experience becomes closer to real life. The content quality has an important role in this experience. That is, when the mind by comparing real-world experiences with photorealistic virtual space, is not able to separate the differences, it will accept that fully and this will lead to a more effective communication channel between the content and the mind of the audience.

Second, the more effective the communication channel through photorealistic content, the more the feeling of audience presence in virtual space, and this will cause more emotional engagement of the audience while dealing with the content.

Third, photorealistic spaces are produced by 3D computer graphics. Because of photo-like realism, they have more details and information for virtual reality compared to the scenes that are produced normally by 3D graphics. As a result, different audiences will have different experiences when dealing with these spaces. In other words, these spaces decrease the similar experience between two audiences, as the experience of different people while visiting a specific location in the real world is different.

For instance assume that in virtual reality space, the audience sees a chair in a very simple room with no details. With regard to the reality of proportions and sizes, this space cannot create an effective communication with the audience and engage his emotions. On the other hand, the second space has photorealistic features, the chair has details in modeling, realistic texture and even carvings on that. The room also has wood flooring and walls are covered with wallpapers. The lighting and shadows seem very real. The second space has this potential to make a memory or experience in the past come to the mind of the audience and its practical result is an increase in emotional engagement and the feeling of presence.

The reason for using 3D computer graphics to produce photorealistic content should be noted. By using this method of production, we can create spaces that do not exist in the physical world and different uses can be considered for that, such as creating fictional spaces used in the entertainment industry, educational spaces, making environments with a specific purpose such as treating the patients who suffer from PTSD or exposure therapy.

### **Research question**

- How can we measure the impact of simulated photorealistic environments on the audience?
- How is it possible to reach a comprehensive and standard pattern in applying the photorealistic features in virtual reality environment?
- How does the categorization of practical and impractical features help the quality of content production for virtual reality environments?

### **Research objectives**

The focus of this research is on every photorealistic feature which can be produced by 3D computer graphics that can increase the reaction of the audience in virtual reality environment or facilitate it. Although these environments are formed by real things and subjects, the research focus is only on environments that do not exist in reality and they are non-characteristic (both human and non-human). In the first phase, this research tries to investigate each feature separately and in the second phase in relation to other features so the impact rate of each one will be clear.

Generally, the objectives of the research are as follows:

- Determining the impact rate of photorealistic features of simulated environments on the communication channel with the audience.
- Classifying features based on the impact rate alone and in relation to each other.
- Explaining and presenting evidence of how photorealistic features affect the real feeling of being in the environment (presence) and emotional stimulus of the audience in virtual reality space.
- Explaining and presenting evidence of how photorealistic features reduce the similar experience between two audiences in virtual reality space.

## **Background**

Although at the moment the photorealistic images produced by 3D computer graphics are used extensively in the production of movies and animations, using them in producing virtual reality content because of the aforementioned reasons, are not that popular. However, in terms of theory and research, it has directed a lot of attention. One of these people is Fiona Carroll whose dissertation in 2008 was 'which aesthetic elements can be used in making an interesting photorealistic virtual reality environment' (Carroll, 2008). In another study by a group of five in Edinburgh University in 2015, first virtual environments were made based on real locations. Then by using the developed version of real-time image-based rendering (IBR), the virtual environments were presented with photorealistic features (Smyth *et al.*, 2015).

This study by considering the findings of others from a different perspective and by focusing on the content produced by 3D computer graphics instead of using photographed images, investigate the photorealistic aesthetic features in virtual reality environment.

## **Methods**

The experimental method is the main data collection method in this study. In this method by examining the impact of stimulus and special condition of the environment on one group of people, the data will be gathered. In this study, in order to discover the causal relationships between photorealistic features, each person in the group will be under special circumstances and the obtained results will be compared with other members of the group. In this study by manipulating the variables and controlling the conditions, the results will be investigated.

## References

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